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The Council is not responsible for the views expressed in the Papers submitted at the Congress nor in the discussions thereon. These manifestly are the product of individual opinion.

NOTE

Volume III of these Transactions, containing the Street and Highway Traffic sessions, Traffic School, Child Education Section, Home Safety and Statistics Section, is being mailed automatically to members who are believed interested. Any other member of the Council may receive a copy of Volume III by requesting it.

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Marine Section

Officers 1930-31

General Chairman—JOHN S. HUNTER, The Atlantic Refining Company, Philadelphia, Pa.
Vice-Chairman (In Charge of Posters and Slides)—ROBERT F. HAND, Standard Shipping Company, New York City.
Vice-Chairman (For the Pacific Coast)—BYRON O. PICKARD, Pacific American Steamship Association, San Francisco, Calif.
Vice-Chairman (In Charge of Publicity)—ARTHUR M. TONE, The Texas Company, New York City.
Secretary and News-Letter Editor—HARRY W. TICHENOR, The Prudential Insurance Company, Newark, N. J.
Chairman Program Committee—CHARLES H. FLAHERTY, Eastern Steamship Lines, Inc., Boston, Mass.
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 KENNETH STEVENS, Douglaston, Long Island, N. Y.
 C. STORY, JR., Cities Service Transportation Company, New York City.
 J. WRIGHT, Export Steamship Corporation, New York City.

**Tuesday Morning Session
October 13, 1931**

JOHN S. HUNTER, Chairman
The Atlantic Refining Company, Philadelphia, Pa.

The first session of the Marine Section convened with General Chairman John S. Hunter presiding.

CHAIRMAN HUNTER: Gentlemen, the opening meeting of the Marine Section of the Twentieth Annual Congress is now called to order. I trust that we will all gain from these meetings a clearer view of what is needed in maritime safety, and a greater desire to aid in the cause.

From data obtained from the National Safety Council Chicago Headquarters, I have learned many interesting things. The first session of this section was held in New York in 1917. Mr. George W. Wylie was the chairman. No subsequent meetings were held until 1923, when a meeting was held with the late William E. Welch as chairman. I could find no names in the first group of men who attended the 1917 meeting who are actively connected with the section at the present time, but from 1923 on there are many whose names we know well—Captain Evans, Captain Kain, Mr. Tode, Mr. Bush—quite a number of the men who are active in the affairs of the section. The membership in 1917 was 14, and we reached our peak in 1928 with 128 members. We have fared very well in this period of depression, because we now have on our roll 125 members. The work done under the leadership of men like Messrs. Kain, Tode, and Bush, has been very good, but I hope we will not be satisfied, but will press on to better things.

When you elected me your chairman, I realized the difficult task I would have in following the men I have mentioned. I take this opportunity of thanking all the men on the executive committee for their loyal cooperation throughout the past year. All that we have been able to accomplish has been due to the work of the men who have given us the greatest amount of cooperation.

The first order of business for the day is the report of the committees. Mr. Robert F. Hand, chairman of the committee on Posters and Slides, is in Europe. He asked Mr. Henry Heidorn to present the report. Mr. Heidorn has been called to New York because of the serious illness of his mother. Captain Henry Blackstone will read the report of the Posters Committee.

Report of Posters and Slides Committee

By ROBERT F. HAND
Vice-Chairman, in Charge of Posters and Slides

The past year witnessed a very decided increase in interest in safety posters as an accident preventive, by members of the Marine Section.

Mr. C. W. Turning of the James H. Harper Company, Duluth, Minnesota, and Mr. Dabney L. Smith of the American Export Lines, New York, were added to the committee.

One one-unit marine poster was produced each month, a facsimile copy appearing in each monthly edition of the *National Safety News*. "Vessel operation" posters alternated with "stevedore operation" posters every other month. The members were requested through the medium of the monthly "News Letter" to submit photographs and suggestions for new safety posters, and many of them responded enthusiastically. It was also made clear to the members through this same medium that they would be able to determine the new posters produced each month. In addition to the issuance of posters, the National Safety Council used numerous photographs and suggested "copy"

submitted to them by the Committee, in the *National Safety News* in the space devoted to "The Safety Exchange."

The Executive Committee endeavored to persuade the Chicago Headquarters to produce at least two marine posters each month, but upon making inquiry it was ascertained that the Marine Section membership is not ordering a sufficient quantity to warrant the production of any more than actually has been furnished in the past. It has, therefore, been decided to start an intensive campaign to try and increase the demand for the marine safety posters. The fullest cooperation of the Chicago Headquarters is assured.

It was gratifying to note also that the Lake Carriers Association of Cleveland, Ohio, through its Welfare Committee has requested complete information with reference to the posters of the Council, suitable for use on board their steamers. It is hoped that following their receipt of this information they will decide to use the posters extensively.

We were advised by the director of the Poster Division at Chicago that they have built up a large collection of photographs for use in marine posters. As the production of the posters is scheduled from month to month, an endeavor will be made to use the ones which will have the widest possible application in so far as the members of the Marine Section are concerned; and, in so far as possible, without duplicating subjects on which posters are now available. It is important to note that if the Central Poster Committee in Chicago does not make use of certain photographs immediately, it is no indication of lack of appreciation. The quantity ordered by the Marine Section's membership has a great deal to do with the issuance of new posters and it is hereby recommended, therefore, that during the ensuing year more of the members of the Marine Section make use of the National Safety Council's posters and those who have been ordering them in the past increase the quantity wherever possible.

CHAIRMAN HUNTER: We have endeavored to get a reaction from all our members regarding the use of posters. It has been rather slow work, and we hope to have something more definite to report on the subject at the executive committee meetings in the near future.

CHAIRMAN HUNTER: In the absence of Mr. B. H. Self, the report of the Statistics Committee will be read by Mr. Frank H. Cogan, of the Delaware Lackawanna & Western Ry.

**Accident Experience in the Marine
Section During 1930**

By BENJAMIN H. SELF
Chairman, Research and Statistics Committee

The Marine Section of the National Safety Council undertook the collection of accident records last year for the first time. Each company was requested to send his experience under the following headings: liners, harbor equipment, tankers, ship building and repair and stevedoring. Such departments as office and engineering were reported under a miscellaneous group. This method of reporting was adopted to enable us to obtain a clear conception of accident experience in various divisions of the section. Results were satisfactory for we received reports from 28 marine companies whose employees worked over 50,000,000 man-hours during the year.

These companies averaged 36.61 lost-time injuries for each million hours worked and 3.50 days were lost per thousand hours worked. These injury rates were about twice as high as the average rates for all industries, which reflects the necessity of continuing with greater momentum than ever all efforts to make our industry one of the leaders in accident prevention activity.

There are also wide differences in experience indicated in each division of the industry. Frequency rates range from 14.42 in harbor equipment to 161.65 for stevedoring and severity rates from 2.43 for tankers to 11.10 for stevedoring. Reports from more companies in the future, however, will provide much more reliable figures for these departments. In addition, more reporters will give each member more valuable information for comparison with his own record.

To accurately measure our progress from year to year in accident prevention, it is very important that every member report every year. Consistent reporting means that the experience of the same companies with the same operations can be compared over a period of years without introducing inaccuracies resulting from the use of a group of irregularly reporting firms whose identity changes annually. Furthermore, the larger the number of consistently reporting companies, the more accurate will be the trend of our injury rates. We now have a nucleus of five three-year identical companies for a start. We hope that all companies that reported for 1930 will again report for 1931 so that next year we may have 28 two-year identicals.

Every member should also thoroughly familiarize himself with the standard definitions on which our accident statistics are based. It is particularly necessary to understand the definition of a lost-time injury, which the January 1931 News-Letter of the Marine Section indicated to be as follows: "A lost-time accident is any accident which results in death, permanent disability or which causes a seaman to lose time for any full scheduled watch subsequent to the one on which the accident occurred or any part of a day subsequent to the day of the injury if he be a day worker or causes loss of time beyond the date of leaving the vessel; or if not a seaman, causes loss of time after the day or shift during which the accident occurred." The distinction between a temporary disability and a permanent partial disability, and time charges for permanent partial disabilities are also necessary to know. The latter, computed on an arbitrary basis, become perfectly understandable with a little study. The Council will be very glad to furnish the instructions and definitions.

Accident records are fundamental in any safety organization or program. They are as essential as cost, production, or any other plant records. Without them, safety activities are based on opinion, progress in reducing accidents cannot be determined, comparisons cannot be made with other firms and prevention work cannot be effectively directed. There are 128 members in the Marine Section—each one should be keeping records and realizing the full benefit of so doing by reporting to headquarters.

Only recently the Executive Committee approved the recommendation of the Research and Statistics Committee to adopt the following classes of accidents which shall be the standard under which every possible kind of personal injury accident among the groups within the Marine Section membership will be shown statistically henceforth. Thus will it be possible in the future, whenever a comparison of classes of accidents is to be made among the companies in the respective groups to make a true comparison and not a case of "like" being compared with "unlike."

Classes of Personnel Accidents

1. Falls of persons.
2. Struck by moving equipment.
3. Falling objects or equipment.
4. Flying objects or equipment.
5. Handling objects (except hand tools).
6. Hand tools.
7. Stepping in or on objects or equipment.
8. Running into or striking against objects or equipment not handled.
9. Fire, Hot, Poisonous, Gaseous, or Corrosive Substances.
10. Physical violence and Occupational Diseases.
11. Not apparent from report and miscellaneous.

The Research and Statistics Committee is completing the first year of its existence in the firm belief that it has accomplished enough to justify continuing its work, and expects to carry on rigorously in the future so as to give all members of the Marine Section the benefit of one another's experience.

CHAIRMAN HUNTER: Most of you understand that we will launch a Marine Section Safety Contest next year, divided into three groups: the ocean-going vessels, the harbor equipment, and shipyards. We desire the cooperation of all of our members, and we would ask all here to do as much missionary work as possible in the enlistment of all the companies in the contest. The rules governing it will be forwarded to members shortly. The next order of business is the report from the Nominating Committee by Mr. William E. Stewardson, Columbian Steamship Co.

Report of the Nominating Committee

General Chairman—JOHN S. HUNTER, Atlantic Refining Co., Philadelphia, Pa.
Vice-Chairman (In charge of Posters and Slides)—ROBERT F. HAND, Standard Shipping Co., New York City.
Vice-Chairman (In charge of Publicity)—ARTHUR M. TODD, The Texas Company, New York City.
Vice-Chairman (For the Pacific Coast)—BYRON O. PICKARD, Pacific American Steamship Association, San Francisco, Calif.
Secretary—A. R. BUSH, International Flare Signal Co., Tippencanoe City, Ohio.
News-Letter Editor—HENRY BLACKSTONE, United States P. & I. Agency, Inc., New York City.
Chairman Program Committee—LEWIS L. SMITH, Merritt-Chapman & Scott Corporation, New York City.
Chairman Membership Committee—WILLIAM E. STEWARDSON, Columbian Steamship Co., Inc., New York City.
Chairman Research and Statistics Committee—BENJAMIN H. SELF, Travelers Insurance Co., New York City.
Chairman Engineering Committee—FRANK H. COGAN, The Delaware Lackawanna & Western Railroad, Hoboken, N. J.
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H. BEARDSLEY, Standard Transportation Co., New York City.
B. C. EDWARDS, Grace Line, New York City.
CHARLES H. FLATHEAD, Eastern Steamship Lines, Inc., Boston, Mass.
E. P. FOISIE, Shipping Federation of the State of Washington, Seattle, Washington.
F. C. GREGORY, United States Employees' Compensation Commission, Washington, D. C.
CAPTAIN W. P. KAIN, Shipowners Claims Bureau, Inc., New York City.
PROFESSOR H. L. SEWARD, American Bureau of Shipping, New York City.
C. STORY, JR., Cities Service Transportation Co., New York City.
FERN WOOD, Moore & McCormack, Inc., New York City.
JOHN WRIGHT, Export Steamship Corp., New York City.
A. J. SMITH, Marine Office of America, New York City.
E. J. ROBERTSON, JR., Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
D. R. DUNLAP, Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.
CHAIRMAN HUNTER: Gentlemen, you have heard the report of the Nominating Committee. What is your pleasure? Mr. Wood, will you please take the chair? (Mr. Fern Wood, of Moore and McCormack, Inc., New York City then took the chair.)
MR. STEWARDSON: I move that the nominations be closed and that the secretary cast one ballot for those named by the Nominating Committee.

CHARLES FLATHERS (Eastern Steamship Lines, Inc., Boston, Mass.): I second the motion.

(The secretary then cast one ballot as directed.)

CHAIRMAN WOOD: I declare that the men whose names were read by the Nominating Committee have been duly elected for the ensuing year.

(Mr. Hunter then resumed the chair.)

CHAIRMAN HUNTER: Mr. Flathers, I will not ask for the report of the Program Committee, for I think that your programs speak for themselves.

CHARLES FLATHERS (Eastern Steamship Lines, Inc., Boston, Mass.): I would like at this time to express my appreciation to the members of the section for their co-operation in the last two years in assisting me to prepare the programs. I hope they will give the same cordial support to the incoming chairman of the Program Committee. In the past the chairmen of the Program Committee have been chairmen in name only. They tackled the job single-handed. It would be of considerable assistance and would probably expedite matters to allow the chairman of the Program Committee to pick two or three members of the Marine Section, and for him to assign part of the task to them. I know that this job takes considerable of a man's time, and it would probably be somewhat easier for the chairman, and would be productive of results. I hope that thought will be given consideration. I want again to thank all the members of the Marine Section for the kindness that they have extended to me.

CHAIRMAN HUNTER: As a former chairman of the Program Committee, I heartily agree with you, Mr. Flathers. Had it not been for the cooperation of the members of our executive committee, I think I would have fallen by the wayside. I will appoint some members to assist the chairman. Gentlemen, we now come to the presentation of the formal papers to be read and discussed. The first one appearing on our program is by Mr. E. R. Cott.

Safety at Coal and Ore Loading Docks

By E. R. COTT

Supervisor of Safety, Chesapeake and Ohio Railway Company, Columbus, O.

The problem of accident prevention on dock properties is similar, in every respect save one, to that of any industrial operation. We operate machine shops and maintain repair gangs. We employ carpenters, steam workers, blacksmiths, and electricians. There is the ever-recurring possibility of slips and falls. There are boiler plants, electric switch-boards, labor with hands, and feet in the way of things dropped, moving machinery, weather, and water.

Most any large plant has all of these with the possible exception of water hazards. The safety man is confronted on the docks, as at any other point, with the requirements: wear goggles, pick up, clean up, guard against shocks, slips, falls; here as elsewhere may be unsafe clearances, and men wearing unsafe clothing. And here, too, may be found thoughtless workmen and indifferent supervision. If you operate other properties in addition to docks there is little that I can tell you that you do not now know. But there are probably a few things to do that you are not now doing that will materially affect the safety program at your dock properties.

I am assuming correctly, I presume, that you understand the fundamentals of a safety program, that of plant layout, guarding, selection, training, and education, and supervision. The meaning of the latter word might better be understood if we spelled it *super-vision*. I am not qualified to discuss the type of dock which would warrant the correct name *lightering*, described as the mercantile dock, though I suspect that your problem varies but little from our own where coal and oil is handled to the exclusion of other commodities.

Before an audience whose properties range the rivers, seas and lakes, and whose handled commodities vary from salt to silk and from bananas to specie, it appears that it should be a waste of time were I to speak on the very small details that surely

have been covered here before. Again, the situation with which I am familiar might not be duplicated in your organization. Or, perhaps, the answer to a particular problem may not be identical in some other plant. So it seems unnecessary to talk to guards, safety committees, etc., before a group of this kind. And it seems proper that the allotted time be devoted to two or three matters that we are most concerned with, and which may apply to all our properties.

One thing worthy of attention is the problem of adjusting ourselves to the vast machine improvement that has made dock operations semi-automatic. Machines have reduced employees; thus automatically reducing exposure. There has been a consequent reduction in employee accidents, part of which may be credited to safety education, but the accidents that do occur are usually more severe and more costly. With the increasing use of labor-saving devices, mangled fingers, hands, toes and feet have decreased in inverse ratio to the increased use of machinery. But the few accidents that we are having are likely to be fatal or of a character that produces long periods of disability or incomplete recovery, which is a dignified way of referring to cripples.

Dock space is expensive, and limited. The engineer is likely to overlook clearances in favor of facilities. Hence many dock properties give the appearance of overcrowding. Machines are large, fast; everything moves and moves with speed. Cars are picked up and turned over. Conveyors carry endless tons to and from holds, and clutching mechanical hands pick up tons at a grasp. Steam, electricity, power, speed, and above all in this world, here and there a man—a life.

Is it any wonder that now and then there is a slip? The answer is "yes", but that man must direct, not engage in this windmill of moving objects. You may disagree and be ready with statistics to prove that I am wrong. Tell me of twenty accidents in 1923 and four in 1930, but what kind of accidents were those four? Go back and look them up and compare the severity of them, compare them with those of years gone past. Having gone this far with power and machinery, we must go further. Giving machinery the entire task, flesh and brain the work of operation and direction, I suspect that you will be disappointed unless we discuss the subject of adequately lighting jogs in docks where sailors are sure to stray and need the friendly assistance of a life preserver. Perhaps I should present problems of loaded cables, blocks, car riders, falling coal, clearances, but surely you have heard of these before. Most of you have solved these years ago, or at least you should have.

I cannot refrain from making some reference to supervision, which I referred to earlier as super-vision. If you have this among those in charge of the operation of your dock, your task is simplified. An officer who understands and accepts responsibility, who runs the job, who knows what he is doing and how to do what is to be done, and who can direct others to do what he wants to be done in the way he wants it to be done is worth ten times more than you think you can afford to pay.

I told you before that the accident prevention problem was similar to that in every respect save one. The dissimilarity which I refer to is a spirit that I both admire and decry. I cannot name it, but can best illustrate it by that spirit of the days of the pony express. "The mails must get through!" The boat must go—loaded or unloaded. We don't add in words "whatever the cost", but we might just as well sometimes put it in black and white.

Don't misunderstand me. I approve of increased production. I appreciate that prompt loading or unloading means increased tonnage, greater earnings, savings; with these I have no quarrel. But sometimes there is a hint of ego to the attitude that "the mails must get through." Perhaps importance is attached to things not as important as they appear. I am ready to quarrel when I find this ego attitude or spirit prevails in an organization as well as a neglect of those details of safe operation which should accompany any intelligent ever increasing operation plan. Where is the saving or where are the minutes gained by such a spirit when it causes men to take chances that in the end spell disaster and greater delay as well as suffering, and wasteful personal injury costs, or when supervision sees only part of its job and does

not understand that horse shoe nails are as important as the horse? It is merely that of appraising values.

A cable is as important as a shoe. We all know that. Do we appreciate that life is as important as production? Do we understand how to get mails through safely? If we do, then we have learned the importance of horse shoe nails. A dock is safe when there are men in charge who demand, as is their right and duty, that boats and cars shall come and go without avoidable delay. When plant lay-out and plan of operation embrace the details that go to bring about an efficient operation, and no operation is efficient unless it is safely supervised; then and only then will the "Mails go through" and go through safely.

No man will long remain in charge of a dock property that does not keep on hand a supply of parts that might break down in service. You must have auxiliary generators, auxiliary boilers, extra cables. Why? Because we appreciate their importance and their value. What is the importance and value of human life? Life is no longer considered a spare part.

CHAIRMAN HUNTER: I am sure you all agree with me that we are indebted to Mr. Cott for a very clear and illuminating presentation of this subject.

C. W. TURNING (James H. Harper Co., Duluth, Minn.): The wind storm hazards on some of the movable structures referred to by Mr. Cott are worthy of attention. Our engineers are out all the time, endeavoring to protect these structures against wind storm damage. Due to some minor storms during the fore part of the summer, steps have been taken to reduce the moving speed of the mechanisms that move these bridges back and forth along the docks. In some cases the moving speed of these bridges has been cut in half. This has resulted in increased protection to life and limb as well as lessening the possibility of damage to the structures.

C. H. FLATHERS (Eastern Steamship Lines, Inc., Boston, Mass.): What is the best way to protect jogs about coal docks?

MR. COTT: I have had some correspondence with Mr. Hand in regard to protection of jogs in docks. The best answer is not to have a jog at all, a condition which is not always physically possible. It is not always possible to provide a railing on your dock. We all know that sometimes a sailor returning to his ship does fall into the water of the dock. There are only two answers I can give you. One, of course, is adequate lighting. One other thing that might be done where it is physically possible to do so is to provide a walk adjacent to the dock edge that may be used by the men in preference to the ordinary wall along the edge of your dock. Of course, sometimes that can't be done. You might have tracks right next to the dock. I know that when we provided safe routes for the men they used them.

MR. TURNING: It has been suggested that a white or aluminum colored line be painted along the edge of a dock where men may walk. Such a line would be visible at night unless it is exceptionally dark. Those who have tried this say that it works out very satisfactorily.

CHAIRMAN HUNTER: If there is no further discussion of Mr. Cott's paper, the next paper is to be presented by Captain Herman T. Parker. In the absence of Captain Parker, Mr. Flathers will read it.

Observance of the Rules of the Road for Safety

By H. T. PARKER

Part Captain, Eastern Steamship Lines, Boston, Mass.

Correctly termed, this subject would be "Rules to Prevent Collisions of Vessels," generally known as a set of Regulations of Statutory Enactment by adherence to which Navigators are expected to attain the object set forth in their title. As a matter of fact there are several sets of Rules in operation in this country. Enumerated as follows:—

- (1) The International Rules of 1890.
- (2) -a- The Inland Rules of 1897.
- b- Rules for the Great Lakes and the St. Lawrence River.
- c- Rules for the Red River of the North and the Rivers emptying into the Gulf of Mexico and their tributaries.
- (3) Inspectors or Pilot Rules.
- (4) Motor Boat Law.

The slightest acquaintance with the Rules as a whole is sufficient to indicate that the subject is broad. That only a passing glance may be taken at some of the essential features in a paper of this kind. No attempt will be made to discuss at length any in particular, or to touch upon all. The purpose in mind being to present for your consideration a few reminders and to prompt a desire to create a better working knowledge of the Rules.

In 1889 an International Marine Conference was held at Washington, D. C., called at the instance of the President of the United States. The purpose being to consider various questions affecting the safety of life and property at sea. Included in its program was the consideration of a uniform set of Collision Rules.

Invitations to participate in this conference were sent to thirty-five countries or nations. Twenty-seven of these accepted and were represented at the Conference. The list of delegates included Naval and merchant officers, Admiralty lawyers and jurists and others connected with maritime affairs. The delegates as a whole being a truly representative group of the various phases of the maritime interests of the world.

All rules considered received thorough treatment. The protocol of the proceedings of the conference is valuable reading to any student of the rules. These rules were adopted by our Congress and enacted into law, becoming the "International Rules of 1890." They were likewise adopted by the various countries participating in the conference and followed by all vessels on the high seas since that time.

Therefore, all navigators are bound to comply with them. Failure to do so may result in loss or damage to property, bringing pecuniary liability on the owner or underwriter. It also subjects the navigator to a possible suspension of his authority to act in his professional capacity.

Provision was made by the International Conference for the establishment of special rules necessary to cover the navigation of rivers, harbors and all other inland waters duly made by local authority. This was simply conceding the right of each country to provide rules for the navigation of waters within its territorial jurisdiction.

In consequence of this necessity Congress enacted the "Inland Rules of 1897" to cover the inland waters of the Atlantic, Pacific and Gulf coasts. The International and Inland Rules are in the main identical, with exceptions where it was deemed necessary by Congress owing to different conditions deemed to exist between the high seas and inland waters. The application of the International and Inland Rules is provided for by statute. It has authorized and directed the Secretary of Commerce to designate the lines dividing the high seas and inland waters for the purpose of the rules. Outside of these lines the International Rules apply and inside the Inland Rules. This has been done and generally follow the geographical division between the high seas and bays, harbors, rivers, sounds, etc. It has been found advisable to modify or alter these lines from time to time. Upon this particular point is well to keep informed.

Of a like nature are the rules for the Great Lakes and the St. Lawrence River as far east as Montreal and the rules for the Red River of the North and Rivers emptying into the Gulf of Mexico and their tributaries. Contrasted with the International Rules and in addition to the possibilities resulting from their violation the statute provides a monetary penalty. For such violation the owner is liable to a penalty of \$200 and the master \$50.

The Great Lakes Rules provide a penalty of \$200 presumably on the vessel and

the Red River Rules \$50 on the master. The Inspectors or Pilot Rules are also special rules duly made by local authority. Congress has so provided in Section 2 of the Act of June 7, 1897. The Pilot Rules have the force of law and in the main conform to the Inland Rules. They do elaborate the situation to a greater extent than the Inland Rules.

Vessels classed and equipped for international waters may navigate inland waters but inland vessels are not permitted to navigate high seas except her lights be changed to conform to the regulation governing thereon.

It will be noted that the rules are divided into three general groups: first, lights; second, sound signals; third, steering and sailing rules.

We assume, therefore, that the Conference considered the matter of lights of primary importance. For without correct lights to indicate the nature and heading of a vessel compliance with steering and sailing rules or the sounding of signals is of no avail.

The value of a thorough knowledge of the required lights then cannot be underestimated. The rules regarding lights like all the others are especially clear and easy of understanding. Yet it is surprising to note in many instances a lack of information on this point. One of the first duties of an officer on joining a vessel should be to observe carefully and in detail her lights, for compliance with the rules.

The very simplicity of the thing leads people to a disregard of the importance of it. In 1918 a collision occurred at night in one of our most important harbors. The collision involved a steamer underway and a sailing vessel under sail and power. The sailing vessel did not show a white masthead light. Much surprise was caused when the sailing vessel was found at fault. Yet the rule clearly stated "a steam vessel to be any vessel propelled by machinery" and "such vessels to show a white masthead light." It was not the practice at that time for this class of vessel to carry this light. They have done so since.

Running light lanterns frequently become deranged, perhaps without cause, this causing lights to show out of the required arc, indicating a false condition.

The range light, Article 2 (a) International and Inland, so called from its position indicating the range of the keel of the vessel or center line, is required on an Inland steamer, shows entirely around the horizon. On a seagoing vessel it is optional and is of a character similar to the masthead light. Article 2 (a).

The 1929 International Conference adopted a recommendation to make this light on seagoing vessels mandatory. It will, no doubt, become a law. It is unfortunate that it had not been more seriously considered years ago as there is no doubt that many collisions would thereby have been avoided.

The stern light, Article 10, International, is not required to be fixed. It may be a flare up. We know it to be of almost universal practice on steamers at least to carry the fixed light. It should be required. Thus equipped a seagoing vessel is showing continuously some light through the entire horizon. In other words, a lighted diagram at night.

Special stress should be laid on thorough observation of running lights by lookouts, watchmen and officers.

Some years ago two steamers came very close on a clear night. Collision was all but upon them when the officer on one sensed something wrong. Stepping from his station he saw the masthead lights of his vessel were not showing. Collision was immediately avoided.

Two lookout men had reported at half hour intervals for a four hour period the lights were showing properly, an automatic (home made) side light indicating device failing to indicate and incompetent lookouts.

In modern constructed vessels the matter of lights is probably 100 per cent mechanically perfect, yet where so much is at stake things should be checked frequently.

The subject of Sound Signals brings with it an opportunity for research work on the question of aberration of sounds. An important condition met under this group.

Much improvement has been made in the past few years in sound devices. This condition has, no doubt, caused many collisions ordinarily ascribed to negligence.

Steering and Sailing Rules. In this group is the decidedly important preliminary paragraph which I quote, "Risks of collision can, where circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel." If the bearing does not appreciably change such risk should be deemed to exist.

In my opinion this is no doubt the most important of the steering and sailing rules, although perhaps not properly termed a rule. Its value cannot be questioned. It is an infallible test when applied.

I can recall four serious collisions, the circumstances of which afforded the actual observation of each others lights from 20 to 45 minutes.

Ample time for either vessel to have accomplished the purpose of the rule and acted within their provisions. All needless and something wrong. True of course. There are few inevitable collisions.

These cases lead me to the conclusion that the rules should carry some mandatory direction that immediately upon sighting another vessel it is an officer's duty to determine the possibility of collision and prepare himself to avoid it.

The attentive officer does not, of course, become involved in such cases. It should be the practice of each officer to read the rules occasionally as a means to keep before him their precepts. In such reading then their points would be kept before him and perhaps overcome the occurrence of needless wastes of property and danger from such causes.

CHAIRMAN HUNTER: We have in the group this morning several men who have had service on the seas, and I am sure they can give us some comments on this paper of Captain Parker's. Captain Blackstone, have you any to offer?

CAPTAIN HENRY BLACKSTONE (United States Protection & Indemnity Agency, Inc., New York): I believe that with the improvement of lighting, the side lights and running lights of a vessel have dragged far behind. How many of us have ever seen these new Neon flashlights used for advertising purposes in the rain and in the hazy, misty weather? They loom up like all outdoors. Why couldn't we adopt them for the side lights at least? Neon lights can be made in either red or green. Wouldn't such lights be a suitable topic for discussion when the Steamboat Inspection Service meets. I believe that this section should be the logical sponsor of such an idea. Couldn't some of the engineers tell us if there is any mechanical objection to it?

M. B. WEBER (Lumbermen's Mutual Casualty Co., Chicago): I don't know much about the lights, but I have a feeling that they would not be reliable enough mechanically. You might have considerable trouble in upkeep, and perhaps atmospheric conditions at sea would prevent them working.

E. R. COTT (Chesapeake & Ohio Railway Co., Columbus, Ohio): Wouldn't the use of such lights necessitate a much larger generating plant than is customary on board ship?

A. J. SMITH (The Marine Office of America, New York City): I think the Bureau of Standards has made a number of trials of the lights.

MR. COTT: The light question is one that is being discussed very strenuously and extensively these days. One thing that might be corrected to good advantage is that in several ports the lights required vary. Right on the Atlantic coast the lights are different for different ships.

CAPTAIN BLACKSTONE: The point which Capt. Parker raises about the bearing of a ship is, of course, very important. But another thing that I have run into in practical experience has been the persistence of some officers to hold their course when they haven't the right of way, particularly coming up the Florida coast. When you are heading across to the shore, you have the right of way of all the vessels bound north in the stream. Frequently it is quite a job to get them to recognize that. On several occasions I have nearly had collisions there because the rules of the road state that the vessel having the right of way shall hold to her speed and course. To

always do so would make it mandatory to run toward the other fellow until such time as you see that a collision is inevitable. Then you are supposed to use your own judgment. Of course, that is merely a matter of education, making the other fellow give way when he hasn't got the right of way.

MR. SMITH: One other source of trouble is in the small-boat navigation of commercial fairways. At several different times I have advocated to one organization or another the licensing of such operators, and the insistence that they shall pass commercial examinations—at least parallel with the road examination of automobile drivers—as to their knowledge of the rules of the road. There have been many narrow escapes of collision because of the ignorance or arrogance on the part of such operators, particularly, the yacht skippers. These fast boats cut through and try nearly everything. I think that a license examination would put them at least in a class with your larger commercial navigators. I understand that it is under discussion in the Government Service now. I see no reason why a manned boat, even a twenty-five footer, if the driver proposes to navigate a commercial fairway, should not be thoroughly cognizant of the rules of the road there, and observe them.

CHAIRMAN HUNTER: The point is very well taken. Any further discussion? I think all of us who have been at all active in this safety work have realized the fact that in some cases too much emphasis is laid on the lost-time accidents, and not enough laid on the so-called minor injuries, losing sight of the fact that every minor accident is a potential lost-time accident. I am glad that we have for our next paper the "Importance of Reports and Medical Attention in Minor Injury Cases," which will be presented by Mr. Fern Wood.

Reporting and Treating Trivial Accidents

By FERN M. WOOD

Safety Department, Moore & McCormack Co., Inc., Steamship Agents
New York City

Trivial injuries to seamen, longshoremen and other workmen are too often ignored by men receiving them and persons whose duty requires them to make out accident reports; primarily because they think the wound will heal promptly without medical attention; and secondly to keep down the accident record of their ship or department. Such practice is quite unfair to those receiving the injury, to those who should report them, and finally to the employer who must bear the ultimate cost, since no one can tell when the result will be disastrous to all concerned.

Government reports show that fourteen out of every hundred broken skin and bleeding injuries become infected, causing lost-time and expense if not continued disability or loss of limbs or life. This fact shows the importance of immediate recognition and treatment of apparent minor wounds by a licensed physician whenever available; and any individual who is not willing to realize this necessity and do everything he can to comply with it is a safety menace to the company employing him and should be persuaded to change his attitude, or be eliminated from the organization. Accident prevention is now a world wide habit and deserves much praise, but care for accidents after they occur should receive just as much attention because suffering and financial expense are more tangible than urging people to be careful; and as the greater number of personal injuries are of a minor nature, many eventually becoming major ones, it behooves every person connected with safety work to diligently attend to the trivial ones.

The *New York Sun* recently published an article entitled, "A Third of a Million for Splinters", stating that during the year ending June 30th, 1929, 82 per cent of compensated injuries in New York State from splinter wounds were because of infection, and further mentioned that splinters make wounds a layman cannot

properly treat with antiseptics. This argues that no wound is too small to be neglected and should always be given prompt remedy and record, thus preventing uncertainty in case it becomes a large liability later. A licensed physician should see and dress every wound whenever practical as he knows better than fellow employees what should be done to prevent serious consequences which, according to experience and statistics, frequently occur.

Protection & Indemnity Insurance companies constantly encounter heavy costs, which are passed to the employer through premium, because some one does not report a trivial injury; and the details of two cases are interesting and impressive.

A seaman, previously employed for about six months, was ordered to the dock to help bring on board some ship's stores. The work was in charge of the boatswain. While carrying some heavy cases to the sling used in hoisting the stores aboard, the seaman injured his foot, which was reported to the boatswain. The injury did not appear to be serious (according to the information) and the boatswain did not believe it necessary to report it. Subsequently the man was discharged and reported to a private hospital for treatment.

His leg was subsequently amputated, due to an infection which was complicated by a venereal condition. The claimant now alleges through his attorney that the amputation of his leg was due to the injury sustained while carrying stores to the vessel. Due to the boatswain's failure to report the accident immediately so that an examination could be made and medical attention furnished, it is quite impossible now to determine whether or not the injury was the probable cause of the man's present condition.

The case is now in litigation and while it does not appear that there is liability, the chances are that the case will cost several thousand dollars, and probably a good deal more if the claimant's attorney is able to raise the question of fact as to the vessel's negligence in failing to supply prompt medical treatment.

While assisting other seamen under the supervision of the boatswain replacing hatch covers on April 4, 1931, one of the hatch covers fell and injured a seaman's foot. The boatswain noticed the man had sustained an injury and after receiving assurance from the injured that it was only slight, they continued to work. The injured continued to work until April 16 when he reported to the Chief Steward with a condition he described as an in-grown toe nail. Iodine was applied and the seaman was subsequently discharged from the vessel on April 27, 1931. At the time of his discharge he requested a medical report stating that his foot was swollen and that he needed medical treatment. He was sent to the Marine Hospital and about two months later his left foot was amputated. He now claims that the amputation of his left foot was a result of the injury which occurred on April 4 and the failure of the vessel to provide prompt and proper medical treatment. The boatswain was at fault for not reporting the accident promptly.

Moore & McCormack's experience with their fleet of twenty ships has not been as expensive as those just mentioned, but during the past year a few have cost around one hundred dollars each, and their record may be due to the diligence of those responsible for giving first aid promptly and making reports without delay.

If this practice should be enforced by every one employing men in any vocation, much suffering and expense could be avoided and would not entail any additional cost to their present method of handling personal injuries.

CHAIRMAN HUNTER: I think Mr. Wood has handled his subject well. We all realize the importance of having every occurrence reported to the office in order that a record can be made, and the physician examine the man at the earliest possible moment. Has any one here anything to offer in connection with this? I am sure that some of our men can.

C. H. FLATHERS (Eastern Steamship Lines, Inc., Boston, Mass.): I think Mr.

Wood has covered a very good point, especially with reference to prompt medical attention, first aid, if it is sufficient, and if not, the services of a competent physician.

ARTHUR M. TODD (The Texas Co., N. Y. C.): The paper just presented contains the elementary factors necessary for the successful prosecution of any accident prevention campaign. Mr. Wood has pointed out the necessity of reporting every injury, no matter how trivial—but we know that is not being done in the majority of the steamship cases today. It is not being done for two reasons. The first reason is that your higher executives are not interested in the accident prevention campaign, and the second reason is that the officers on the ships are not interested. The subject has been brought up at previous discussions. We are not going to get the officers interested unless we have the higher executives' support. We know that in the majority of cases the master does not realize the importance of reporting these trivial or no lost-time accidents. However, if he can only put the message over first to the executives and, through them, to the officers of the ship that every accident *must be reported*, we are going to be able to have a better campaign. Around that campaign revolve our statistics, and without our statistics we know not where we are. Unless we can tell the why and wherefore of the small accidents, they will grow into big accidents, just as the small acorn will grow into the big oak tree. We know that the small injury accidents may many times cause the big claims.

CHAIRMAN HUNTER: The last paper on our program for today was prepared by our good friend Frank C. Gregory. Due to Mr. Gregory's necessary presence on the west coast, he is unable to be with us, and I have asked Mr. Todd to present this paper.

Bonuses and Penalties in Safety Work

By FRANK C. GREGORY

Safety Engineer, United States Employees' Compensation Commission, Washington, D. C.

As those who have studied the causes of industrial injuries have learned that by far the greater part of the injury producing "accidents" are caused by human failure somewhere, and not by unavoidable mechanical or natural causes, they have given more attention to the "human engineering" side of accident prevention work. This has taken two general trends, an appeal to the entire body of employees and an appeal to the management and supervisory forces. From the nature of marine employment, the latter appears to be the more suitable at the present time.

Many methods have been used in the attempt to reduce the frequency of accidents through arousing the interest of the workmen. Educational programs, "humanitarian" appeals, the sporting instinct of contests, strict discipline, responsibility for results, and the offering of cash bonuses are among these. Each plan or combination of plans has worked satisfactorily in places and failed in others. Employment conditions, type of labor and general policy of management make the selection of the proper program for each plant an individual problem. The big problem in all of them, however, is to secure and maintain the interest of foremen and men in accident prevention on the same plane with interest in quantity production. The pressure for production is always present. Production can be maintained at an increased efficiency by greatly reducing the accidents of industry, but it is going to take more effort on the part of those who direct the work. If this is done we have production with safety, which means real efficiency.

The great mass of workers are impelled by two forces, the hope of gain and its opposite, the fear of loss. Industry has long recognized this by using the wage plans where the more skillful and industrious receive "incentive wages" for production above the average, and the unfit are discharged when unable or unwilling to keep up their end of the work. Some companies have extended the idea to their safety work and either reward good performance or penalize a poor one in accident frequency.

Where piece-work rates or a production bonus are used, the desire for increased earnings on the part of the workers is so great that some strong counter influence is needed, not to slow down the work, but to prevent the development of unsafe habits and chance taking by those who hate to exert themselves to do the job right. While safety bonuses and regular systems of penalties for accidents are not common in the marine industry, they have been in use for years in some plants in this country.

At the last safety congress, John Wright of the Export Steamship Company presented an excellent paper on the safety bonus plan of his company, which is available in the proceedings of the Marine Section for 1930. The National Safety Council's Safe Practices Pamphlet, No. 74, "Competition as an Aid in Promoting Accident Prevention", while devoted mainly to safety competitions, has some valuable information on bonus plans. With the exception of occasional articles in technical magazines, these constitute the present literature on the subject. There is a decided difference of opinion on the principle of using a safety bonus, which this paper cannot go into. Briefly, those opposing it say that employees are paid to work according to the policy of the management, that the prevention of accidents benefits the workers more than the management, and that any special bonus for failing to get hurt is bad in principle, bordering on the nature of a bribe. These men rather favor the penalty system, even though they do not use it. Those who have used the safety bonus recognize the superior efforts of their careful employees and feel that they are getting all that they pay for. Their argument is, "It works." The adoption of either system is a matter for the consideration of the individual employer, with the knowledge that the same results may be obtained in other ways, but with greater effort.

Types of Bonuses

For the purpose of this paper, competitions for records or prizes will be excluded. Only such plans as provide for substantial cash payments in relation to the results achieved will be considered as "bonuses." Within this general limitation there are two general plans, each of which has been successfully used. One is the payment for actual results, either individual or group, and may be termed a "performance bonus." The other provides for a competition between groups, with the prize money divided among the winners, regardless of the real results, and will here be called a "competitive" bonus.

The performance bonus is generally offered to individual foremen, for the performance of the men under their direction. This is in accordance with holding the foreman responsible for his men and makes it possible to offer a bonus of attractive size. The payment for individual records of foremen is the most common in this type, but, where the hazards of the work are unequal, the bonus earned by the whole group can be equally divided. In a few cases, the entire working force is included in the performance bonus with good results, as every workman has a monetary interest in the accident record. The individual amounts must necessarily be small in such systems and may be too small to be an incentive.

The performance bonus is the simpler in application, not requiring extensive records or rules. It is paid only where earned. If it is sufficiently attractive, there is no doubt that it will stimulate the additional effort necessary to get results. It does not necessarily make use of the competitive spirit which is strong in most American workmen, but this may be injected by publishing the bonus records regularly.

The competitive plan depends mainly upon using the spirit of competition which it arouses, but also makes it possible to pay an attractive sum to each member of the winning group, if groups are carefully planned. It develops team work between members of the group, as the success of each individual depends upon the success of all. This plan is applicable to an organization which has several units of approximately equal size and having similar hazards. Its application involves working out all the details of competitive rules and of having an "umpire" to settle disputes. Its

disadvantages are: The winning unit receives the agreed bonus regardless of the real savings, and the losers get nothing, although they might make an excellent record; there is danger of one or more units becoming discouraged by a poor start and losing interest.

Amount of Bonus

The safety bonus is purely a business proposition, and should be based upon the possible saving in the cost of accidents. Since this cost is commonly considered in terms of insurance premium, or compensation and medical expenses, this may be used as a starting point. If all the saving in insurance is applied as a safety bonus, the company will still show a profit on the reduction of the "hidden" costs of accidents. However, it will seldom be necessary to use all of this direct saving in order to make an attractive proposition.

The use of the bonus will not entirely stop injuries, and those occurring must be paid for. So an estimate of probable results must be made, in which this cost is considered. Industry in general, including many marine organizations, has found that 50 per cent of its accident cost can be prevented by proper methods. At least one half of this can be safely offered on a basis of the prevention of all lost time injuries.

Essentials to Success

If the most benefit is to be derived from a bonus system, or if it is to have even a fair chance of success, certain conditions will have to be met. Its success depends entirely upon its ability to inspire the recipients to more than ordinary efforts toward accident prevention. If working conditions are such that a man's earnest efforts are defeated time and again by conditions beyond his control, the whole thing will fail and probably have a bad reaction.

(1) Management should have a definite policy of maintaining the physical plant safely or not charge injuries from this source against bonus records.

(2) All efforts of the men should have the active support of management. In competitions, publicity should be given to standing of groups, and other aid rendered.

(3) The bonus should be sufficiently large that it is worth working for.

(4) The conditions should be such that it can be earned by sincere effort.

(5) The bonus period should not be so long that interest is lost through the occurrence of an accident at an early stage.

(6) All conditions, such as amount, persons eligible, bonus period, time of payment, and definition of an accident, should be clearly understood in the beginning.

Bonus Plans in Use—Performance Bonuses

- Plan A—(1) Recipients of Bonus—Individual subforemen
(2) Requirement—no lost time accidents
(3) Period—Supervise 30,000 man hours
(4) Amount of Bonus—\$30.00
(5) Time of payment—following month

The occurrence of a lost time accident cancels all accrued credit and a new bonus period starts the following day. In addition to the above bonus, each general foreman receives an annual bonus based upon the records of all of his subordinates. The amount of the bonus here is approximately 10 cents per man per day. Before starting accident prevention work, injury costs averaged 25 cents per man per day. A 65 per cent reduction was accomplished in three years.

- Plan B—(1) Recipients of bonus—Individual foreman and subforemen
(2) Requirements—no compensable accidents
(3) Period—calendar month
(4) Amount of bonus—\$10.00 to foremen, \$5.00 to subforemen
(5) Time of payment—next pay day
This company operates its own hospital and excludes the no-compensation injuries to encourage reporting and treatment of minor ones.
- Plan C—(1) Recipients—all foremen, sharing equally
(2) Requirements—stevedoring one ship without lost time accident
(3) Period—calendar month
(4) Amount of bonus—\$5.00 for each ship without accident
(5) Time of payment—one month after end of period
This plan tends to equalize the risk of working the more dangerous cargoes and sub-standard ships. Average bonus earned per foreman about \$15.00 per month. Plan satisfactory to foremen.
- Plan D—(1) Recipients—all employees
(2) Requirements—reduction of accident cost over previous average
(3) Period—six months
(4) Amount of bonus—all saving in cost over corresponding period of previous year, divided equally
(5) Time of payment—special safety meeting
- Plan E—(1) Recipients—members of ship safety committee
(2) Requirement—no accident to member of ship's company severe enough to cause him to leave the ship
(3) Period—Season (approximately six months)
(4) Amount of bonus—\$10.00 per man
(5) Time of payment—close of season or layup of ship
This plan of the Lake Carriers' Association, in effect upon the first on the Great Lakes, also requires members of the committee to attend all ship safety committee meetings in order to be eligible for the bonus.

The foregoing plans, with variations according to the needs of the particular company, cover the forms of performance bonus, with the exception of elaborate plans based upon a merit and demerit system which generally takes into account other features besides the industrial injuries. The general basis is the frequency of disabling injuries. Plan D, where all employees share, is based upon actual saving in cost, all of which is divided.

The Use of Penalties

By assessing penalties of some kind for poor accident records, fear or discipline is substituted for hope of gain as an incentive. There is no doubt of its effectiveness under certain conditions. It is more difficult to apply with fairness to all, and, because its appeal lies in fear rather than hope of reward, carries the danger of arousing trouble and discontent. All of its possible reactions in relation to employment problems should be considered before it is adopted. It is, however, a solution of certain situations.

Before a system of penalties for the occurrence of accidents can be fairly used the management should see that the physical plant is safely maintained. Safety rules are almost a necessity, since the disregarding of established rules is one way of fixing responsibility. A general safety organization, sufficient to assure the proper plant maintenance and instruct new employees, is advisable. Investigation of accidents to determine final responsibility is absolutely necessary if penalties are to be assessed justly. There should be fixed penalties for unsafe practices and no discrimination allowed among offenders.

There are two general classes of penalties, depending upon the wage systems. Where a bonus above basic wages is paid for production, deductions are made for accidents. When straight wages are paid, demotion, lay-offs and discharge are used as accident deterrents.

Where a production bonus is paid, deductions may, in all fairness, be made from this sum when a disregard for ordinary safety results in expensive accidents, either to machinery, material, or men. The tendency for accidents to increase under such a wage system makes some preventive measure essential if injuries are to be kept within bounds.

Any person occupying a supervisory position whose accident record is much worse than the average probably is lacking in some of the necessary qualities of foremanship and his demotion becomes necessary. Laying off or discharge of a man because he receives an injury can be done in fairness only after a thorough and impartial sifting of all the facts. The workman has control over only a very limited part of the system under which he works. In an effort to insure impartial use of the layoff system, one company has a provision that the general foreman may suspend or discharge any man for the breaking of established safety rules or recognized practices, whether an injury results or not. The foreman must, however, post notices on the bulletin boards, giving the facts in the case. This has caused a very sparing use of this form of discipline and has also given desirable publicity to the incident.

The following two plans represent the essentials of the penalty systems:

Plan F—(1) Wages	Company has production bonus which allows 50 per cent increased earnings.
(2) Recipients	All employees, by groups under foremen
(3) Period	Calendar month
(4) Amount	As earned
(5) Penalty assessed	Graduated deductions for accident above previous three-year average combined with penalty for sub-standard work.
(6) Amount	Possible to lose entire bonus
Plan G—(1) Wages	Straight days pay
(2) Men affected	All employees
(3) Basis of Penalty	Violation of safety rules
(4) Penalty	Lay-off or discharge
(5) How assessed	By superintendent after investigation and recommendation of safety committee on which men are represented.

The use of rewards or penalties under a definite plan is but systematizing the common practice of most organizations of favoring, in some manner, the employees whose records are considered good and gradually ridding the organization of the inefficient. There are countless ways of doing this. If it is done under a regular plan, and in accordance with accurate records, the elements of chance and favoritism are not so apt to enter. Absolute fairness is essential to the success of either plan.

Either plan can not accomplish its object unless it is the part of a well considered program. Both plans will tend to arouse and maintain interest in accident prevention. The chance of winning the bonus and the spirit of competition with others in the organization make the job more worth while. If the job is worth while, the fear of losing it has the same result in stimulating a desire to avoid those things which will cause layoff or dismissal.

CHAIRMAN HUNTER: That was a very interesting paper. I don't think there is anyone better qualified to present the subject than Mr. Gregory. His wide knowledge, due to his contacts in the various parts of the United States, makes him a man whose word is authoritative. We would be glad to have some discussion on this paper.

ARTHUR TOBE (The Texas Co., N. Y. C.): Mr. Chairman, I believe it is difficult

to discuss a paper such as Mr. Gregory's immediately after hearing it read. Mr. Gregory's paper contains real food for thought. He has pointed out in there several concrete definite plans which have been established and work successfully. He has pointed out that the changing of those plans to meet the conditions of individual organization is something which will only be decided upon by considering all the many factors which enter into a respective group organization.

CHAIRMAN HUNTER: Is there anyone here who has any knowledge of any definite bonus plan or bonus penalty plan being carried on by a steamship company or a stevedoring company?

CAPTAIN HENRY BLACKSTONE (United States Protection & Indemnity Agency, N. Y. C.): I am acquainted with the plan that was used by the Export Line aboard its ships. When first put into effect, the reaction among the officers was rather unfavorable. It resulted in their not reporting trivial accidents. In fact, they wouldn't report anything unless it was a major accident. At that time the plan used was based on the number of accidents which occurred in each individual ship, but it was discarded for one predicated on the cost of the accidents over a period of a year. The results were a lot better, because the officers could not cover up the costs. But, at the same time, the plan caused a lot of dissatisfaction, because the officers felt that the awarding of the bonus was predicated on something over which they had no control. They argued that in a great many cases too much money was paid on a case. Recently I talked with the captain of one of the ships, and he was not at all satisfied with his standing. It was a most unfortunate attitude to take, because it demonstrated the fact that he and several others were not interested in the campaign because they didn't feel that they were getting a square deal. He seemed to think that his ship hadn't the number of accidents to warrant the amount of money that was paid in claims. I don't know what could be done to break down that feeling among the officers. It is a subject we all have given considerable thought to lately. We are trying to develop a system whereby we can award a certificate to the high ship in every company once a year. I believe the Standard Transportation Company does that already, and apparently it is satisfied. The captains and officers seem to appreciate the certificates, and keep them framed aboard the ship. It seems to pep up the morale of the ship to have one of the certificates aboard. That, to my mind, is a comparatively inexpensive bonus system. It doesn't cost much to have a certificate printed, and it seems to do the work. It doesn't seem to engender the same feeling of envy and dissatisfaction as the payment of the other monetary bonus does.

CHAIRMAN HUNTER: Thank you, Captain Blackstone. Does anyone else have any comment on this question of bonuses and penalties? In our own company we publish monthly the names of the ships and date of the last lost-time accident, and it has created quite a little rivalry. I think this question of bonuses and penalties is one which we should confront really seriously in our endeavor to work it out. It has been practically adopted in other industries in the form of a bonus system for production. It does seem to me it could be well applied in this field.

J. W. DORSEY (Solvay Process Company, Syracuse, N. Y.): We have no connection with the marine section but I came to hear this paper on bonuses and penalties. Within the past year we have adopted a method which seems to have worked out pretty well. We have divided our plants into groups. We have set each group with a certain objective to aim for, depending upon the conditions of their work and units connected with it, etc. We have given, at the end of the six months' period, a souvenir like a fountain pen or a pen and pencil set, or something of that nature, to each man in the group who has the best accident record for the period. This includes the foreman and everyone else in the gang. Sometimes they will average from fifty to three hundred in a group. Everyone in the group receives a souvenir of some sort, properly inscribed, "Safety at Work" for a certain period. It has worked out very satisfactorily, and there is a lot of keen competition. Our fellows turn over boards, pick up nails, and do everything else to keep from doing themselves an injury. I agree that the paper has hardly been easy to follow, but it is a very splendid thing to analyze.

FERN WOOD (Moore & McCormack, Inc., N. Y. C.): In our stevedoring operations on the Atlantic coast from New Orleans to Boston, as an initial bonus plan we have started to give a money prize every three months for the least dollar cost per thousand man hours working—that is, per thousand hours of exposure. It has created a very satisfactory interest among the stevedoring superintendents of all the six ports that we operate. Irrespective of the number of accidents, it is a one-dollar cost per thousand hours work.

CHAIRMAN HUNTER: Most of this discussion has been on the bonus side. I for one am interested strongly in the penalty side. I think there should be a corresponding penalty for failure to comply with rules and regulations when you are awarding a bonus.

MR. WOOD: I think that is a very sound idea, providing you can find out the individual who is responsible. It is the hardest thing in the world to find anyone who will accept the blame. Men are all keen to accept praise, but if you try to put the responsibility on a man he is going to duck it every time.

CHAIRMAN HUNTER: I would like to have someone express an opinion regarding this subject. Mr. Dorsey, do you have any penalties in your company?

MR. DORSEY: No, except that when a man continually commits a number of offenses against the rules, he is disciplined with a week off.

CAPTAIN BLACKSTONE: The fact that a seaman loses time through an accident does not affect his pocketbook to any great extent. He is still on the payroll, and he is still collecting money so that the mere fact of losing time has no effect on him. I think he'd rather lose time. There is one case I have in mind. A captain of one particular ship had been plagued for a long time with the refusal of his men to wear goggles. He got fed up with arguing with them. One day, when he was signing on, he asked the men if they objected to wearing goggles. No, none did. He stuck a rider in the articles, which was read to all the men, in which they agreed to wear goggles when doing any work requiring their use, subject to such penalties prescribed by the navigation laws for refraction of any one of the articles.

It so happened that in that particular voyage they drew one of these particular men who think they know it all. He decided he'd make a test case out of it. The first time he refused to wear his goggles the captain fined him two days' pay. The second time he fined him two days' pay. The third time he soaked him four days' pay for disobedience of orders. When they got in and paid off, this man refused to take his pay, and made an issue of it, carrying it down to the barge office, where the commissioner upheld the captain. It had a very salutary effect in this case.

This is an infraction of a specific rule. It applies only to goggles. A lot of things are a whole lot harder to reach. The infraction of general safety rules aboard ship is a different matter, and so far I don't believe we have gone far enough with the safety movement at sea to formulate any hard and fast rules in regard to penalties. Conditions are so different, and an emergency may arise at any time of the day or night when safety rules have to be more or less cast away or discarded for the preservation of the ship. All those things have to be taken into consideration. It is rather a difficult problem to handle specifically.

ADJOURNMENT

Wednesday Morning Session October 14, 1931

JOHN S. HUNTER, Chairman
The Atlantic Refining Company, Philadelphia, Pa.

The second session of the Marine Section convened with General Chairman Hunter presiding.

CHAIRMAN HUNTER: The first paper that we have this morning deals with a very vital subject, "The Safe Operation of Graving Dry Docks," by Louis J. Lynn. Unfortunately Mr. Lynn is unable to be present. I have asked Mr. William E. Stewardson of the Colombian Steamship Co. to read it.

The Safe Operation of Graving Dry Docks

By LOUIS J. LYNN
Safety Engineer, Newport News Shipbuilding and Dry Dock Company,
Newport News, Va.

This subject is confined in general to graving dry docks as that is the only type we have at Newport News. There are three docks, one 840 feet x 80 feet and two about 600 feet x 70 feet at the bottom of gate with 25 to 30 feet of water over the sill blocks at mean low water. My experience has been limited to this type of dock although most of my remarks will apply to any kind of dry dock.

Each of these docks has piers extending into the James River so that a ship is formed at the gate end with sufficient clearance to handle an ordinary ship if necessary between the vessels tied at the piers.

GAS TESTS are made on ships before they enter the docks, especially oil tankers, and fuel oil-burning or pulverized coal burning vessels. If the gas conditions are bad, the vessel is left in the stream until gas free. Vessels are given a second and a more thorough gas examination before any work is allowed to proceed. Our chemist issues written certificates covering the conditions of various tanks and the classes of work that can be done in each compartment. When work is proceeding on ships with tanks not yet approved for hot work a wide yellow stripe of paint is put on the outside of the hull well forward and aft of the compartment and completely around the ship marked "Danger Zone." These rules are very important. They are followed very closely by the company's inspectors or supervisors who are assigned to work on the ship, since in these days of oil-burning and pulverized coal burning vessels small gas pockets are easily formed which can do a great deal of damage, if neglected, both to the men and to the ship. All-service gas masks are available for the men and are located at convenient places on either side of each dock with extra masks on our fire truck for emergencies.

The handling of the ships into the docks is carried on with extreme care and is done by having a good hawser attached to a winch at the head of the dock. The ship is then held in position by four breast lines while being hauled, one from each quarter, and in case there is a heavy wind blowing, two additional lines are put out on the windward side with sufficient men to handle the lines while snubbing the ship into position. The use of a tug boat attached to stern of the ship on windy days is a big help in order to prevent damage to ship propellers, plating, and the corner of the dock itself. The tug is also important when undocking a twin screw vessel since there is generally very little clearance for the propellers. In docking and undocking vessels where the tide conditions affect the handling, another condition may exist which would prove serious if overlooked, that is, the running of a dock trial

on a ship at an adjacent pier. This would increase the velocity of the water equal to that of a mill race and pull the vessel being handled against the pier, damaging her shell or propellers.

Ships being docked should be plumb (no list) because the bilge keel will then be clear of the dock and no overstrain will be put on the bilge blocks which might crush them when the dock is pumped down.

Once the ship is in position, she is held there by four sets of blocks and tackle, one from each quarter, until the water is pumped out and the ship is resting on the keel and bilge blocks. Since some ships have from four to six foot draught while being docked, our center line of keel blocks contains three sets of cribbing aft with one set forward, so that when the keel of the ship aft is located it will rest on one of the cribbings, preventing the vessel from working aft while it settles down. This also prevents the tipping over or collapse of the center or bilge blocks. These cribs are made of 10 inch x 16 inch x 16 foot white oak longitudinals with 10 inch x 12 inch x 6 foot white oak cross members which give a very rigid foundation. The bilge blocks are movable and adjustable for height, being pulled into place by chains as the vessel settles on the center blocks. At this stage of the docking an important precaution to be taken is that there is no obstruction between the vessel and the keel blocks. This is determined by the even settling of the ship on the blocks as the water recedes. Once the vessel is resting on all the blocks, employees attach a brass nozzle to a 3 inch high pressure salt water line to wash the side of the ship which has been below the water. This removes a great deal of the sea growth. While they have the nozzle hooked up, they wash down the alters of the dock and the four stairways, two of which are located on each side, removing the slime and mud that is left by the receding water. In this manner we have quite a clean dock and have had very little trouble with men slipping or falling while going to or from their work.

There are several important rules that must be observed while docking a vessel, one of which is the removal of bleeder plugs, especially on ships which have been carrying oil that has become mixed with water. This type of drainage will get below the planks of the dock and create a dangerous fire hazard as will the unauthorized pumping of ballast into the dock. Another precaution to guard against in removing the plugs is the extra weight put on the bilge blocks, if the plugs are removed from one side of the vessel and a full tank of oil or water is allowed to remain on the opposite side without any additional support under the ship. This condition is sometimes found while testing tanks under pressure and should be avoided if possible as it has been known to cause a lot of damage to shell plates and frames of an oil ship where they drained a full cargo tank on port side and left the starboard tank full without any extra support. This could also happen on a ship with three large boilers, if the crew were to blow down two boilers and leave the third full.

GANGWAYS OF SUFFICIENT SIZE should be provided to all ships in docks. Vessels using fuel oil or pulverised coal should have a gangway forward and aft of the storage compartment on opposite sides, so that in case of a fire or explosion means of escape are provided. All gangways should be kept clear of pipes, hose, and wires, and should be of sufficient strength to support, at least three times, or more, the largest deadweight load.

STAGING alongside ships in dry dock is of vast importance because of the cost of handling and of the various types used. Our method is to use trestles constructed of heavy lumber for rough hard usage of various heights up to 30 feet with an average of 20 feet. These trestles are handled from the alters of dock by a gang of 4 to 6 men, except in case of a wide ship, when it is necessary to remove them from the dock with a locomotive crane. The crane also replaces them as required. Two of the feet of these trestles sometimes rest on the alters while the top rests against the vessel's side with the result that an unequal strain is put on them; hence they must be sufficiently braced to provide for this.

STAGE PLANKS used in the docks are of spruce 3 inches thick, 12 inches wide, and vary in length from 20 to 30 feet. A 24 inch lap over the top of trestles is allowed on each end of plank for springing or creeping. Various trades require different types of staging, inasmuch as we use only a single plank for cleaners and painters and a three-plank stage for riveters when working over 12 feet from the ground. Our swinging stages at present are hung by means of manila rope. When any burning is being done around these stages, a special man is detailed to watch for sparks igniting the ropes or planks. In addition to this a rigid frequent inspection of all staging is made by the riggers and safety department. We have recently tested the use of 2 inch and 2½ inch spruce stage plank but find them very unsatisfactory, because they are limber and might cause men to fall. We will continue the use of the 3 inch planks because they are quite rigid even with a 26 foot span and two men working on them.

TANK TESTING. When any tank testing under water pressure is done, especially in cargo tanks of oil tankers, it is customary to put in an additional row of shoring under the longitudinal about two-thirds of the way from the center keel to the bilge, if the water is to be put in the tank over eight feet in depth.

ANCHORS. If any work is to be done on the bow of the vessel in dock, or on the anchor windlass, the anchors should be lowered to the bottom of the dock. If impossible to do this, inspection should be made to determine that the windlass brakes are holding, that the chain dog is in place, and that the hooks for chain are in place if the vessel is so equipped. This is done by our riggers department, who put a tag on the windlass instructing unauthorized persons not to use the machine.

ISOLATED COMPARTMENTS ON SHIPS are considered by us to be enclosed places which the watchman does not visit on his regular rounds. We have issued instructions that all men working in these sections must report to their supervisors before entering and upon leaving so that there is no chance of a workman being left in them. They also work in pairs or gangs so that there is help available if required in an emergency.

VENTILATION. Compartments or tanks in which much work is being done, especially riveting, burning, welding or heating, should be provided with fresh air from portable blowers under low pressure if possible, or by means of an air jet which can be attached to a high pressure air line so that the air may expand to cover a larger area in the bottom of the tank. Both of these systems are in use here and prove very satisfactory under our conditions. The aim of men working on ordinary repair work is to finish the job with all possible speed which tends toward fatigue. This fatigue may cause other physical conditions to be aggravated to such an extent as to cause a death, thereby placing the responsibility on the Company; so extra precaution should be taken during the hot weather to provide as nearly ideal working conditions as possible.

TEMPORARY LIGHTS installed on repair vessels should be given extra consideration because of the various hazards that exist. The lights should be hooked up and arranged so as to prevent short circuits. Our electric lines are arranged in such manner that the connections are individually fused so that there is no chance of more than 110 volts going through any line.

SUPERVISION of the men on repair work in dry dock is largely responsible for the accident record of any plant. We have tried to impress on all our men that it is just as important to work safely and without accidents as it is to get the job done. The result of a serious injury may cost more than the profits made on the average ship repair job today, when one considers that prices have been held at very low figures on account of the competition for the work.

REPORTING OF ACCIDENTS AND TREATMENT OF INJURIES are two important agencies which help keep down the severity rate of any company. The

following items recently appeared in our plant publication which is issued bimonthly and is given to each employee:

REPORT MINOR INJURIES

When is a slight injury a minor injury? It is a minor injury only when it is taken care of promptly and carefully. The medical department has been having trouble with employees who have not been reporting little bruises, cuts, and scratches which to them seem harmless. They must not decide on these things. Whenever you see blood, you see red, and red is the danger signal the world over. Come to the clinic at once. The management wants you to do this to protect the interests of everybody involved.

DO NOT REMOVE SURGICAL DRESSINGS

When an employee goes to the clinic to have a wound dressed, he must realize that this dressing is applied by professionals who make this kind of work their living. The wound is sterilized first and a sterilized gauze bandage is put around it in a scientific manner. This is done in order to avoid any possible infection. Many employees go home and feel a little uncomfortable perhaps with the bandage on and remove it. This is dangerous as long as the cut is open and may result even in the death of the person so infected.

DO NOT REMOVE SURGICAL DRESSINGS. HAVE THEM REMOVED AT THE CLINIC WHEN THE PROPER TIME ARRIVES.
DO NOT TRY TO DRESS A WOUND YOURSELF.

This bulletin contains approximately one page of safety matter each issue. In addition to this we have bulletin boards in all departments on which are shown new posters every week.

RESULTS. The safe operation of our docks during the past two-and-one-half years has decreased the number of our lost-time accidents to 51. This includes the personnel of all trades working on the ships while they were in the docks. The severity of these accidents caused an aggregate of 5,815 days lost, according to the National Safety Council scale of charges. The record cannot be figured on a frequency or severity rating, as we do not keep a separate record of the man-hours worked in the dry docks.

During the two-and-a-half year period mentioned we accomplished an outstanding record in the reconditioning of the passenger and freight steamship, "President Johnson," of the Dollar Steamship Lines, within forty-one days and without a single lost-time accident. The labor price on this contract was nearly a quarter of a million dollars and the job was completed ahead of schedule time.

CHAIRMAN HUNTER: Thank you, Mr. Stewardson. Mr. Lynn has covered the experience of the Newport News Company quite thoroughly.

The next paper has been prepared by Mr. Hubbard of the Submarine Signal Corporation of Boston. He, also, is unable to be with us, and I have asked Mr. Charles H. Flathers, of the Eastern Steamship Lines, Inc. to read it.

The Fog Horn As an Aid to Navigation

By B. R. HUBBARD

• Director of Laboratory, Submarine Signal Company, Boston, Mass.

Among the obstructions to navigation none, perhaps, are more to be dreaded than those which arise from fogs. All mariners know the helpless sensation which is experienced when they find the vessel completely shut in by this substance. Since the danger of collision or stranding under such circumstances is a very real one, this sensation is not alleviated by a continuation of this atmospheric condition for, in this case, familiarity merely emphasizes the importance of using extreme caution. So greatly does a dense fog obstruct light that the most intense artificial illumination

is entirely obscured at comparatively short distance. Even the light of the sun, which is far more intense than any artificial illumination, is so diminished by a single mile of dense fog that the luminary becomes invisible.

For many years the only means for obviating this difficulty has been that of employing powerful sounding instruments which may be heard at a sufficient distance to give a timely warning of impending danger. The importance of the fog horn as an aid to navigation hardly can be overestimated. In fact, the laws governing navigation require that, in addition to lights, fog signals must be maintained upon ships, light vessels, and at important shore stations. In view of its value as an aid to navigation, it hardly seems necessary to emphasize the importance of using only the best sound producer that can be made.

Three processes are involved in an audible sound signalling system,—the production of sound, the transmission of sound, and the reception of sound. In the design of an effective signalling system not only must each of these processes be analyzed separately but also each must be considered with reference to its effect upon the others. In this paper these subjects are discussed in the reverse order, that is, reception, transmission and production of sound, with especial emphasis placed upon transmission and production. In practice, the ear is used almost entirely for receiving the sounds. Since, in this case, the final stage of the total process cannot be controlled, any improvement of the system must be sought in transmission or production. We may, therefore, proceed to consider the question of transmission.

The fog horn is supposed to speak for itself. To the navigating officer on the bridge, the ability to hear the blasts from a whistle often means the difference between safety and disaster. Unfortunately, as any mariner can testify, these warning signals do not fulfill their purpose in an irreproachable manner. The late Captain Sir James Charles, Commander of the Cunard liner "Aquitania," who before his death had spent forty-eight years at sea and was finishing his 727th trip across the ocean when stricken, stated at a luncheon on board his ship that it was his experience that a large number of accidents at sea were due either to the inefficiency of steam whistles or to the fact that they were not blown as often as they should be.

*In fact, ever since the time sound signals were first used as a warning during times of obscured vision, it has become increasingly evident that the audibility of such fog signals in air varies in a most capricious manner and that extreme caution must be exercised in using these sound signals for guidance. The uncertainty and unreliability of the ranges of even the most powerful fog horns that have been used up to the present time are well known. All mariners will testify to the variation in the ranges at which these signals can be heard. It must be clear also that these devices can give little reliable information to the mariner of the distance of his vessel from the danger point. While some indication of the distance can be obtained by noting the loudness of the received signal, the unreliability of such a method is well known.

In this connection the following statements which may be found in the Light List, Atlantic Coast and in the United States Coast Pilot, Atlantic Coast, both of which are publications of the Department of Commerce, are significant:

"Sound is conveyed in a very capricious way through the atmosphere. Apart from the wind, large areas of silence have been found in different directions and at different distances from the origin of sound signal, even in clear weather. Therefore, too much confidence should not be felt as to hearing a fog signal.

.....
The conditions for hearing a signal will vary at the same station within short intervals of time; mariners must not, therefore, judge their distance from a fog

*The following discussion on the influence of atmospheric conditions on the audibility of fog signals is a repetition in substance of certain parts of a paper by the author on this subject, published in the July, 1921, issue of the Journal of the Acoustical Society of America and has been used with the permission of this Society.

signal by the force of the sound and must not assume that a signal is not sounding because they do not hear it."—Atlantic Coast Pilot—1922.

"Mariners are cautioned that fog signals sounded in air cannot be implicitly relied upon.

.....
Experience teaches:

That distances must not be judged by the power of the sound.

That occasionally there may be areas close to a fog signal in which it cannot be heard."—Atlantic Coast Light List—1930.

It must be evident, therefore, that these warning signals furnish relatively imperfect aid to the mariner so far as range of audibility is concerned. A fog signal, which, under favorable conditions, is audible eight miles, may be just audible under different atmospheric conditions at a mile or less.

Another most perplexing situation frequently occurs. The sound is completely lost a short distance from the fog signal station, only to be heard again at a greater distance. These "silent zones" have been met often at sea and constitute a source of danger if, by any chance, a mariner is so unwise as to estimate his distance from the danger point by the loudness of the signal. The "silent zone" is most undesirable since the fact that a particular fog signal is inaudible may give the confidence of safety in the midst of danger and thus prevent the necessary caution which would otherwise be employed.

These "silent zones" are not always present but occur under special conditions of atmosphere both at the surface of the sea and in the upper regions.

A question as to the cause of these irregularities in the audibility of fog horns arises quite naturally at this time. The importance of understanding the acoustic conditions which are responsible for these variations in the range of audibility has been recognized for many years and this problem has received the attention of both the Lighthouse authorities and many distinguished physicists. As a consequence, most authorities now agree upon the causes affecting the audibility of fog horns.

The factors affecting the audibility of fog horns may be considered under two groups, permanent obstacles, and atmospheric conditions.

From a consideration of the elementary principles of sound propagation it would be expected that—

1. Obstacles in the optical path between the sound source and the listener may tend to reduce the audibility of the sound.
2. Irregular surfaces in close proximity to the source may produce reflections and destructive interference which result in a reduction of the loudness of the fog signal.
3. Reflections from regular objects in the neighborhood of the fog horn may deflect the sound to points at which the direct sound would not be heard, and this would tend to weaken the intensity of the sound in the directions where it might be expected that the sound would be heard clearly.

All of these phenomena have been verified by experiments, but have not proved to be capable of exerting sufficient influence to account for many of the observed aberrations in the range of audibility. In the first place, the influence of permanent obstacles should be substantially constant, at least so far as the places in which the sound can be heard is concerned. Numerous experiences prove that this is not true. In the second place, the influence of permanent obstacles does not account for the observed aberrations in the audibility of the fog signals on lightships. Finally, theory indicates that because of the long wave length of the sound ordinarily used for warning signals, most objects in the neighborhood of a fog horn are not large enough to cast a well defined acoustic shadow or to produce a good reflection.

On the other hand atmospheric conditions may exert a powerful influence on the audibility of fog horns. In fact, practically all of the aberrations mentioned may be attributed to the effects of meteorological conditions. The atmosphere is seldom perfectly stagnant and homogeneous as regards temperature, humidity and wind and as a consequence the sound is not propagated in a straight line. The velocity of sound in air changes with a change in air temperature, air humidity, or velocity of the wind. As a consequence, the velocity of sound is not the same throughout the atmosphere. It is these variations which cause the sound waves to bend from their normal straight line path of travel. This deflection of the sound waves exerts a powerful influence on the audibility of fog horns.

The physicist refers to this phenomenon, in which the sound waves are bent from their normal straight line path of travel by changes in the velocity of sound, as the refraction of the sound waves. The laws of refraction of the sound waves in the atmosphere by changes in wind velocity, temperature, and humidity have been developed and may be found in treatises on sound. (Rayleigh, "Theory of Sound" or Stewart and Lindsey, "Acoustics"). The reader, who wishes a more detailed discussion of the refraction of sound waves in the atmosphere than is contained in the following description, is referred to these treatises.

The deflection of the sound waves from their normal straight line path of travel by variations in the temperature of the air is due to the fact that under such atmospheric conditions the velocity of sound is not the same in all parts of the atmosphere. The velocity of sound in air increases with temperature. During the day the temperature of the air usually diminishes with altitude and consequently the velocity of sound also diminishes with altitude. For this reason, the upper edge of a sound wave does not advance as rapidly as the lower edge and the wave front is distorted from its circular form. The detailed analysis of this case shows that the path of any point in the wave front (that is, any sound ray) is not a straight line as would be the case if the wave front retained its circular shape. Instead, these points gradually rise upward along curved paths as the wave moves forward. The amount of upward curvature to the path depends upon the rate of change of temperature with elevation and is greater the greater the temperature change. In general, it may be said that these paths or sound rays bend toward the cooler air. Thus if the temperature is less at the earth's surface than above, the sound rays will bend down toward the earth.

This fact throws considerable light upon the question of the inaudibility of fog horns at even moderate distances on certain occasions. For example, if the temperature decreases with elevation, it follows that all the sound rays will gradually rise upward. The sound ray starting horizontally, after traveling a certain distance, will gradually curve upward and a sound ray starting in a certain slanting downward direction will bend so as to meet the surface of the sea, run horizontally, touching it for a short distance, and then rise again along an arc. Consequently, if the fog horn and listener are both near the surface of the sea and separated by a considerable distance, the listener, under the most favorable conditions can hear the sound only as a result of this bending of the sound rays. In the area beyond the limiting ray which meets the surface of the sea and eventually rises along an arc, the fog signal becomes practically inaudible; the sound rays rising higher can never enter the silent region while the sound rays slanting more sharply meet the surface of the water and are reflected upward again. Due to other irregularities in the atmosphere, the silent region will not be completely silent, it is true, but the sound is considerably weakened in this zone.

Placing the fog horn higher up increases the range of audibility; doubling the height of the source does not, however, double the range of audibility. Increasing the strength of the sound source does not improve the range since the sound rays still must follow the same paths as before which depend entirely upon the temperature changes in the atmosphere.

If the warm layer of air is above the colder one, the sound rays are bent down-

ward toward the surface of the sea and no sound shadow is produced. Fortunately this condition occurs frequently during fog, in fact it is one of the chief causes of fog. No doubt it is due to this circumstance that sound signalling through air is not even more ineffective than is actually the case.

Even when the air temperature is uniform the sound waves may be deflected by the wind. It is well known that the speed and direction of the wind at different elevations is not the same. The most common condition is that in which the wind velocity increases with elevation. It can be shown that as a consequence the sound ray, which is traveling with the wind, curves downward while the sound ray traveling against the wind curves upward. Therefore, bearing in mind the discussion on the refraction of sound by temperature changes in the atmosphere, it would be expected that the range of audibility of a fog horn would be greatest on the lee side and least on the windward side of a fog horn. This, of course, is true.

The effect of changes in the humidity of the air with elevation can be deduced by the reader from the discussion for the refraction of sound by temperature changes, bearing in mind that the velocity of sound increases with the amount of moisture in the air. The effect of water vapor upon the velocity of sound, however, is slight and consequently the deflection of the sound rays by this condition is not an important factor.

Of course aberrations in the audibility of a fog horn may be due to any or all of these causes—wind, temperature and humidity. One fact, however, stands out so clearly that it can hardly escape notice; the variation in the audibility of a distant fog horn because of the wind is so marked that one is warranted in considering the wind to be the principal cause of the ineffectiveness of the signal in many cases.

Notwithstanding the fact that the fog horn at times furnishes only imperfect assistance to the mariner, it continues to be one of the most important aids to navigation in times of obscured vision. Obviously, the extent to which it is possible to protect the steamship channels from accidents due to fog depends ultimately upon whether the warning signals installed and operated on ships and along the coast are the best for the purpose. Without doubt, therefore, the need for powerful and efficient warning signals in air will continue for many years.

Fog, the bane of every mariner, has caused the development of devices of many types to protect ships from collision and stranding. Millions of dollars have been spent to install, maintain and operate lights, steam and compressed air horns, sirens and whistles to assist the mariner and thereby protect shipping. In this connection it is to be noted that efforts have been directed mainly toward producing sounds which can be heard at greater and greater distances in order to increase the protective value of such warning signals. The tendency has been to strive to obtain increased range of audibility regardless of cost or efficiency of operation. The desire of the lighthouse authorities has been, of course, to obtain the maximum range for air sound signals at a minimum cost.

Until recently little progress was made in the development of efficient apparatus for the production of air-borne sound signals. Existing types of sirens and steam or air whistles are extremely inefficient; that is, very little of the power supplied to the sound producer is actually converted into sound of such character or quality as will penetrate the desired distance in foggy weather. In fact, the following statement, made by Major Livermore, engineer for the First and Second Lighthouse Districts in 1894, may be said to apply with equal validity to some of the fog signal equipments in use today. In the Report of the Lighthouse Board, 1894, Major Livermore says, "In general terms, sirens and whistles can be heard far enough under favorable circumstances but the consumption of coal is excessive, involving enormous expense, not alone in its first cost, but especially in landing and storing it on the exposed shore where most of the lighthouses in this district are located."

This important field of investigation has attracted the attention of the acoustical engineer with the result that a number of distinct improvements in fog signal apparatus have been made, in spite of the fact that the engineer is still unable to overcome the effects of unfavorable atmospheric conditions.

In an effort to increase the efficiency and penetrating ability of the fog signal, the acoustical engineer has discovered many interesting facts which, applied to the design of fog horns, have resulted in the development of devices that are far more efficient and effective than any apparatus used heretofore for this purpose.

Before describing the recent developments in this field, it will be interesting to consider in greater detail the characteristics of the devices which have been used for the production of powerful sounds for fog signalling.

The inefficiency and large power consumption of these devices have already been mentioned. Louis Thompson, of the U. S. Naval Proving Grounds, at Dahlgren, Virginia, has reported in a recent paper on steam and pneumatic whistles that such sound producers may consume as much as several hundred horse-power; in fact, he states that a 12 inch whistle may consume as much as 400 horse-power. These figures are confirmed by an independent investigation made a short time ago by the writer. According to Mr. Thompson, the siren type of signals was found to be more efficient than the whistle. The writer computed the power consumed by a standard 6-inch automatic siren used by the Lighthouse Service on the basis of data taken by the Lighthouse Department and finds that the power consumption of even this device may be as much as 100 horsepower. Unfortunately most of this power is wasted; very little of the power consumed is actually transformed into sound.

Both theory and practice show that high pitched sounds do not carry as far as low pitched sounds; in a sound composed of a mixture of low and high pitched notes the higher pitched components are dissipated at comparatively short distances so that at a great distance only a relatively pure low pitch note remains. The sound from a steam or pneumatic whistle or siren is extremely complex and is composed of a low pitched master or fundamental tone combined with numerous high pitched overtones. It is, in fact, these high pitched overtones which give the note of such sound producers its harsh raucous character when it is heard at short range. During the propagation through the atmosphere the discordant overtones do not travel far but are filtered out; the low pitched fundamental or master tone alone survives to an appreciable extent at distances greater than two or three miles. It is obvious then, that the overtones produced by such sound producers represent waste of power and that the chief concern of the designer of powerful fog signals should be to concentrate all the energy if possible, into the master tone.

Furthermore, the presence of the unpleasant overtones in the note of a fog horn disturbs unnecessarily those nearby, whether they be the passengers in the case of a steamship or the residents in the case of a shore fog signal station. In other words, the raucous part of the note is dissipated in the neighborhood of the fog signal where least desired and does not increase the value of the fog horn as an aid to navigation.

Many of the commercial fog whistles and sirens now used require from 20 to 40 per cent of the time they are energized to bring the blast to maximum intensity. This is undesirable for two reasons. In the first place the time lag makes code signalling slow and difficult. In the second place, since the signal is sounding at maximum intensity for only a part of the time it is energized, the power absorbed in bringing the blast to full strength does not produce sounds which are heard at considerable distances and, therefore, much of this power may be considered as wasted. It is, therefore, desirable to have a fog horn which may be sounded at maximum strength throughout the desired duration of the blast.

These undesirable features have been largely overcome by an electrically operated fog horn which was developed a few years ago by the Submarine Signal Company

and is called the Electric Air Oscillator. The Electric Air Oscillator is a modification of the electric submarine oscillator which was originated and developed for transmitting sound signals through water. This latter oscillator has proved through years of service, in meeting numerous requirements, to be the most efficient mechanism ever devised for creating under-water sound signals which may be identified at great distances. It was to be expected, therefore, that the Submarine Signal Company could also see in the mechanism of the submarine oscillator an efficient means for producing powerful sound signals in air.

In principle, the operation of the Electric Air Oscillator is quite simple. It consists of a powerful electromagnet so arranged that, when it is energized by alternating current, it causes armatures rigidly fastened to two diaphragms (one at each end of the electromagnet) to oscillate at a definite frequency. A cone shaped horn or trumpet and a resonating chamber is placed in front of each diaphragm and so proportioned that the maximum sound is emitted. All portions of the device are designed with relation to one another so that perfect resonance is effected, thereby producing the great power of the sound signal.

This type of fog signal, which is a radical departure from all other forms of signal for this purpose, not only overcomes the disadvantages already enumerated but also excels the other devices in several important respects.

The frequency of the alternating current used to energize the air oscillator is adjusted, and controlled within narrow limits, at that value at which the most powerful sound is produced. Thus a sustained signal may be blown at maximum strength throughout any desired duration of blast. The pitch which has been selected is 256 cycles per second, this having been ascertained as being easily distinguished from other noises on a ship at sea. These features are innovations in air fog signals and conform with the conclusion that one of the most important considerations in the design of powerful fog signals should be that of concentrating all of the sound energy, if possible, into the master tone.

When this objective has been accomplished it is obvious that the high pitched overtones in the note of the fog horn, which give the note its harsh, raucous character nearby and represent wasted energy, will have been eliminated also. For this reason the signals of the air oscillator are musical and far less annoying to those nearby than are the sounds created by the older forms of sound signalling devices.

Furthermore, the signal from the air oscillator starts with full power the instant the switch is closed. The time lag which made code signalling slow and difficult has been eliminated. Not only can the maximum intensity of sound be maintained for any desired length of time but signals of the proper pitch may be produced and transmitted with ease and rapidity.

The construction of the air oscillator is such that there are no rubbing or sliding parts. The parts which move are subjected to bending only. Consequently, this fog horn, after being mounted and connected to the power supply through a cable will operate continuously at maximum efficiency with little upkeep or attention. By the use of sea or shore cable, it is possible to install the electric air oscillator at remote points. The difficulties of maintaining pressure pipes for steam or compressed air in freezing weather are avoided. Thus it is possible to install the air oscillator at inaccessible points, if necessary. This is not practical with the steam or pneumatic types of fog horn and removes an obstacle which has heretofore prevented the establishment of powerful warning signals at important navigating points.

While these features may be interesting to the engineer, any fog horn, to be acceptable, must in the final analysis be capable of being heard at long ranges. The electric air oscillator has been compared for range of audibility on a number of different occasions with various types of "first class" fog signals on light vessels, lighthouses, and shore stations of the Lighthouse Service. On every occasion the air oscillator has been proven to be at least equal in range and effectiveness to these fog signals; in some cases the range of audibility exceeded that of the "first class" fog signal.

It is important to note that the comparison between the air oscillator and other "first class" fog signals in the preceding paragraph was made on the basis of comparative range tests made upon the same day and in such a manner that first one, then the other fog signal, was sounded. Due to the great influence of atmospheric conditions on the range of audibility any comparison between the range of audibility of different fog signals sounded on different days is meaningless. Furthermore, it is not practicable, if indeed theoretically possible, to describe the loudness of the sensation produced at a given distance by a fog signal. A statement, for example, to the effect that of two sounds one is twice as loud as the other is only rough approximation at its best. Experience has shown that the only comparison which has any practical importance and from which it is possible to assign a figure of merit is that in which the tests are made in such a way that the sound at the point of reception is so faint as to be "only just audible." The data on which the above comparisons were made were obtained in this manner.

The amount of power required by the air oscillator to accomplish this result is only a fraction of that required to operate the other types of "first class" fog signals. For example, in one of the comparative range tests, the air oscillator and the standard six inch lighthouse air siren were tested. According to data taken on a similar air siren at Manitou Island Light Station the six inch air siren consumes between 100 and 150 horse-power, depending upon the air pressure used. A signal equal in range and effectiveness to that of the six inch siren is produced by the air oscillator with a power consumption of less than six horse-power. Similar comparisons may be made with other types of steam or pneumatic fog signals. It is evident, therefore, that the air oscillator has proved to be capable of producing signals which are at least equal in range and effectiveness to those of the "first class" fog signal with a power consumption only a fraction of that absorbed by the latter.

Audible sound fog signalling covers a very broad field. The discussion in this paper has been confined to certain of the more important aspects of the transmission and production of sound. The fog horn continues to be one of the most important aids to navigation in times of obscured vision. There should be, therefore, a clear understanding of what may be expected of this warning signal; of equal importance is an appreciation of its limitations. It is hoped that the discussion of the influence of atmospheric conditions on the audibility of fog signals will assist in doing this. Until recently very little has been done to improve the efficiency or effectiveness of fog horns. With the development of the Electric Air Oscillator, however, the disadvantages of the older types of fog horn have been largely overcome. There are, already, a number of air oscillator installations in operation at important fog signal stations where they are doing their part toward increasing the safety of navigation.

Of course some fog signal stations are equipped with additional aids to navigation for use in times of obscured vision, such as underwater sound (submarine signals) and radio beacons. Water has many advantages over air for transmitting sound. For one thing, underwater sound signals are not affected by atmospheric conditions. Furthermore, the absorption of the sound is much less in water and consequently the signals can be transmitted to a distance many times greater than when they are transmitted in air. These underwater sound signals can be synchronized with the radio beacon signals so that the mariner may determine his distance by measuring the difference in the time of arrival of the radio and underwater sound signals. Already several lightships have been equipped for synchronous signalling. While in some cases this method of distance finding has been extended to the synchronization of the radio and fog horn, the reliability of this system is limited by the effectiveness of the fog horn itself. Until the scientist discovers some means for eliminating the effects of atmospheric conditions, the use of synchronized radio and underwater sound signals will continue to be the more reliable means for distance determinations.

CHAIRMAN HUNTER: For a number of years one of the men who has been most active in our section, and who has done a great deal for the Maritime Safety Movement is Arthur R. Bush. He has prepared a paper, the title of which is "Ship Safety Organization." We all regret that Mr. Bush was unable to come to the congress this year. Arthur Toole will read Mr. Bush's paper.

Ship Safety Organization

By ARTHUR R. BUSH
Westfield, New Jersey

Organizing ships for safety involves no complications, merely the application of sound commonsense. Unfortunately, commonsense is more rare than common, with the result that safety, just as everything else managed by man, has suffered because of the want of it. Essentially, the problems of safety are simple; it is the ponderous minds floundering for solutions that makes them complex. Science is invoked where sense is indispensable.

Ashore, the committee system of organization has functioned exceedingly well. Afloat, with the exception of the Great Lakes, the same measure of success has not been realized. Probably this arises from the fact that in transferring the system from shore to ship some of its features have been left behind. The plan was received with reservations.

I know, for instance, of no ship committee which includes in its membership the lower ratings. Seamen and firemen are barred and yet these are the very men who come into direct contact with the conditions causative of accidents. The committee personnel consists exclusively of officers who perform simply because they stand in fear of the consequences if they do otherwise.

The principal objections to giving seamen and firemen places on the committee appear to be the frothy character of their suggestions, their tendency to introduce matters entirely foreign to its jurisdiction; they develop an aggravating aptitude, once the muffling influence of inequality breaks down, for venting grievances, registering complaints—become too garrulous, in other words. And this is thought to be dangerous, rather than desirable. Too quickly liberty is distorted into license. Then, too, are they not drifters, with a penchant for roaming from ship to ship, remaining ashore long enough to woo their women, lap liquor, waste their wages, then search for a vessel to earn more? Very true! They differ but little from their kind ashore. Human weaknesses are the same wherever found the world over.

In shore procedure the presence of workmen on safety and other committees has been proved an asset of actual, not intangible, value. The success of the movement has been due in no small way to the active participation of those who do the work. They constitute a source out of which hundreds of invaluable suggestions emerge, as the minutes of these meetings forcefully attest. Of course, there is bound to be a certain amount of drivel, of loose talk, of foolish proposals, but no more so than the overdoses spilled in the United States Senate or the Rotary Clubs, where the big boys of business pay \$1.25 for a 60c lunch and sing songs to counteract indigestion. It is the lowly place occupied by the worker in the social scale that makes his articulation the more offensive. We are prone to condemn in others that which we condone for ourselves.

Whether the committee method of organizing ships for safety is the most effective, perhaps might be answered after the manner of the American statesmen who, asked his opinion on the success of the democratic form of government, laconically replied—"I do not know: it has never been tried." Judgment should, therefore, be withheld on the efficacy of the committee plan, since, with minor exceptions, it has been adopted only in part. But in view of

the highly satisfactory results met with in its various applications elsewhere, there is every reason to expect equally good returns from a complete adaptation to the requirements of safety on board ships.

And even where the plan has been accepted in a form embodying far more than the main essentials, it is surprising to find the innumerable hampering restrictions imposed. Operations are not free but fettered. Responsibilities are assigned and the necessary authority to carry them out denied. Once the plan has been determined and the structure developed, it is usually left to take its own soundings, in unfamiliar waters, with neither chart nor compass. PREVENT ACCIDENTS, is the mandate peremptorily presented, as though the mandate of itself was all sufficient.

Safety is the one division of industrial relations to which so little is given and of which so much is expected. Mal-nutrition for years has retarded normal growth. The upper strata of officials tacitly give their sanction but active, personal support is largely lacking. Not that they are indifferent to the conservation of human life and limb! Far from it! Their time is fully occupied; the burdens of business, or the worries of no business, bear heavily, and only matters of the greatest importance may usurp their attention. Accident prevention, as yet, has not attained to that degree of recognition.

The reason why the safety man finds the door to the front office more often closed than open, is because the movement, so far as shipping is concerned, is destitute of the quality of leadership needed to facilitate free entrance. What safety needs more than anything else is fewer technicians and more thinkers; more of the men of vision and of personality, whose convictions inspire confidence, not contempt. Here again, leadership has fulfilled ashore where the absence of it wrought failure afloat.

Super-annuated employees, foremen or run-of-the-mine clerks, whose period of service or loyalty gives them a preference for continued payroll attachment, are not the caliber of men qualified for the executive direction of accident prevention policies. To such it is merely a job, in no sense a jurisdiction of grave responsibility. They are assured security of a means of a livelihood—pensioners retained in active service. They are satisfied while the interests entrusted to them suffer.

Safety has not reached definite professional status, being considered more in the light of an experiment than as an economic necessity. Value it has assuredly but how much is vague? An important industry takes it up, ordains it as an established unit, prepares a program, selects a specialist for supervision and success follows. Other industries, more curious than convinced, do likewise, but with the injunction to incur no expense. Chosen as chief is somebody with not too much to do, or whose retirement is imminent if not otherwise inevitable. He has no conception of the potentialities of his position and persuasion is impossible without perspective. Yet he is the point of contact between the front office and his own. Can you believe that these same industries recruit their sales forces, their staff of attorneys or departmental executives in any such manner? A man is respected for what he represents, his character and connections. A business institution is judged by the type of men conducting affairs. One does not react favorably to the overtures of a slipshod salesman.

Shunting a man into a position for no better reason than that both happen to be available, or political considerations require that an opening be created, is a usual method of filling the vacancy, but a studied selection will prove far more satisfactory and successful. Ability, of course, should, and is said to be, recognized and rewarded. But is it? Scrutinize the make-up of the organizations with which you are familiar and invariably you will find that the rank and file faithfully mirror their active chief. Men favor their own kind. Like attracts like.

Hence, the basis of an efficient marine safety organization is personnel and not a mere skeletonized program of projected activities. Success will come only

in so far as it is endowed at inception with the qualities of success. And these I would enumerate as follows:—

1st.—The selection of a capable executive for the sole control and direction of all accident prevention measures. In the appraisal of qualifications, personal attributes are accorded the greatest weight. He should be a convincing speaker, wield a persuasive pen, possess a commanding personality and above all have a pronounced ability for working harmoniously with his associates. Regardless of all other virtues, I stress this latter as of first importance. Leadership consists of nothing more than inducing cooperation to a common end. That he has had actual experience at sea or a thorough knowledge of the economics of ship operation is assumed.

2nd.—Clothe him with the necessary authority, within, of course, well defined limitations. Give him to understand that he is held responsible for results and that he may rely on the unstinted support of the management.

3rd.—Inaugurate safety committees on each vessel of the fleet consisting of the master as chairman, the chief engineer, the steward, a seaman and a fireman. The master, engineer and steward to remain as members during their attachment to the ship, the seaman and fireman being rotated every three or six months. A secretary to be appointed by the master.

The committee, accompanied by the secretary, will make a weekly inspection of the ship, carefully noting and recording all hazardous conditions and practices which will be considered and corrective steps taken at the regular monthly meeting. Instances where immediate action is called for, the committee has power to decide. At the monthly session the secretary will present a prepared memorandum of the items which the inspection uncovered and incorporate in the minutes each item and its disposition.

Each accident on board ship will be investigated by the committee, interviewing the injured where their condition permits, and their conclusions and recommendations to preclude a recurrence will form a part of the official report on the form provided to the safety supervisor. All reports to be issued by the secretary and approved by the master.

In addition, the secretary will see to the periodical changing of posters on bulletin boards according to a schedule and assume such other duties as may be assigned to him by the master, as chairman, from time to time.

4th.—Create a permanent general or shore committee representative of the operating, engineering, claims and steward departments, the safety supervisor acting as chairman.

At the monthly meetings—to assemble less frequently is ineffective—they should pass upon all matters which the rules and regulations require ship's committees to so consider. Approval or rejection should be prompt and seldom deferred. In cases where disapproval seems merited, the ship committee is to be notified, the reason stated, and a request made to amplify their recommendations with additional data. If upon reconsideration the General Committee elects again to reject, the decision becomes final.

The minutes of the ships' committees are to be read at each meeting of the General Committee, thus to keep fully informed of the fleet's safety activities.

Each accident report to be read, reviewed, and the recommendations of the ship's committee considered and the action taken noted. At each meeting the safety supervisor will present a detailed report—a copy to each member—of the results of the month preceding and a comparative analysis of individual ships. Composite reports to be prepared quarterly.

The foregoing is a mere outline of a form of organization calculated to meet, with adaptations, the requirements of the average cargo or passenger ship. No hard and fast rules apply, from the fact that circumstances vary as do the ships themselves. The duties of safety supervisors are fluid rather than fixed. Some rule over a wide domain, while others can scarcely be said to rule at all. The

latitude allowed the committees however, determines their value. No safety committee is needed to place wrenches where they belong, to tighten a hand-rail, or wipe up oil drippings from the engine-room floor plates. Necessary, to be sure, yet calling for no special set-up. Men become responsible by shouldering responsibilities. Whether your committee will die or develop, depends on the stimulus received. Interest is infectious. Indicate yours and the committee members will respond in kind.

Safety is cooperative, mutually inclusive, from the highest to the lowest. Everyone is concerned, everyone must do his part. To prevail upon them to do so is an educational, not an engineering problem.

CHAIRMAN HUNTER: Mr. Bush has given us some rather concrete plans for an organization, and I'd be very glad to have any one express his views in connection with any of the points that he makes. We have at the present time four ships with ship safety committees, and on all four of them we have unlicensed men. The master is the chairman, the third mate the secretary. One of the chief engineers or some one that he may appoint is also a member; the steward, and we have one unlicensed man from the deck and one from the engine department.

FERN WOOD (Moore & McCormack, Inc., N. Y. C.): Some one has said that when unlicensed men are on the safety committees, the men in their safety meetings talk about irrelevant things. I don't seem to see where their personal desires and feelings have any bearing on the safety campaign. They talk about food and things like that.

CHAIRMAN HUNTER: I think that is a matter that the master can handle satisfactorily. There may be such a discussion aboard our ships, but we never hear of it. We haven't had that difficulty.

CAPTAIN HENRY BLACKSTONE (United States Protection & Indemnity Agency, N. Y. C.): The Protection & Indemnity Agency two years ago inaugurated a plan very similar to the one Mr. Bush outlines. We recommended the including of unlicensed men as members of the safety committees, and we found in shipping where this scheme had been tried that it works. It was just as you said a minute ago—it is up to the master. We can suggest and outline for an organization, but if the master hasn't sufficient personality to put it across in one ship, it won't work. It is entirely different from safety organizations in a plant ashore where there is continuous supervision. The shore safety committee can organize the ship's committee while the ship is in port, but she is not in port very long. It is up to the captain and the officers after that. My observations have been that in ships where the committee has been taken seriously, organized, and the plans carried through, the seamen and firemen have cooperated. We have several outstanding instances of that. It is quite possible, of course, that they may discuss the merits and demerits of the food and the personality of the steward and all that sort of thing. But we have found that very valuable suggestions have emanated from the men, and they have improved conditions considerably where they have been carried out.

ARTHUR TOOE (The Texas Co., N. Y. C.): I believe that the paper just presented gives a very clear and concise picture of the attitude of the executives in the shipping business. My belief is that Mr. Bush has hit the nail on the head. He has minced no words, and he put for future publication the picture of the feeling of the majority of executives in the maritime business, which we talk about but which we never have had the nerve to write about. We know that unless the executives will back up the safety movement, you can't get the masters of your ships and the officers and crews under them to have an interest in them. We know of many cases within our own section where the affairs are conducted with hesitancy on the part of the supervisors of safety because they either are afraid to go into the office or because they feel that it won't do them any good to go in. I wish that the paper just presented could be written in twelve-inch type and sent to all our shipping executives who make fun of the safety movement!

Mr. Wood: That condition may exist among some executives in probably a large percentage. But I know companies who keep account of their safety men, who hold more meetings all the time.

CHAIRMAN HUNTER: I think that is rather the exception to the rule.

Mr. Wood: I, personally, am very fortunate in the fact that my superior is very much interested in the movement, and backs us up in anything we try to do. But I agree with Chairman Hunter that it is rather the exception to the rule. Those who work under the exceptions are fortunate.

CHAIRMAN HUNTER: I think he is perfectly correct in saying that the attitude of a master toward his ship, where it is clearly defined by a responsible statement, or just what you can infer from it, colors the whole thing aboard a ship. I know that we had one master whose idea was that if men were fools enough to get hurt, let them get hurt. A lot of the masters feel this way, but they don't have the nerve to come out and say it. When they get the impression that the people above them are interested in safety, the majority see that it makes quite a difference.

Mr. Wood: What every safety worker needs is to get the support and the interest of the superior, more than is ordinarily done.

CAPTAIN BLACKSTONE: The safety man who feels that he can walk into the superior's office any time and get a hearing is fortunate. I am very much in agreement with Mr. Tode's view for the simple reason that I have had a lot of experience with it. One line in particular formed very successful committees aboard the ships. I think that was entirely due to the fact that when we took it up with the management, the marine superintendent was heartily behind it, and instead of having the organization meeting aboard the ship, he called all the officers up to his office, and the organization meeting took place in the marine superintendent's office. That in itself impressed the officers with the importance of the thing. The marine superintendent told me after one meeting that it was the first time he had ever seen a couple of those officers with a white collar on. They considered that it was something really important when the ordinary routine work on a ship was discontinued, and they could sit down in a chair. The superintendent gave them a brief introductory talk about the importance of the movement, and let it be known that he expected their complete cooperation. That is the company in which we had the outstanding success with the organization of the committees aboard the ships, and the functions of the committees were wonderful.

CHAIRMAN HUNTER: Mr. Bush referred to one thing where he is perfectly correct, and that is the question of expense. I know of one case where certain definite recommendations were made at a meeting. Things had to be done for absolute safety and the engineering department was instructed to prepare an estimate of what it would cost. At a subsequent meeting they said it would cost about \$60,000. No one has ever heard tell of the thing again. The last paper we have on our program for today is by Captain Blackstone. Captain Blackstone brings to this subject a rather comprehensive experience in that he has been master of ships at sea, as well as activities ashore for the Protection & Indemnity Agency. Captain Henry Blackstone.

The Safe Handling of Cargo on the Dock

By CAPT. HENRY BLACKSTONE

Safety Engineer, United States P. & I. Agency, Inc., New York City

Each individual dock presents its own particular problem with regard to the safe handling of cargo. Different classes of cargo require different methods of handling and many excellent articles have been written on the subject. Most of these articles, however, were written for the purpose of extolling the virtues of some particular tractor, truck or conveyor and, naturally, were somewhat biased and are beyond the scope of this paper.

We have two fundamental questions to consider. One is the "Liner" service with regular schedules and a more or less steady flow of cargo, the nature of which can usually be foretold. The other is the "Tramp" service with an irregular schedule and a heterogeneous collection of cargo consisting of everything under the sun.

In addition we have a labor problem differing considerably from that found in industry. Continuous supervision is difficult under the usual plan of operation. Labor is largely unskilled and floating. Misunderstandings are caused by the absence of close contacts between the management and the longshoremen and few mutual interests are engendered.

On the docks used by a liner service these conditions may be readily overcome by ambitious and energetic management. In this case the foremen, and to some extent the longshoremen, are regularly employed. They have acquired a certain amount of skill in handling the commodities regularly moved over the docks. Close contacts and mutual interests may be developed through proper organization. Such an organization is flexible enough to be applied to almost any stevedoring operation and has been successfully inaugurated and operated by several prominent companies. For the success of the whole plan the foremost idea is that the management remain squarely behind the movement. It is not sufficient for the general manager to issue an order and then forget the entire matter or subsequently pursue the plan in a disinterested or halfhearted way. The attitude of the longshoremen is directly dependent upon the attitude of the supervisory force and the men are quick to sense a let-down of interest on the part of the management. The idea which prompts such a movement must have the support of the outstanding personality of the organization. This does not mean orders supported by high-powered salesmanship but earnestness supported by practical knowledge.

Some one person should be placed in charge of the safety organization and he should be given enough authority to lend weight to his orders.

His first duty should be a survey of the situation to ascertain the physical condition of the property and equipment. An analysis of the accidents which have occurred over a definite period should be made. This will determine the cause of the most serious or most frequent accidents and indicate a starting point for the safety campaign.

After the facts have been established a meeting of supervisors and foremen should be called. The general manager should be present and address this meeting, setting forth the reasons for and the objects of the safety campaign. The safety director should then give a résumé of the findings of his survey and analysis, pointing out any changes in the equipment that may be necessary to eliminate hazards or increase efficiency. He should also instruct the foremen in the principles of safe practice and the supervision of their men. All efforts should be pointed toward the improvement of conditions causing the largest number of accidents and should be continued until these conditions have been eliminated. Then the next most hazardous condition should be taken in hand.

Since an accurate knowledge of facts is essential to the efficient management of any enterprise a complete record of all accidents should be maintained. This record should show the name of the injured man, date, cause and location of the accident, number of days lost, if any, and compensation costs. If the employer does not have the facilities available for this statistical work he should insist that his insurance carrier compile the statistics in a manner whereby the employer can analyze his own problems.

From this record a monthly statement should be prepared, showing the number of accidents, the estimated days lost and approximate costs.

To indicate the progress of the work a comparison of the monthly trend of accidents with that of the corresponding month of the previous year should be made.

A regular monthly meeting of the supervisory force and foremen should be called. The report for the month should be read and discussed at this meeting. Each fore-

man should be called upon to explain the details of each accident which occurred to men in his charge and state what steps have been taken to prevent a recurrence of the accident. In this way continual interest is maintained and cooperation encouraged.

Ship's officers should be present at these meetings whenever possible and should be encouraged to offer suggestions for the improvement of working conditions.

The general manager should write a personal letter monthly to each superintendent, commenting on his accident record. These letters should be posted where all employees can read them.

A large bulletin board should be placed in a central location on the pier where all longshoremen may see it. This should be supplemented by smaller boards placed at strategic points where the men may see them while at work. These boards should be posted at regular intervals in a manner to attract attention and should be maintained in a fresh and attractive condition. Never allow the boards to contain stale matter. We never like to read the same newspaper twice.

An important point, which is frequently overlooked, is the maintenance of morale through a sympathetic understanding of every idea presented by the men. They should be encouraged to make suggestions. If all suggestions, regardless of how trivial or impossible they may seem, be seriously received and considered it will not be difficult to maintain the interest and loyalty of the men. On the other hand, if a suggestion be ridiculed or cast aside without comment the man who made it will feel slighted and will soon lose interest in the work.

With the proper functioning of an organization of this sort it is not difficult to overcome misunderstandings and establish mutual interests. The men can be made to realize that they are personally interested in the earnings of the company; that every sixty dollars saved from needless expense will pay a six percent dividend on a thousand dollars of capital invested in the business. And, by the same token, an accident costing sixty dollars will require a thousand dollars at six per cent for a year to pay for it.

On a dock used by casual ships with no definite schedule the problems are different. Here we have no regularly organized force of longshoremen. The floating labor problem presents itself.

To whom must we look, then, as our leader of the safety campaign? We must put the Stevedore in the place of the general manager of the liner company and adapt our organization to his needs. He has a contract with the ship to discharge and load her cargo for the current voyage. He has compensation insurance covering all of the men on his pay-roll, or is self insured.

With a few minor changes the plan outlined can be made to apply to an operation of this kind.

In view of the fact that no regular dock is used we will have to dispense with the bulletin boards. The regular meeting will have to give place to a number of informal talks by the "Boss Stevedore" on the job. With no permanent safety director the records will not be so complete, although the timekeeper can keep a comprehensive record from his time book and compensation reports. The best plan is to require the insurance carrier to submit periodical reports.

Here again we have the answer in the attitude of the supervisory force. If the stevedore so desires he may easily inaugurate a safety campaign. We appreciate that often in an operation of this kind the "Boss Stevedore" does not fully realize that his efforts in prevention of accidents are measured in dollars and cents. If the Stevedore is not insured it is difficult to educate him if he does not fully appreciate the situation. Just how to present the idea to him is a problem, but it would seem that costs themselves would indicate that something was needed to keep down compensation losses. If an insurance carrier is involved it is the duty of that carrier to his assured to see his problem and sell him a safe and sane idea. Once the idea is implanted it will grow.

In competition for a stevedore contract the ability to show a record of high production at low cost is essential. In making such a record possible the prevention of personal injuries plays an important part.

A large number of accidents have been found to result from men having been placed in positions for which they were not suited physically or mentally. Largely due to the inability of the man to adjust his working habits to the hazards of the job, this has resulted in human failure.

It is here that proper supervision enters the picture. Immediately the foreman finds a man not suited to the particular job to which he has been assigned he should shift him to one better suited to his capabilities. As an example I might cite the case of a man who had only the thumb on one hand. He always wore gloves and the foreman didn't know of his disability until after he was injured and sent to the doctor. He was a willing worker and so was given a broom and told to keep things swept up. The result was greatly improved working conditions due to the absence of the usual accumulation of dirt and small scraps of wood, etc., in the way of the truckers. This brings out the importance of "good housekeeping." The consensus of opinion of a number of pier superintendents and boss stevedores who were questioned on this subject was that a smooth, non-slippery trucking surface contributed more than any other one thing to the safe handling of cargo.

Continual, intelligent supervision is the price of safety. This type of supervision rests not alone on the foreman but is shared by his superiors. If the foreman will not accept the responsibility of efficiently supervising his men; if he be inclined to overlook conditions which are conducive to accidents; if he be prone to take chances; it is far better to dispense with his services than to await the inevitable accident.

We have records of many cases which bear out this statement. One man suffered fractures of both legs when a tier of lumber collapsed in the hold of a vessel. He was making up drafts and followed the line of least resistance by digging into the lumber in the square of the hatch instead of breaking it out of the wings. His foreman allowed him to continue in this bad practice until one of the wing tiers fell on him. A similar accident might readily be caused on any one of a number of docks where cargo is tiered, in fact we have a record of one which occurred recently. A man was breaking down a tier of baled jute and pulled out the key bale, causing the top bales to fall. He suffered a compound fracture of the leg.

In another case the hatch tender was seriously injured when he was struck by several rails which slipped out of an improperly stung draft of railroad iron. In this case he attempted to instruct the men making up the drafts while a draft was in the air over his head. He knew the rails might slip and was in the act of telling the men to be more careful when the whole draft of eleven, thirty pound rails slipped out of the sling and struck him on the head and shoulders. This accident was the direct result of improper supervision and taking a chance. Had the hatch tender stopped the draft and remedied the obviously dangerous condition as soon as he saw it, he would not have suffered the serious injuries which he received.

Too much stress cannot be brought to bear on the subject of the safe tiering of material on the dock. There is a safe and an unsafe method of tiering any kind of material. The tiering of barrels, boxes and bales is always a hazard unless properly done.

Barrels should be tiered on end with damage between the tiers and the upper barrels resting over the chimes of the lower. If for any reason they are tiered according to the generally accepted "Bung up and bilge free" method of stowage in a ship they should be secured by means of end chocks of sufficient height to prevent the end barrels being forced over them by pressure of the upper tiers. In removing barrels from tiers the upper barrels should always be removed first. This seems obvious yet accidents have been caused by pulling the chock out from under the lower barrel and allowing the tier to spread.

In tiering baled material the bales should be built up in such a way as to be self

supporting and not leaned against the side of the pier shed. The bales should be cross tied at sufficiently frequent intervals to insure stability to the pile or else the tiers should be built in the form of a pyramid. Care should be exercised that all bales or other containers of the same consignment be tied together, if possible, so that the whole pile may be broken down at the same time and not leave a lone-some "Washington Monument" of bales or cases standing alone to commemorate someone's lack of foresight, and perhaps collapse with disastrous results when a heavy truck passes.

Boxes and crates present a serious tying problem. Because of unusual shape and size it is difficult to cross tie this sort of material. Some boxed and crated materials are extremely unwieldy, largely due to the flimsy construction of the box or crate and the small bearing surface of the material or machine contained therein. Here particular care is necessary.

Plate glass, bicycles, marble slabs, etc. are usually piled on edge and handled in the same position. It would seem the better practice in handling this material to assign a sufficient number of men to lift or carry the article in such a position that the article will not be damaged and yet so that too much strain need not be placed on any one man. I have in mind a fatal accident which was caused by two men attempting to move a slab of marble in a vertical position. It tipped over and crushed one of them.

Rolls of paper may now be safely handled by means of a specially designed lift truck. As previously stated, however, this paper was not intended to extol the virtues of any equipment. This phase of the problem brings us back to the fundamental question.

Will the management give the problem of the safe handling of cargo sufficient thought to apply all possible aids to its solution?

The foremen can be depended upon to deliver the goods provided the management will furnish them with the proper tools and prove by continued active interest that the safety campaign is not just a "flash in the pan" but a sincere effort to eliminate a serious type of human and property wastage.

CHAIRMAN HUNTER: Captain Blackstone has given us a very concise and clear picture of the conditions that exist on most docks. I am sure that some of the men here have had experience with dock work, and have some comments to make on this paper. We'd be glad to have them now.

CHARLES H. FLATNERS (Eastern Steamship Lines, Inc., Boston, Mass.): I have dock experience up in Boston. Captain Blackstone's paper has quite a few points of interest to our concern, especially the piling and tying. We have accidents quite frequently while breaking out either in the vessels or on the pier, and some of the upper parcels will fall and cause an accident. I think that he has covered the subject well, and no doubt has given us some suggestions which will be of benefit to eliminate that type of accident. Our problem, in addition to the handling of cargoes that are tied, is the trucking problem. That is where we have most of our accidents—in trucking. The packages will fall off the truck, or the truck will strike some obstructions, the handle will hit a man on his chest. Most of our accidents seem to be of that type.

CHAIRMAN HUNTER: The question of good housekeeping comes in there.

MR. FLATNERS: I wouldn't say that, because we have made it a point to follow the suggestions laid down in the paper, we keep all sorts of materials off the docks. But when they have an excessively high or low tide, and there is quite a pitch to a gangplank the truck gets away from the man causing an injury.

FRANK H. COGAN (The Delaware Lackawanna & Western Railroad, Hoboken, N. J.): Captain Blackstone, what has your experience been in connection with barges and lighters? On some piers they haven't the same supervision of the gangs when they get them on the boat.

CAPTAIN BLACKSTONE: Of course, a great deal depends on the organization of the stevedore gangs and if they have a foreman in position to supervise the men on the barge just the same as he does on the dock.

MR. COGAN: If they have a small gang on the boat they don't have a full hatch gang, as they do on the dock, and there is property damage as well as personal injury when things are dropped by breaking gear. The tendency is, in some cases, to go ahead and take a chance on gear that is inadequate.

CAPTAIN BLACKSTONE: Well, that's a case of improper supervision again. The hatch tender will watch his step, as soon as he takes the strain on the draft, to see that it is coming up even. That's one of the points I stressed—that proper supervision is the price of safety. If the foremen are sufficiently impressed with the importance of the thing, and made to realize that speed isn't the only consideration, things will work out O. K.

MR. FLATNERS: In connection with the handling of cargo on shores, some companies have already put into effect use of automatic couplers on trailers. We recently tried them out on our piers, and found them a very effective means of stopping accidents. Their use has increased the efficiency of handling the cargoes and there has been quite a reduction in the claims of damaged cargo. I don't know whether the rest of the members here have put those automatic couplers on, but I would advise them to. They are very efficient.

A. J. SMITH (The Marine Office of America, New York City): One situation has arisen under my own personal attention more than any other in the case of the cargo damages or damages to ships and lighters from the drafts, and that is this: the stevedoring firms employed by a steamship line either handle a particular ship occasionally or regularly. They are given the use of the ship's tackle and winches, they operate and possibly use their own slings, but outside of that it is all the ship's gear. Now, that stevedoring firm may obtain this contract by competitive bidding, and its men may observe some fault on the part of the ship.

For example, the head block on a tackle was so badly hung that the cable had scored the cheek of that block until there was a groove where the cable actually laid. The lead-off was at about a thirty-degree angle out of that block. That was on a British ship. I spoke to the crew's officers, and the answer was, "Well, there are other stevedores." The result was that the cable sawed the draft, it went through the deck of the liner, and I think there was about a three or four thousand dollar repair damage. The question of the use of defective equipment has come up a great many times. I believe it is something that well warrants the attention of both the safety men from the ships and the stevedoring companies. It seems as though there must be some way of getting together and rectifying things that a stevedore notices as soon as he comes aboard, and yet is powerless to remedy unless the ship officers feel like it. And usually they don't. They are in a hurry, and they don't want to spend the time or the money in any changes aboard. I would like to hear some of the experiences of other men about the situation, for it has been the origin of most of the cases I have had under stevedores' liability loadings and cargo damages at the docks.

CHAIRMAN HUNTER: Captain Kain, what is your reaction on this?

CAPTAIN W. P. KAIN (Shipowners Claims Bureau, Inc., N. Y. C.): I think it works the other way just as often. I know of numerous cases and instances where the ship's equipment has been turned over to the stevedoring firms, and because the stevedore has not used it properly, the equipment has failed. You have the lack of coordination in the ships. When the equipment has failed, there is the tendency to blame the ship.

MR. SMITH: I am ready to admit that it does work both ways. The point I am driving at is that there should not be the lack of coordination, the lack of responsibility. There seems to be no time when you can get anything done when the stevedore finds something obviously wrong. There is very little control over it.

stevedore. He goes under the assumption that the ship's gears are sufficient to hoist anything up to so many tons, and pull it out from or load it into the hold. That is bad practice.

CAPTAIN BLACKSTONE: That is a very real condition. We have taken it up with the companies where we insure both the ships and the stevedores. In every case we have had complete cooperation. Of course, that doesn't apply to foreign ships. That was what Mr. Smith refers to. We have no control over foreign ships. But in the case of the companies that are both under our coverage, stevedoring and the shipping, we have had no trouble at all. Of course, we do inspect them quite frequently. We have an inspector on the job practically all the time, but we have had little trouble with any lack of cooperation. In many—in invariably all cases, as soon as a condition is brought to their attention, remedy is forthcoming immediately.

CHAIRMAN HUNTER: There have been great strides on the west coast in cooperation between the stevedores and the shipowners. It was tried here, as I remember, on the east coast some few years ago, but not much progress has been made.

CAPTAIN KAIN: It has been the experience of practically every ship officer, that the stevedores out there are a whole lot more for cooperation than they are here.

CHAIRMAN HUNTER: This all gets back to the idea of education and endeavoring to enlist the support of both sides.

MR. COGAN: Another bad practice that ought to be discouraged is that they will handle automobiles or some heavy commodity and won't take the time or expense of changing the gears.

ADJOURNMENT

Thursday Morning Session
October 15, 1931

JOHN S. HUNTER, Chairman
The Atlantic Refining Company, Philadelphia, Pa.

The third session of the Marine Section convened with General Chairman Hunter presiding.

CHAIRMAN HUNTER: One of the most important phases of the marine industry at the present time is the development of the motor ship. We are hearing a great deal about this on all sides. The first paper this morning is to be presented by our good friend Arthur M. Tode, who from his experience with the Diesel engine of many types, I am sure will give us something worth listening to.

The Prevention of Explosions in Motorships

By ARTHUR M. TODE

Technical Division, The Texas Company, New York City.

Always the development of marine machinery has proceeded with three primary principles in view: efficiency, economy and safety. Precisely as with the earlier types of industrial machinery ashore, so technical advances in marine engineering have been attended by certain and many inescapable hazards. One need but refer to the record of experiences touching the early Scotch and water-tube boilers—explosions with all too frequent loss of life and damage to property; of steam pipes letting go; of steam cylinders bursting and turbine casings exploding, to force home the realization that steam machinery has made its full contribution to death and destruction.

Joint investigations by the United States Steamboat Inspection Service and owners of the vessels involved, resulted in the formulation and promulgation of certain rules and regulations governing the building of steam machinery and its operation in service, so that at the present time such occurrences may be directly traceable to incompetence, carelessness or neglect on the part of the operating personnel.

The past years have seen the motor ship propelled by Diesel (internal combustion) engines come quickly to the fore, until in certain trades and services it has seriously threatened the supremacy of the steamer, and, indeed, in certain cases it is already supreme. The rapid gain of motor ships required an increasing number of specially trained operating personnel, which was sometimes difficult to recruit from the ranks of the steam engineer. Then, too, the manufacturers of Diesel machinery have had their problems to solve, some of which included the adaptation of certain apparatus for shipboard use. In the majority of cases, where difficulty of operation developed from any cause whatsoever, attempts have been made to silence or minimize reports of the trouble, especially in the case of severe damage to machinery, or a disaster. Usually, it has been because of the fear of arousing prejudice on the part of shipping executives that such difficulties have been discounted by the manufacturers. Frequently, however, this policy has resulted in minor troubles being exaggerated manifold through the agency of the underground system of communication, or, in the parlance of the sea-going profession, "scuttle-butt yarns."

The advent of the motor ship has introduced certain problems of manufacture and of operation entirely different from those prevalent in steam practice. Due to the nature of Diesel engine construction and operation, and aside from mechanical difficulties akin to steam engines, the chief source of grave trouble has been explosions—usually caused by high pressure air or by gaseous vapors. While such explosions (and this is equally true of steam boilers) probably never will be entirely eliminated,

yet their occurrence can and will be reduced to a large extent by frank discussion of the probable causes with the aim of finding means to prevent them, and by following out the two premier twins of safety—intelligent instruction and proper supervision.

Among the factors which must be included in such a study, and which have also played a part in past disasters, are the air compressors, inter-coolers and air system, the employing of oil for piston cooling, crank case explosions, the proper ventilation of motor rooms and the machinery, and the use of petrol or gasoline for cleaning purposes.

Explosions in the Air System

Explosions have taken place in fuel valves during the start of Diesel engines, resulting in burst fuel valve bodies, cylinder heads and air injection pipes. Such disasters have occurred, for instance in early foreign (British) submarine motors, and resulted in the introduction of the solid injection system in these craft. Similar explosions have been caused by bad practice tolerated by some manufacturers and intended to save air.

Most builders of air injection Diesel engines discourage the practice of admitting the blast air while starting takes place whereby it may possibly be admitted too late. In order to eliminate air line explosions some manufacturers assure that full pressure always will be on the air lines when the engine begins to turn, accomplishing this by a master valve for blast air actuated by the starting handle. Incidentally, where such a system is employed, the otherwise necessary opening and shutting of the valve on the air bottle is avoided, saving one man's time during maneuvering.

Flarebacks may occur in air spray valves when for any reason the cylinder pressure rises above that of the injection air. This is caused by the heated air flowing back into the atomizer, igniting the fuel present there. If lubricating oil vapor is present in the injection air line, or if fuel in the atomizer is blown back into it, serious explosions may take place in the line and may even travel back to the injection air bottle, rupturing the latter with great violence.

Injection Air Bottles

The air bottles for storing injection air and starting air are nearly always made of seamless-drawn steel and provided with forged steel heads in which are mounted the control valves. The complete loss of air for starting purposes on a motor ship is an embarrassing situation to say the least; yet such a condition has occurred in the past, although with the present system of fitting independent auxiliary air compressors the probability of its happening is not great, excepting on smaller vessels not equipped with such auxiliary apparatus.

There have been numerous occasions where an emergency source of pressure for injection and starting has been in the form of a carbonic acid bottle. The usual pressure in the carbonic acid bottle is around 700 lbs. per sq. in. at room temperature, but this is reduced rapidly when the gas is passed over into the injection bottle. To restore the pressure, the carbonic acid bottle is warmed—it must never be heated—by the application of rags laid over the bottle, while hot water is poured over them. Energetic heating in such a case positively must be avoided, involving as it does the risk of explosion.

If in doubt, the danger of using oxygen for starting purposes may be avoided by testing the gas in the bottle before using. This can be accomplished by slightly cracking the valve on the bottle of unknown content and allowing a little of the gas to blow on a charred, glowing stick of wood: if the gas is oxygen, it will immediately burst into flame. If the gas is carbon dioxide, it will immediately extinguish the glowing ember. As an additional safeguard, a small piece of burning oily waste may be held under the cracked valve; if the gas is carbon dioxide, the flame will immediately be put out.

If an injection valve is ever operated with oxygen its parts are likely to be fused together by the resulting intense heat, while in most cases the cylinder head is likely to be destroyed. Fatal accidents have also followed attempts to use oxygen for starting, because in addition to fusing the engine parts, explosions in the air lines and tanks are not only possible, but probable.

Intercoolers and Coils

Inter-coolers are provided on air injection Diesel engines to keep down the temperature of the air passing through the several stages of the compressor. During its passage through the inter-coolers the air surrenders to the cooling water practically all the heat of a compression, although some of this heat has already been absorbed by the water in the compressor jacket. After the air leaves the last stage it is usually conducted to an after-cooler, where the heat generated in the final stage of compression is removed in exactly the same manner as in the inter-coolers. The cooled high pressure air then passes to the receiver, where it is stored, until drawn off for use as required.

The safe operation of all forms of inter-coolers depends on keeping both the interior and exterior tube surfaces free from deposits. The interior of the tubes must be guarded against coatings of oily slime such as may be readily produced by over-lubrication or the use of an unsuitable oil in the compressor. On vessels operating in shallow or muddy waters, marine growths tend to coat the outside surfaces of the tubes, so that regular cleaning is necessary. Inter-coolers have been known to burst with disastrous consequence owing to excessive thinning of the tubes by corrosion or erosion. Corrosion may be caused by the formation of organic acids due to oxidation of the lubricant in the presence of water, particularly if the oil contains fatty acids or substances having a pronounced chemical affinity for certain gases which may be present; also, to galvanic action caused by the presence of dissimilar metals.

Erosion may be the result of a high-velocity cooling system carrying particles of grit, the continuous abrasive action ultimately thinning the coil or tubes with the results already described. As the process of erosion and corrosion removes metal from the inner walls of the coils or tubes, no warning is generally given until they fail. Two general methods can be employed for detecting this condition early enough to forestall accidents. The coil may be tested under hydrostatic pressure equal to twice its normal working pressure, or it may be accurately weighed when new, and then weighed again each time after it has been steamed out for cleaning. The latter process is not very convenient, and may give misleading indications if the tube is nearly corroded through in one spot and only slightly affected everywhere else. Local effects are more likely to be produced whenever there are any sharp bends against which particles of carbon, pipe scale, etc., intensify the chemical action by mechanical erosion.

Copper coils which are often used for the high pressure coolers are blamed for some past troubles. Vibration is sometimes caused when coils of copper pipe in the high pressure stage cooler happen to touch. This may wear a hole in the pipe, or rub a bright spot where mineral salts may attack the metal. This trouble may be avoided by seeing that the coils are spread far enough apart to preclude danger of touching each other. Copper pipes are hard to clean, and tend to expand and contract with variations in pressure like the spring in a pressure gage. Some manufacturers, therefore, prefer to construct the coils of solid drawn steel tubes.

The use of steam for cleaning inter-cooler coils is most convenient as well as a safe procedure. In this fashion the gummy deposits which have collected on the coils are given an opportunity to melt and to collect in purge pots or draining chambers fitted below each stage inter-cooler whence they may be drained at the end of

the cleaning operation. Straight tubular inter-coolers may be freed of deposits by means of cleaning rods and brushes similar to those used for cleaning gun barrels, a hot soap solution being used for flushing. Kerosene and similar solvents should not be used, but if they are used the utmost caution in cleaning inter-coolers must be taken because if any is left in a pocket, the low flash point vapors are likely to lead to an explosion.

When an intermediate-pressure or high-pressure cooler tube or coil gives way, it generally bursts the casing also, imparting sufficient velocity to the fragments to cause injury to personnel. Inter-cooler and after-cooler casings have been known to burst even when fitted with safety valves, so that it behooves the engineer to keep a careful watch on the coils and tubes.

Air Compressors

The air compressor as usually installed in higher powered Diesel engines will have either three or four stages, and will be equipped with suitable inter-coolers. The exact quantity of air required for injection is difficult to determine; moreover, since it varies with different fuels, and the compressor must also provide air for starting purposes, ample margin is usually allowed for in the design. The compression of air to pressures in the neighborhood of 1,000 pounds will, of course, develop a considerable amount of heat; it is the function of the inter-coolers to reduce this heat and thereby keep cylinder temperatures down to minimize the extent of oil vaporization. This is, of course, in the interests of safety, for otherwise accumulations of dust and carbonaceous matter in the inter-coolers, etc., might easily so restrict the air passages as to increase the velocity and consequently the frictional temperature of the air to a dangerous extent.

Flash Point of Air Compressor Oils

The subject of the heat of compression developed in the operation of Diesel air compressors causes some confusion in the minds of engineers as to the interpretation of the flash points of safe lubricating oils for such service.

Flash point readings are of value only in indicating the relative initial volatility of different oils, and are not definite temperatures at which they "boil" or pass completely into vapor corresponding to the boiling point of water.

Oils of the proper consistency which leave unusually low carbon are much to be preferred to oils of high flash point. Certain engineers, however, in their eagerness to secure oils of high flash point will frequently overlook this matter of subsequent carbon deposits. This is, of course, erroneous.

It is sometimes assumed that a high flash point is a desirable quality of a lubricating oil for air compressor service. The thought is that a high flash point will prevent the loss of oil from the cylinder walls through evaporation thereby lessening the danger of explosions. However, laboratory tests have been made with high quality, light body lubricating oils having a flash point between 310 and 325 degrees Fahr. These tests showed that negligible quantities were distilled off up to a temperature of about 615 degrees Fahr., at atmospheric pressure.

It appears that the rapidity of evaporation of an oil, as well as its tendency to carry oil vapors from the cylinder wall film over into the discharge pipes and inter-coolers, is not governed by the flash point alone. Moreover, it appears that even with such an oil of too high a viscosity for compressor lubrication, a temperature of about 600 degrees Fahr., would not generate sufficient vapors to form an explosive mixture. The discharge temperatures in an air compressor range in the neighborhood of 325 degrees to 375 degrees Fahr., and since the cylinder walls are always jacketed it is natural that the oil film on the wall has a temperature lower than the discharge air.

Effect of Over-Lubrication

Even the best oil is at times carried over with the discharge air in liquid form when compressor cylinders are over-lubricated. This discharge air sweeping over the wetted surfaces carries small globules of oil along with it. The result will be an accumulation of oil and carbon deposits on the discharge valves which are directly in the path of the hot discharged air. Not being separately cooled like the cylinder walls, these valves have the highest temperature of all compressor parts. This is further proof that high flash point oil is unnecessary as these high valve temperatures cannot condense oil vapors from the colder cylinder walls. It must, therefore, be assumed that carbon which is found on the discharge valves leave the compressor along with the air.

Oils too heavy in body for compressor use will tend to deposit more carbon than an oil of the right body. Furthermore, heavy body oils distribute very slowly and require excess feed to assure a complete lubricating film being maintained. Over-lubrication, especially where a high carbon residue oil is used, promotes carbon and may be the cause of air compressor explosions. Consequently not only must an oil be most carefully selected, but also, whatever its characteristics, the utmost care should be taken to prevent the use of more oil than is necessary.

In this respect, it is very difficult for some operators to realize that but one or two drops of oil per minute is all that is necessary. This is effectively counteracted in many Diesel air compressors by so designing that the intermediate stage is at the bottom. As a result of such construction there is always a pressure opposing the tendency of the oil to work up into the air space from the lowest cylinder wall where it is thrown by the crankpin.

While dirty air is perhaps one of the most general causes of accumulations of foreign matter, yet, as has been pointed out, an excessive amount of lubricant will tend to develop carbonaceous matter which will materially increase the accumulation of deposits.

In addition, an excess of oil fed to the compressor cylinders may bring about leaky valves due to a certain amount of the oil becoming carbonized on the latter. All this, of course, leads to a decrease in operating efficiency. For this carbonaceous matter being relatively sticky in the early stages of its formation, will also tend to adhere to the piston rings, thereby causing them to become inoperative; furthermore, it will tend to destroy the lubricating film and result in scored cylinders. Unfortunately, there is no oil which will not deposit some carbon. On the other hand, there is a surprising difference in the characteristics of carbon which will be deposited by different oils.

To best effect air compressor cylinder lubrication, each cylinder should be equipped for force feed or pressure lubrication, whereby uniform and measured quantities of oil can be fed regularly. Only a drop or two a minute to the first one or two stages will be necessary.

The third or last stage will usually be abundantly served with oil carried up from the preceding. On the other hand, no hard and fast rule can be laid down in this regard, and the safest course to follow in determining upon the quantity of oil to use is to remove the valves at periodic intervals and examine the cylinder walls. A properly lubricated wall should be coated with a film of oil which will just barely dampen or stain a cigarette paper.

Compressors Must be Kept Clean

It is very desirable to clean out the air compressor system at intervals and wash out the carbon deposits before they grow to large proportions. Kerosene or any similar light oil must under no circumstances be used for this purpose, because of the danger of explosive mixtures due to their high volatility and the comparatively large

quantity used. The flammability of such material as kerosene, naphtha and benzene is so acute as to constitute a dangerous experiment to introduce it into any kind of a cylinder.

Some operators look with favor on the use of soap suds for cleaning, the solution of soap and water being fed into the air intake or through the lubricator about ten times as fast as the usual oil supply. The quantity used must be judged by the amount of carbon found on the valves when they are inspected. After such an application all receivers must be blown down to remove all the soapy water, and oil used again for a time before shutting down, in order to prevent rusting.

In the erection of air compressor piping it is of importance to have as few bends and tees in the pipes as possible. Pockets such as are formed in tees, elbows, etc., should be eliminated whenever possible as such pockets become receptacles for oil which add fuel for the fire if ignition should occur.

Air Compressor Explosions

The different stages of air compressors are so arranged as to compress the air at the same ratio correspondingly, so as not to overheat the valves in any one of the stages, and thereby damage the valves and springs; also, to obviate the danger of lubricating oil vapors becoming ignited with consequent explosion. Before there can be a fire in a compressor, there must be an accumulation of combustible material. If all the oil fed to a compressor were burned as it entered, the amount would be so small that it would have no appreciable effect. Any oil exposed to air at a high temperature will in time either evaporate or decompose, or be carbonized as it is commonly called. Carbon, combustible dust and some oil can and often do accumulate in compressor passages. Restricted passages may also have some effect in raising the temperature.

Cases of air compressor explosions which have been investigated carefully have revealed that the cause was excessive carbon deposits on discharge valves, piping and inter-coolers which had restricted the area of the passages. Such accumulation may interfere with valve seating. Leaking discharge valves may result in a rapid increase of the compressed air temperature to a degree far above the highest flash point of any lubricating oil. The abnormally high temperature of the air causes the carbon deposits to become incandescent which, in turn, will result in a rapid formation of oil vapors from these deposits as well as from any excess lubricating oil present in liquid form. An explosive mixture is thus formed with the hot compressed air, which is eventually ignited by the incandescent deposits.

The real cause of many explosions never has been satisfactorily explained. Some of them have occurred in piping remote from the compressor, and hence at places not subject to the highest temperatures. Oil made from inferior stocks is, therefore, inadvisable for compressor lubrication, even though it may be cheaper; the probability of very high carbon residues becoming great should preclude their use.

Crankcase Explosions

For use in marine work oils having a flash point below 150 degrees Fahr. have been considered as dangerously explosive and/or flammable. Because of this, boiler fuels for steamships as well as Diesel fuels and lubricating oils have always had a flash point in excess of 150 degrees Fahr. It has been considered that such fuels were much safer than gasoline and other light fuels and, therefore, that such a precaution offered greater protection against disastrous explosions. Recent investigations into crankcase explosions have, however, determined that this is not wholly true in all circumstances.

As a result of investigations relative to some particularly serious crankcase explosions it has been ascertained that under certain conditions mixtures of oil are

created from normal lubricating oil, the flash point of these mixtures being very low. It has further been determined that the explosive gases formed from these mixtures have been the cause of frequent crankcase explosions.

When an explosion occurs in the crankcase of a Diesel engine the crankcase covers may be blown off. This will certainly happen should the explosion be a violent one, with more or less extensive damage to the engine itself but not necessarily endangering human life. However, there have lately occurred some serious explosions causing grave injuries to the operating personnel which seem to have had other reasons than ordinary crankcase explosions.

Piston Cooling

On the larger sized Diesel engines the pistons are cooled either by sea water, fresh water or lubricating oil. The choice of cooling fluid is affected by a variety of operating conditions. Water has the advantage of a high specific heat and a good coefficient of heat abstraction from metallic surfaces. However, it is avoided in some designs because they do not permit of completely excluding water leakage from the lubricating oil system, where its presence is dangerous.

Where water is employed for this purpose it is, of course, necessary to provide a closed circuit so that no mixing with the lubricating oil will occur. If water cooling is used, or if the piston cooling oil is kept separate from the bearing oil, the cooling fluid is led into the piston through a telescopic or knuckle jointed pipe and flows out through a similar pipe discharging into a cooler, or overboard if salt water is used. Fresh water is better than salt water because it is less corrosive and less harmful to the lubricating oil. On shipboard, however, it requires heat-exchangers, separate pumps, and other complications of a re-cooling system, while the assurance that it will not sooner or later become salty cannot always be had.

Oil Cooled Pistons

The reliability of oil for piston cooling due to the relative unimportance of leakage has caused it to be viewed favorably for such service. The use of oil completely eliminates the leakage problem and permits of a simplification in the piston cooling gear in many designs. On the other hand, oil has a low specific heat and a low coefficient of heat transmission. Greater quantities must be circulated, while the difficulty of cooling it calls for extra-large coolers. The cracking of an oil-cooled piston in service may be dangerous.

In some marine installations the piston cooling oil is of a lower viscosity than that used for bearing lubrication, which makes it necessary to keep the two oils separate. In such cases it is necessary to have duplicate sets of cooling equipment to cool the heated oils. When it was found that one oil could advantageously be used for both piston cooling and crankcase lubrication, some ship-owners preferred this simplification which also allowed the dispensing of one set of cooling apparatus by permitting the piston cooling oil to discharge directly into the crankcase where it comes into contact with the lubricating oil used for the main and other bearings.

When oil cooled pistons are examined after operation, a certain layer of coke will invariably be found in the cooling spaces of the pistons. This layer of coke is an indication that the cooling oil has undergone a definite chemical change in the heated piston. To investigate these chemical alterations, experiments were conducted in a foreign laboratory with several first-class lubricating oils whose flash points ranged from 410 degrees to 428 degrees Fahr. The lubricating oil was then heated and the different fractions of distillation showed different flash points. The flash point of the mixture of all fractions of distillation was then determined and found to be between 86 degrees and 100 degrees Fahr. The oil had been heated in this test up to 644 degrees to 680 degrees Fahr. This chemical test definitely proved that lubri-

cating oil after being extensively heated has been altered as in the "cracking" process, reducing the flash point very much and to a point where the gases became very flammable and highly explosive.

The use of the high temperatures which were used in the laboratory tests may be objected to by some proponents of oil cooled pistons. However, it can not be questioned that these temperatures were much lower than might reasonably be expected to occur in a Diesel piston because of slowing down or maneuvering of the engine when ignition is irregular, or possible failure in the cooling system.

An explosion on board a foreign motorship ("Max Albrecht") in December, 1930, while in the Kiel Canal, which accident caused injury and death among the engine room personnel, was traced by the investigative board to just such a cause. The pistons were oil cooled on board this vessel, the cooling oil discharging directly to the crankcase. It appeared evident that this oil, whose flash point had been appreciably lowered through use, caused the explosion which was brought about by the failure of an automatic valve in the starting air line, permitting the passing of the ignited fuel through a vent pipe into the crankcase.

Following this investigation the Hamburg authorities have recognized this dangerous condition. A certain reduction of any possible danger is guaranteed through regulations published by the Hamburg authorities prohibiting the free discharge of piston cooling oil to the crankcase on vessels entering the port of Hamburg. This requirement in the interests of maritime safety is the first official act guarding against the danger of using oil for cooling pistons and making it mandatory for such vessels to have the piston oil system entirely enclosed so that this oil can not come in contact with the crankcase lubricant prior to being cooled.

Although a closed circuit in way of discharge of the piston cooling oil has certain advantages from the safety standpoint, yet this chemically altered piston cooling oil will mix with the bearing lubricating oil so long as the same oil cooler is used. This will again introduce the source of danger by resulting in an oil mixture of low flash point in the crankcase. The vapors from this low flash point oil will still have contact with air and with those parts of the engine which may cause an explosion by being heated, or even by sparks. It appears, therefore, urgently necessary that where oil cooled pistons are used, the cooling system for its lubricating oil must be independent of all other oil supplies to and from the engine. To entirely eliminate the danger of crankcase explosions from such source it will be necessary to eliminate oil cooling and substitute a water cooling system for the pistons.

Smoking in Motor Rooms

The several parts of an engine room of a motorship are always a potential source of oil vapors which may be present due to any number of reasons. As an example, it is probable that the chemical structure of the lubricating oils in the crankcase may be adversely affected through use and because of such changes more or less explosive vapors are prevalent in the crankcase. One of the crankcase doors may have been warped or through carelessness not set tightly in place; a stream of flammable vapor issues forth from this crack due to the engine pulsations and a man passing by heedlessly strikes a match to light a cigaret—the result is only too likely to herald another engine room disaster.

In the interests of safety, smoking, as well as all naked lights, should be prohibited in the engine room of all motorships and this order should be strictly enforced.

An Unusual Motorship Explosion

An explosion in the motor room of a foreign vessel (the "Kungsholm") which brought forth much discussion occurred a few years ago. The investigation of the Hamburg Sea Court definitely proved that several factors contributed to cause an

accident of such severity, and that the explosion was occasioned by coincidence of unfortunate circumstances.

This vessel, powered with twin-screw Diesel engines of 15,000 H. P., was proceeding to sea where the technical tests were to be held. While running along at slightly reduced speed, a slight explosion inside the crank casing of the starboard engine occurred, followed immediately by a violent explosion in the engine room. The first explosion caused several of the sheet-iron doors on the engine to be blown out. The flames shot out from the door openings, spreading through the engine room aft of the starboard engine into the thrust recess and tunnel, extending round the aft end of the port engine, lessening in force, and then reaching the space between the engines; as it went forward it lost its intensity.

On the starboard side the flame went forward and through the door to the forward engine room. Part of the floor plating in the main engine room was lifted out of place. An examination of the port engine showed that the lubricating oil trough under the bed plate was bulged in about three inches at the sides as well as at the bottom. The condition of the trough, made of steel plates 4 mm. in thickness and welded together, proved that the explosion had been most violent under the floor plates. The air pressure following the explosion was released out through the engine room casing, and the force was still so strong that the sky-light was lifted and blown overboard.

An examination of the starboard engine disclosed that the premier cause of the accident was due to the heating of a jockey-wheel for the main chain drive to the camshaft. This wheel was made of cast steel and provided with two bronze bushings driven hard into the wheel, each secured by means of a tap bolt. The bronze bushings had heated and seized on the shaft with the result that the securing pin was sheared, allowing the wheel to revolve on the external surfaces of the bushings. The heat generated in this way was so intense that it had ignited the lubricating oil, and deposits of burnt oil were found on the bushings. The heated bushings generated gas vapors which, with the air in the crank casing, formed an explosive mixture; this mixture had been ignited by the burning oil on the bronze bushing, thereby causing the explosion.

Many causes can be attributed to the heating of the bushings, but as the engine had been thoroughly tested under full power for long periods on the test-bed in the shop, having worked for ten hours under full power on the trial trip, and the jockey-wheel on the port engine was in perfect order, it was deemed likely that some sand or foreign matter, in spite of the careful cleaning, had remained in the piping and worked itself into the bearing.

Due to the severity and peculiar nature of the explosion, which had all the characteristics of one of gasoline, the accident was very thoroughly investigated. It was ascertained at the inquiry that gasoline had been used for the purpose of cleaning the lubricating oil filters, and an examination of the two containers in which these filters were cleaned disclosed a mixture of gasoline and lubricating oil.

It was found that for about 14 days prior to the trial trip, gasoline had also been used for cleaning the lubricating oil filters and that in this fashion about 12 gallons had been evaporated during the cleaning, i. e., turned into gasoline vapors or drained into the lubricating oil. The filters on this vessel were arranged in a cofferdam having a drain to the lubricating oil tank to prevent any loss of oil, also in the interests of cleanliness.

Summary

Within the limits of a discussion such as is presented here, it is impossible to point out every detailed cause and preventive which should be taken relative to eliminating explosions on motorships. It is possible, though, to invite attention to some

of the more common measures which should have the careful consideration of owners and operating personnel of such vessels. These include:

- (a) Inter-coolers, pipes of air blast system, air compressor cylinders, valves, etc., must be kept clean and in the very best of condition.
- (b) Lubrication of air compressors must be accomplished in an intelligent manner and the lubricant applied only in small amounts as absolutely necessary.
- (c) Inferior oils, and oils having a high carbon residue, should never be used for air compressor service.
- (d) All crankcase doors, and sight glasses fitted thereto, should be kept tightly closed when motors are running to prevent leakage of volatile gases into the engine rooms.
- (e) All oil drips around the engines must be eliminated and cleaned up immediately should an oil leak occur.
- (f) Only flash-lights of an approved type should be permitted within the engine room spaces.
- (g) All electrical connections must be kept in first class order to prevent a spark being generated, and all electric light bulbs should be fitted with vapor globes.
- (h) Besides providing for adequate ventilation of engine room bigges these compartments should be kept scrupulously clean and free from all gases, waste oil and foreign matter.
- (i) Ventilation of all parts of the motor rooms must be thoroughly provided for, particularly such portions underneath the floor plates and other pockets where gases heavier than air may collect and remain undetected.
- (j) Gasoline or similar light oils must be prohibited even in small quantities for use in cleaning air compressors. Gasoline must not be stored in the engine rooms of motorships; where gasoline is stored in metal containers they should be of an approved type and kept tightly closed when not in use.
- (k) White metal should be used wherever possible on hearings which are enclosed within an engine, the heat of which may not be readily discernible.
- (l) Where bearings are enclosed vapor pipes should be fitted to enable the excess heating of the bearings to be detected.
- (m) The free discharge of piston cooling oil to the crankcase should be prohibited, and where oil is used for piston cooling, it should be in a closed circuit so arranged as to have no contact with the bearing lubricating oil.
- (n) The "No Smoking Order" must be rigidly enforced within the engine room spaces.

In conclusion, if the above stated facts are followed out in word and spirit, the prevention of explosions on motorships due to the respective causes will be practically eliminated. Unforeseen accidents may, however, occur and be brought about by a chain of circumstances which can hardly be anticipated, as in the case of the M. V. "Kungsholm". It must be admitted that the continued training and education of competent, reliable and safe motorship engineers will do more to eliminate such disasters in the future than any other one factor.

CHAIRMAN HUNTER: Mr. Tode has certainly covered his subject very comprehensively. Instead of asking whether anyone has any comment, has any one any questions they would like to ask Mr. Tode?

FRANK H. COGAN (The Delaware Lackawanna & Western Railroad, Hoboken, N. J.): Would you mind telling us something of the backfires?

MR. TODE: The backfires usually should occur in the air injection pipe but, as I brought out in the paper, this can be caused by other things. When you have the compression and the heat generated, and the fire resulting, if that fire travels to your air injection bottle, something is going to break. Either the pipes or the bottle will burst if there is a valve between the cylinder and the air injection pipe.

MR. COGAN: What is the remedy?

MR. TODE: The remedy is to see that your fuel valves are all tight, to see that your pistons and other rings are fitted tight, to see that your air injection bottles are right, and most important of all, to eliminate those explosions that only cease with tight systems and proper timings.

MR. COGAN: I spent four years on a Diesel ship, and very, very frequently when that ship laid idle for a day or two, and started up, we'd get an explosion in the ship. We never were able to remedy that condition.

MR. TODE: The only remedy I can suggest is a tight system and the proper timing.

MR. COGAN: What I refer to is really the backfire, the violent explosion with sound. But, of course, it goes up through the stack and it isn't confined. It doesn't do any particular damage.

A. J. SMITH (The Marine Office of America, New York City): Several times I have heard complaints that the atmosphere of the engine room affects the men physically. Have you ever had complaints of that kind? I have heard this in two or three different places.

CHAIRMAN HUNTER: We have had about six of the ocean-going Diesels now for a period of perhaps four years. I have never heard any concrete complaints. Occasionally you hear a man say, "The gas is rotten this voyage." But you never hear of anything serious in this line.

MR. TODE: Not over continued operation. I have had the opportunity of going on voyages many times, and in most of those jobs the engine room is in fine condition. Still, in a couple of them it was so close down there that I just had to get out. But that condition would probably be only for that period. It might be remedied by a change of oil or tighter gaskets around your cylinders or piston rods, etc. There is more chance, I think, of your engine room becoming contaminated with foul gases in a Diesel engine room.

CAPTAIN HENRY BLACKSTONE (United States Protection & Indemnity Agency, N. Y. C.): The heavy atmosphere would tend to hold the gasses down, and they wouldn't have a chance to escape.

MR. SMITH: Have any of you men ever had any experience with exhaust ventilators in machinery spaces? I mean, either as a side vent or something of that sort—pulling the slight vacuum into your trunk, and moving the air outward and letting it come in through doors and skylights, etc., rather than driving it in through a cowl?

CHAIRMAN HUNTER: That improves the condition of the atmosphere, by clearing the under-floor plate spaces. We will proceed to the next paper, "Safe Motorboating." This paper was prepared by Professor H. L. Seward. I had a letter from him in which he said he had had every intention of coming to the Congress, but as the Congress is a week later this year, he found that his work at Yale University prevented and I have asked Mr. William E. Stewardson to read the paper.

Safer Motorboating

By PROF. HERBERT L. SEWARD

Assistant to the President, American Bureau of Shipping, Member of Governing Board and Past Commander, U. S. Power Squadrons, Inc.

One year ago, a paper entitled "Motorboat Hazards" was presented to the Marine Section of the National Safety Council by A. J. Smith of the Marine Office of America. This paper discussed the exterior hazards of stranding, collision, heavy weather and fog, as well as the interior hazards of exposure to fire and explosion. It is a paper well worth re-reading and the present author suggests that the reader look it up and associate it with the present paper. Mr. Smith, after discussing the exterior hazards and pointing out the importance of "going fully found" as well as

developing that sense of responsibility and resourcefulness so necessary in making a real sailor man out of the motorboat owner and operator, concludes his paper with a short discussion of the hazards of fire and explosion. These are the most dangerous of the motorboating hazards and, strangely enough, seem to be the most difficult to impress upon motorboat operators—until they have been "burnt."

Without any desire for reiteration, although a repetition of the message does seem to be necessary, it is the intention in the present paper to offer further discussion on the matter of motorboat fires. Judging by the number of accidents due to fire and explosion during the past season, something must be done to help the motorboatmen realize the fundamental facts and to stimulate him to be everlastingly alert to his duties concerning his family, friends and property as well as his own life. Activities amongst the underwriters and other associations in studying this problem give further evidence of the importance of the problem. The author has no desire to produce unnecessary and unfavorable publicity but feels that further study should be given to the matter of putting proper emphasis upon the good housekeeping phases of motorboat operation.

We have become so accustomed to receiving gasoline in our automobiles at the ubiquitous filling stations along the roadside that we do not stop to realize the difference between such open air filling of automobile tanks and the fueling of a motorboat. A small amount of overflow from the automobile tank or an occasional leak may often be dissipated, or disappear without dangerous consequences. In spite of regulations to the contrary, one often sees automobiles receiving gasoline with engines running, or perhaps the passengers are enjoying a comfortable smoke. Nothing much seems to happen unless someone does something absolutely idiotic.

There are two fundamental facts for the motorboatman to keep in mind and then use his common sense. The first fact is that all hydrocarbon vapors, including the fumes of gasoline, are *heavier than air* and will easily enter a boat through an open hatch, a companionway or port and sink to the bilge or lowest level they can find inside the boat. We should strenuously combat the widespread notion today that "those gases will work their way out somehow." This is the one thing they are unable to do. If the gases are allowed to roam into the interior of the boat, they must be removed. It is usually impracticable to push or blow them out because they merely go to other lurking places. The most desirable installation is a suction fan arrangement with ducts, although a system of inlet and outlet ducts alone can be made to work satisfactorily. The second fact to remember is that it takes but *mighty little gasoline* in the compartment to make a highly explosive mixture. The explosive range for all hydrocarbon vapors extends from 1 to 6 per cent by volume, gasoline being about 3 per cent. This means that 3 cubic feet of gasoline vapor with 97 cubic feet of air in a compartment is a highly explosive mixture with capacity for scattering or disrupting anything in its way—including human life. In other terms, we may say that if we permit a teacupful (half a pint) of gasoline to get down into the bilges, we have planted several pounds of dynamite or T.N.T. there—under certain conditions they have comparable explosive powers. One cubic inch of gasoline, vaporized, will make 7 cubic feet of air into a highly explosive mixture. Think it over.

As R. L. Hague said recently: "It may be well to point out that, while 'incombustible' means not combustible, 'inflammable' does not mean not flammable. 'Inflammable' in its usual sense implies explosiveness, or of a character that will burn readily and rapidly. 'Flammable', which is the same word with the prefix omitted, means exactly the same thing. Fire protection engineers, who were among the first to be inconvenienced by this confusion of terms, decided a few years ago to abandon the use of the word 'inflammable' entirely. Now 'flammable' is used to indicate ready combustibility while 'non-flammable' is for the opposite." Readers who are interested in learning how large cargoes are handled on tank ships will wish to read Mr. Hague's paper on "Tank Steamer Fires and Explosions" in the Transac-

tions of the Society of Naval Architects and Marine Engineers for 1927. While the motorboatman is handling much smaller quantities of gasoline than the tankship, he will find that gasoline behaves in relatively the same manner on his little craft.

With the above two fundamental facts in mind, certain rules for design, construction and operation on motorboats have been promulgated, but it must be borne in mind that rules alone will not make things safe. Intelligent common sense and alertness must always be observed in addition to the rules. The Marine Committee of the National Fire Protection Association have prepared a valuable 18-page pamphlet entitled "Regulations Governing Fire Hazards for Internal Combustion Engines" which should be read and observed by everyone connected with the motorboat industry. This pamphlet is to be had by requesting a copy from the association office in Boston. The principal topics treated are:

Gasoline Engines

- Location, material and construction of fuel tanks
- Fuel piping
- Carburetor
- Motor and exhaust
- Bilge ventilation and cleaning
- Operation

General requirements for fire protection on motor craft

- Hull arrangement
- Galley arrangement, galley stoves
- Electrical equipment
- Fire extinguishing equipment
- Kerosene

Diesel Engines

- Fuel tanks, piping and other equipment.

The diesel oils contain only a small percentage of the high volatiles and for that reason a dangerous concentration of vapor therefrom is less likely to occur than from exposed gasoline, but even diesel oil should be treated with respect as dangerous vapor combinations can easily be formed. It must be remembered that gasoline auxiliaries on a diesel-motored yacht require the same precautions as any gasoline outfit.

The National Board of Fire Underwriters have issued some very clearly written instructions, with their approval, which are quoted in part:

"To all Power Boat Owners and Builders:

In view of the many explosions occurring on gasoline yachts and boats, especially while, or just after filling tanks, often involving loss of life, the Underwriters wish to call attention to the fact that these explosions can be prevented by keeping the boat absolutely clear of gasoline fumes and by thorough ventilation.

The Underwriters strongly recommend that before tanks are opened or gasoline brought on board—

All engines, motors, fans and other spark producing devices be shut down—

That all galley fires be put out—

That all ports, windows, doors and hatches be closed—

That no smoking be permitted while filling—

That in filling tanks, no gasoline whatsoever (not one drop) be allowed to get below deck except into tanks—neglect of this has cost many lives—

That after filling hose and, or, cans have been removed from boat, any spillage on deck be wiped up and all ports, windows, doors and hatches be opened and kept open if possible for at least five minutes before any fan, motor or engine is started or stove lighted.

The recent series of explosions on gasoline boats involving loss of life and heavy loss of property have rendered it necessary to take some action in regard to fire prevention.

Three things are vital to this—

First, that not a drop of gasoline or any gasoline vapor be allowed to get into the engine compartment.

Gasoline vapor is heavier than air and even in filling a tank on deck, the vapor will flow down any open hatch or companionway and sink to the floor and bilge and remain there unless removed.

Second, that no spark or flame be allowed in engine room that can be avoided.

Third, that all engine compartments be so ventilated that all vapors or gases which may have gathered there be quickly removed.

After examination of many boats and doing everything possible to avoid unnecessary expense, the matter was taken up with the National Board of Fire Underwriters and the following have been considered necessary by their engineers.

That all filling pipes to gasoline tanks must be on outer deck, outside of cock pit and combings, so that any overflow will run overboard, and that filling pipes run to the bottom of tank.

That all vent pipes to gasoline tanks should lead to outside of hull.

That all tanks should have an indicating device.

That all outlets for drawing gasoline for any purpose whatsoever be prohibited in engine room.

That all carburetors should have Underwriters Laboratories approved backfire flame deflectors, to prevent explosion from backfire.

That all switches and fuses be placed outside of engine compartment. On large boats where it is desired to have all equipment in the engine room, switches and fuses and other spark emitting devices should be enclosed and located at least 4 feet above the floor.

That all electric light and auxiliary plant tanks have filling pipes run to outer deck same as main tanks, or engines piped directly to main gasoline tanks.

That drip collectors be well fastened under all carburetors. Openings should be properly screened with 40 mesh brass. A venturi pipe should lead from the bottom of this pan to the manifold, so as to keep this pan, as nearly as possible, free from gasoline at all times.

That there be a cutoff valve at each tank and at each carburetor.

That 3 inch or larger ventilating pipes running down all the way to bilges be placed in all four corners of engine room.

These should be made so that they CANNOT be closed. The little water that would enter in a heavy sea would be negligible in comparison with the danger of confined gasoline vapors.

Two of these pipes should be provided with electric fans to remove gases from the bilges. If suction fan is used motor must be of explosion proof type or located outside of vent duct. These fans should be run for at least ten minutes before starting and after shutting down engines. Where boats are so small as to make the electric fans impracticable, the same pipes should be installed with the fans omitted.

No ventilation above, either at deck or sides, will remove these vapors.

In still smaller boats already built where the installation of the above ventilating pipes is impossible, an opening of not less than 36 square inches should be cut close down to the cabin floor in both forward and after partitions of engine room to induce a draught, so that the heavy vapors that lie in the bilges may be forced out. A ventilating cowl or port both in the forward and after ends of the boat should always be open, so that a draught be made through the fore and aft engine compartment partitions."

As far as is now known, no losses have occurred on boats properly equipped and where the rules were observed and a very insignificant number of fires of any kind

have been noticed on boats so equipped. It is also understood that Rules for Filling Stations will soon be available.

Those who have experienced a motorboat explosion, if they live through it, are usually impressed with the extreme suddenness and say that there just isn't any time factor at all. Even if we have pure clean air at the top of the compartment and liquid gasoline at the bottom, there is a region or envelope around the mass of vapor above the liquid where the mixture is just right in being extremely explosive and the rate of flame propagation through that region is enormous. In a motorboat there are many lurking places where explosive gases can hide.

We shall not have "Safer Motorboating" because we produce more Rules or let governmental supervision take hold of the situation. Some system of motorboat inspection may become necessary, either governmental or privately organized, unless conditions improve. We shall have "Safer Motorboating" only when everyone on board of a well-equipped boat is willing to be thoughtful and consider the essential safety factors in the matter of handling gasoline. The only protection, insofar as explosives are concerned, is prevention and the best prevention is wittingly to permit no gasoline or fuel gas vapor to escape below decks, and to so ventilate the lower portions of all compartments where vapor may accumulate that a dangerous concentration cannot be reached.

CHAIRMAN HUNTER: Thank you, Mr. Stewardson. I think we all agree with Professor Seward that there is quite a field here for missionary work. I am inclined to believe that the proper thing is Government inspection of the boats. I believe the work of the Steamboat Inspection Service has proven conclusively that it is best qualified to handle it, and I for one would like to see the Service extended to take in motorboats. Are there any questions or comments on this paper of Professor Seward's?

It is an axiomatic statement that the busiest men are the ones who find time to attend to obligations which they have. We have a very good demonstration of that fact today. Mr. Dickerson N. Hoover, Supervising Inspector General of the United States Steamboat Inspection Service, Washington, has come all the way from New York to attend our meeting. I am sorry that more are not present to hear Mr. Hoover.

Depression a Safeguard

By D. N. HOOVER

Supervising Inspector General, U. S. Steamboat Inspection Service, Washington, D. C.

It has become the fashion to dilate upon the evils of economic depression, to explain how it came about, and to point out the remedy. Some say it is a state of mind. Some seem to think that it does not exist at all. Some claim that it is over, that we have turned the corner, and that times will soon be better. For the purposes of this address it is not necessary for me to enter into an argument with any of the proponents of these different views, but rather to approach the subject from an entirely different angle, and point out, if you please, some of the advantages of this depression from the standpoint of safety.

Business does not wish to be slowed up. It is conducted for gain and profit. Indeed, if I may say so, it is legitimately selfish. Its keynote in our country is speed—speed in the doing of a task—speed in the quantity produced, which is another way of saying quantity production. Trains and ships must be operated at high speed; automobiles, notwithstanding there are laws in many states restricting speed to not over forty miles an hour, are built to be able to be driven at a much higher speed, and are in fact driven at much higher speeds even in those states where theoretically it is forbidden; and young America when discussing the merits of cars

stresses not cost, but speed, not comfort primarily, but speed, and the brakes to control speed. In referring to this I do not claim to be different from the rest of the community, but only to state a fact that will be recognized by all. With speed comes impatience at delay, and with that impatience too often comes arrogance. With it comes a lack of thoroughness. With it comes the spirit that the end justifies the means, and with that doctrine comes a general collapse of good ethics and morals. Let me give some examples of it.

Under the law it is required that a vessel receive an annual inspection. That is known by all. Notwithstanding, requests come to permit that vessel to make yet another voyage before submitting to the annual inspection. We cannot permit this even though we believe in so doing. There must be a time to start, and a time to stop. There must be a line of demarcation, and Congress has indicated what that shall be. There is therefore time for everything else, but not time for inspection. There is a rule of the Board of Supervising Inspectors requiring that at certain intervals during the year there shall be certain lifeboat drills, but licensed officers know how difficult it is to hold these drills and still keep up the sailing schedules. In the event of disaster, however, it may be very good business to have good lifeboats, but what is more important, competent men to handle them, and these drills help right there.

It is a favorite pastime with some high-pressure salesmen to ask for permission to use some device in which they are interested on the very day that a ship is to sail, as for example a moving picture machine without a booth, or to use a booth that has not been approved. The picture is painted in wonderful colors indicating that the passengers will be just terribly disappointed if this particular thing cannot be allowed. Others have attempted two hours before sailing of a steamer to arrange with Washington for a passenger increase without the proper boatage, and when refused refer to what is called Government red tape. When these super-salesmen are questioned they refer to the hard times, and the inability to make a living; they stress the putting of the American Merchant Marine upon the map, and in so doing they resort to what is called, in literature, a considerable amount of poetic license.

The same thing is also true of some of the gentlemen who wish to be officers of the ships. Here is one patriotic soul who hails from a foreign clime, and who during the World War had a provisional or red ink license, and who now when times are hard wishes to get a license without going through the routine of becoming an American citizen.

The rules of the Board of Supervising Inspectors require the kinds of valves and fittings that shall be used on vessels subject to inspection. During the war sometimes exceptions had to be made as a result of military necessity, but that condition does not exist now. Nevertheless the same requests are still sometimes made.

Now the great depression has had a salutary effect upon this condition of speed, for in the first place the cargoes are not pressing to be carried. There is no good reason now to stretch the law, or become indignant because we will not do it, to ask for a ship to proceed without the annual inspection. To be sure we do permit them to proceed to the port of final discharge for inspection, but there is a difference between that and asking to make another voyage. There are not now such large passenger lists that super-salesmen are in danger of their lives if they cannot comply with the colors of the pictures that they so delightfully paint. There is time to get the proper valves and fittings, and there is time now, as there always was, for an intensely patriotic person to make arrangements for naturalization.

Depression, among other things, means "a holding down." That is essentially what the safety officer has to do. To hold men's feet upon the ground, when they wish to travel too fast, when with the desire for profit, there is too often a thoughtlessness of what is safe, when the desire for profit may result in too deep

loading, when the desire to sail may be greater than the desire to take precautions to see that certain ports are properly closed.

Depression has also the effect of stopping waste. At such times we seek to get rid of overhead. It is not at such times possible as a result of a desire for business to indulge in foolish competition. Hence some thought must be given to the coordination of industry. During depression, therefore, we reflect. We engage in introspection.

Depression should also have a beneficent effect in Government itself, because manifestly if business is not good, this is no time to make onerous regulations. It were better to wait for a time when there is money that may be spent for betterments.

There is in this whole thing of safety, an ideal. It is something with a spiritual value. Business as it is applied is, by its nature, a material thing. Business seeks profit, safety thinks in the terms of human life and its value, which in the end is good business, and profitable. But what an irony we face! Who in the days of Queen Elizabeth could have predicted that the problem of the world would be, not whether we could raise enough to eat, or enough to wear, but rather having them, to be crushed by the very quantity of them. To have wheat so cheap that we tell the farmer not to raise wheat, and yet at the same time we have bread lines. The selfishness of men was so great that they would not stop, each one wishing that the other fellow would do it, until the disaster overtook us.

But what the laws of man could not do, the laws of God could. We have had to stop and take stock. It has been a breathing spell for the safety officer as we have him represented here. Out of it will come good, out of it will come better understanding, out of it will come better and safer conditions.

CHAIRMAN HUNTER: Thank you very much, Mr. Hoover. I for one feel that we are very much honored by Mr. Hoover's coming to us today. Mr. Hoover has to return by an early train. I propose that we adjourn the meeting now, and have the other two papers presented this afternoon.

ADJOURNMENT

**Thursday Afternoon Session
October 15, 1931**

JOHN S. HUNTER, Chairman
The Atlantic Refining Company, Philadelphia, Pa.

The afternoon session of the Marine Section convened with General Chairman Hunter presiding.

CHAIRMAN HUNTER: The first paper this afternoon will be that prepared by Mr. Robert F. Hand, Vice-President of the Standard Shipping Company, New York City. Due to his absence in Europe I have asked Mr. Frank Cogan to present the paper.

Safety Promotion in the Marine Industry

By ROBERT F. HAND

**Vice-President and Assistant General Manager, Standard Shipping Company,
New York City**

While safety work has been receiving considerable attention during recent years, it is not recalled that the subject of safety promotion has been discussed with specific reference to the marine industry. This topic has therefore been chosen with an idea not only of showing what has been done along this line but also of bringing to light the expansive field of activity which it embraces.

Safety promotion has been carried on by the National Safety Council for twenty years and the excellent results attained are generally known. However, it is unreasonable to expect that a body such as this Council can by itself carry on an effectual campaign to promote safety which will reach all of the individual workers, without the absolute, concurrent effort of the whole range of industrial organization, as this in the first place is primarily a function of industry. The cooperation of each and every one of the companies within and without the Council's membership is a vital necessity.

Promotion of safety should be handled in the same capacity as the promotion of sales. It is an administrative responsibility. As the latter is the tie between the advertising and the sales departments, the former should connect the administration and operating ends of the business. It should work independently of the advertising and sales departments, however, and should be the link which forges the chain of accident prevention.

Unfortunately at this time, not all companies in the marine field are giving this phase of their business the serious consideration it deserves. The delinquents are lacking in the proper interest and respect for this all-important part of their enterprises, and have not formed a habit of continuous and unabated effort which is so essential in order to bring about a reduction in the frequency of personal injury accidents. These "Doubting Thomases" depend too much for results along these lines on incidental media for disseminating safety education, such as posters and an occasional stereotyped warning through the medium of a circular letter or the like. In other words, many shipping firms are still doing nothing save "wink" at this noble work.

Every executive head, inclusive of masters and subordinate officers, must be in sympathy with a safety campaign. Any who are not wholeheartedly in accord with the principle of modern-day accident prevention work must necessarily be convinced that there are decisive benefits to be derived, and must be shown that their sincere support is required, if lasting and successful results are to be secured.

The mind of the operating manager has to be imbued with a broad viewpoint; he must disassociate his thoughts from the traditional tendency which considers accident prevention activity as nonsensical! "We never did any of that in my sailing-ship days", say some of the old-timers who refuse to give in; "we never heard anything about safety!" Yes, it is all true. And they didn't have the same respect for human life in all too many instances!

It is this same nonchalant attitude that created demands for Workmen's Compensation Laws in the United States and other types of social legislation in foreign countries. The workers became enlightened; they refused any longer to be trod upon, and the result was the improved conditions of today. Why should the vast number of men employed in marine and semi-marine pursuits nowadays be handled differently? They are humans!

I predict that Congress will soon enact a federal compensation law applying to American seamen, who are about the only class of American labor remaining unprotected from the standpoint of a regular, consistent means of securing financial relief for interruption of earnings and permanent losses sustained as a result of accidents on shipboard.

Returning to my subject specifically, the introduction of the campaign system enlists the cooperation of the workers in offering suggestions for the mutual good; it provides a method of overseeing whereby the executive, ignorant perhaps of certain practices, may be furnished reliable data concerning the weak spots.

It has been said that advertising is commonly recognized by industrial and commercial executives as imperative for maximum sales production. It serves as a process of education to keep the public informed regarding the merits of the commodity or idea to be sold, and by constant repetition gradually establishes an association between the subject with which it deals and the needs of the public.

There is no reason why this principle cannot be applied to safety as well as to commodities. In connection with safety, however, it is more difficult to apply at the outset. One would never conceive of a manufacturer of any patented article plunging into an expensive publicity campaign and he himself "unsold" on the merits of his commodity! Yet I have run across several cases of executives approving the inauguration of a systematic, concerted attempt to eliminate personnel accidents and inwardly ridiculing many aspects of the campaign which are recognized by experts to be fundamental. The operating heads in those few instances are men of the old school. They are unfamiliar with safety engineering, will not concede it is a study in itself, and look upon it as "bunk." It takes years sometimes to "de-bunk" such a man, and until his false conception of accident performance is eradicated from his mind, it is a waste of time, energy and money to try to "sell" safety to him.

This attitude is generally reflected among his subordinates; theirs among those beneath them, all the way down the ladder, to its lowest rung. Result? Accident frequency and accident severity rates do not show the percentage of improvement desired; operating costs, if anything, are increased, due to the expenditures associated with the campaign; the management becomes discouraged, and the "traditional policy-holder" executive, more than ever, is convinced erroneously that he is right.

It is too much to expect that a safety campaign of one year's duration will accomplish wonders. The application of safety education etc. must be kept everlastingly active. There will be ups and downs but usually after about five years of diligent effort, results will have been gained which are so substantial both from an economic and human standpoint that the work thereafter will be accepted as a vital necessity and a continuous operation problem.

In summary of these last few thoughts, therefore, I should like to say this:—Convince the operating manager of the advantages of safety education and practices, get him behind the project body and soul, and you will begin to reap the reward of a lower frequency rate and a lower severity rate. All of this will mean reduced

outlay for compensation, medical and sundry expenses, and will be reflected eventually in decreased insurance rates. The difference may be added to the employer's profits.

The following program is believed to contain a great many suggestions useful to any company engaged in a marine capacity which is desirous of embarking upon an honest-to-goodness endeavor to reduce the number of its personnel accidents. It is realized that some of these suggestions may not be feasible during the present slack period in business, but the others would help a campaign bear fruit within a reasonable length of time after it is started. The measures I advocate may be enumerated as follows, under the heading "Direct Promotion:"

- (a) Safety specialist reporting to the operating manager as supervisor of all safety work.
- (b) Formulation of a general safety campaign by a central safety committee.
- (c) Set up of subordinate committees on all ships of the fleet or individual units.
- (d) Ships to be kept continuously supplied with new safety posters and appropriate literature.
- (e) Safety contests.
- (f) Safe practice rules.

I shall make just a brief explanatory reference to all of the foregoing, pointing out the salient features of the program. To my mind, it is highly important to have one man who is safety-conscious in every respect and who has had a good theoretical as well as practical experience in the marine field concentrate on the accident prevention work of the organization. This man should be a specialist in safety engineering and should supervise, under the guidance of the operating manager, the fulfillment of all of the approvable suggestions and recommendations which are forthcoming from the central safety committee.

This main committee should be responsible for formulating a vigorous safety campaign, and in order to accomplish this, subordinate committees should be organized to handle the individual units of the organization.

Suitable safety posters, attractive literature and other media are obtainable from the National Safety Council, as well as from other sources, and should be supplied anew from time to time to these units, so that interest at no time will be allowed to wane.

All communications from the subordinate committees should be given prompt and serious consideration by the central committee. The subordinate committees are entitled to be heard and to have their suggestions considered. In my opinion, disinterestedness is bound to come if the subordinate committees are given the impression that the central committee, the operating manager, the safety supervisor, or the management in general is paying little attention to the campaign, expecting a miracle out of a clear sky without proper effort.

Safety contests are good because they stir up competition. If one unit presents an enviable record, the other units will "sit up and take notice."

Safe practice rules are always preferable to regulation because they show the right way and still give lee-way.

In addition to this direct campaign, safety can be promoted indirectly by having better trained employees. This can be accomplished by reducing the turnover figures. There are many ways of retaining employees for long periods in a company. The main thing is to keep the man contented at his work by offering him rewards for long, continuous service, such as accident and sickness benefits, death benefits, vacation with pay, continuous service bonus, efficiency bonus, library service, comfortable quarters and above all, a good mess. It is after all a true saying that the way to a man's heart is through his stomach.

These are all plans that can be carried out in any organization, but the vital thing to be accomplished is to strike a human interest and "reason why" appeal to the individual group, and this is something that has to be worked out by each company

according to its own situation, because what will succeed with any one may be absolutely useless with another.

To illustrate my point on this, I should like to cite the method employed by an oil company in Venezuela. Most of its peon laborers in the field are illiterate, and in endeavoring to carry the safety message to these men the company's management took into consideration the fact that although very few of them can read, most of them are interested in all sorts of handbills, advertisements, etc. In this company's first experiment it was found that those who could not read carefully preserved the material until they found a companion who could read it to them. The company played on this propensity of its employees by inserting safety literature in pay envelopes and the results were gratifying.

Another trait of these peon laborers is an inherent desire to participate in lotteries; although they are very poor they often deprive themselves of food and other necessities in order that they may purchase chances. The management realized this and devised the plan of offering safety rewards in a substantial sum, giving each employee a chance to win this sum by lottery. The only requisite for obtaining a ticket was the requirement that they work a certain number of days without an accident. In one instance, lotteries were run once every four weeks. This method awakened in the minds of the laborers the idea that they had only to work without an accident and without losing any time from work in order to gain the chance at the free money. This was exactly what was desired; to promote the idea of working without accidents. In the words of the author of the article, who described the method referred to, "The plan worked like a charm." There are a thousand-and-one different plans of a similar nature which can be worked up by the individual companies to attain the same end.

The Standard Shipping Company has adopted much of the program just outlined. Some three years ago they organized a Port Safety Committee as well as a safety committee on each of the ships, at the Bayonne Storehouse, at Baltimore and several other U. S. ports where many of their ships call. Results have been produced by these committees which fully justify their continuance. Ships' committees hold meetings twice a month. At these meetings the officers review every accident, no matter how trivial. Each case is gone over carefully and suggestions are offered to prevent recurrences. In addition to this, other suggestions are offered to improve working conditions and eliminate hazards. Once a month the Port Safety Committee meets and reviews the minutes of each ship, carefully considering the recommendations of each ship's committee and is extremely careful to answer each one in detail, thereby impressing on the various subordinate committees that their suggestions are being given serious consideration. In this way a great many improvements are made and practices adopted which we feel are responsible for the prevention of accidents.

In addition to this, we never fail to have an article on safety in our monthly Ships' Bulletin, each one different, however, to avoid monotony. We also run a "No Accident Month" campaign along with our participation in the National Safety Council, Petroleum Section's safety contest.

We have a Plan for Annuities and Benefits whereby wages are paid during disability due to sickness for specified periods according to the length of service, and an annuity upon retirement; a plan for death benefits for varying amounts dependent on length of service etc.; vacation with pay, and a plan whereby employees may acquire common stock of the company at an advantageous price. We also pay very careful attention to keeping our men well fed, being very particular in the selection and training of men for our Steward's Department.

These are the high lights of safety promotion. Anyone seriously following the general trend by adopting at least some of the direct as well as indirect measures can be almost guaranteed success in the endeavor to lower his accident frequency rate.

CHAIRMAN HUNTER: That is a very good paper. It fits in very nicely with the one Mr. Bush gave us. There is material in these two papers to form the basis of

a pamphlet which we talked of some time ago on safety organization for ships.

ARTHUR TOOE (The Texas Co., N. Y. C.): Mr. Chairman, the paper which has just been presented gives the facts of a man who has spent many years in the supervision of marine safety work as he sees the situation. The paper is, in a way, merely a confirmation of the remarks made by others at the Congress this year and in previous years. It is interesting to again observe that Mr. Hand points out the absolute necessity not only of the wholehearted support of the executives of a company, but also that there can be no compromise with the employees on the question of safety work. Mr. Hand points out that in some cases the executives of a company tend to support the safety work in so far as outward appearances are concerned, but that their real support given does not meet up to the standards which are so necessary.

There comes to my mind an actual story told of a marine superintendent in New York whose company had a safety superintendent who had been making strenuous efforts along the accident prevention lines. One day a man asked the marine superintendent how the safety work was going. His reply was, "Fine! The men are so busy reading the safety superintendent's literature that they are falling down the hatches." A spirit like that emanating from the head of a company cannot possibly help to inculcate the proper spirit among the men of the ship to realize that the head of a department considers the safety movement more or less of a job. I feel the same way about it, and I furthermore say, as was stated in Mr. Bush's paper, that human beings usually mirror their superiors. If the heads of a company are really sincere about safety work, the subordinates fall in line. If one of the subordinates sees that the chief is not interested, he will mirror the chief, and follow.

CHAIRMAN HUNTER: Are there any other comments on Mr. Hand's paper? Mr. Cogan, do you agree that there is material in these two papers to make a definite start on the proposed safe practices pamphlet?

FRANK H. COGAN (The Delaware Lackawanna & Western Railroad, Hoboken, N. J.): There is the nucleus of one there.

CHAIRMAN HUNTER: We hope, then, that we will get that under way promptly. If there is no further discussion on Mr. Hand's paper, we will proceed with the last paper on our program, by Mr. George A. Marr, which will be read by Mr. A. J. Smith.

Observations from Our Experiences with Ship Safety Committees

By GEORGE A. MARR

Vice President, Lake Carriers' Association, Cleveland, O.

You, who have been reading in the American Legion Magazine Colonel Frederick Palmer's series of articles entitled "When Mr. Baker Made War", were probably impressed, as I was, by a remark President Wilson made to Mr. Baker to the effect that the latter was the only person who never told him the same thing twice. The papers which I have presented to the Marine Section in previous meetings have so fully covered the accident prevention work and experience of the Great Lakes vessels that I have hesitated about accepting the invitation of your Program Committee for fear of committing that offense of which Mr. Baker was so free as to win presidential commendation. Personal injury prevention is, however, a work in which I have had an active part for twenty years along definite, practical, feasible lines—a work that has, by experience, demonstrated its value—and this interest has dictated my acceptance at the risk of repetition and notwithstanding the impoverished condition of the subject as to new and worthy thoughts.

It has been exceedingly gratifying to me to observe the growth in the membership of the Marine Section and in the interest in its work, and in expressing my con-

gratulations to your present chairman and to your officers, committees and membership, for their effective dissemination of safety information. I wish also to pay my respects to your first chairman, to whom this Section is deeply indebted for its creation. Mr. Welch's up-hill efforts for a number of years to organize this section would have been discouraging to a less persistent personality, but his indefatigable zeal was ultimately crowned with the realization of an active, purposeful and successful Marine Section composed of able men engaged in every branch of the trade and keenly alert to the elimination of the dangers incident to a more or less hazardous occupation. Mr. Welch might well, before his death, have been proud of his accomplishment and he would certainly be gratified if he could today view the progress made by those who have ably followed him in carrying out his ideals.

In my earlier papers I have dwelt at length on the system of accident prevention employed on vessels of the Lake Carriers' Association. I have given comparative statistical data and have shown some of the collateral benefits that accrue to the vessels themselves and to the operating companies by virtue of the mutuality of interest engendered in the crew by this cooperative service. Today I desire to lay before the Marine Section some deductions from our operations which, to me, have a deep significance in their relation to our work.

Bonuses for Safety Work

I have noticed with interest that among your Atlantic members discussions have recently occurred on the subject of the efficacy of paying bonuses for successful safety work aboard the ships in their fleets, and have observed, also with interest, references to the operation of ships here and there through an extended period of navigation without a member of the ship's company having sustained a lost-time injury. Both subjects open a field that so far has been sparsely cultivated and I think therefore in view of the interest manifested in these two directions that some comments revealing our experiences on the Great Lakes along these lines may be of concern and perhaps of profit to others who are furthering the elimination of personal injuries among seafarers.

It is unfortunate that, due to the wide divergence in seafaring conditions and navigation as between the lakes and salt water, the application of ship safety work cannot be of a more uniform character in order that close comparisons may be made; for example, in the different interpretations that have been put upon what constitutes a lost-time accident. As I understand it, those who pay a bonus in salt water trades consider a lost-time accident to be one in which the injured missed a watch, or more, as result of the injury sustained. Ship operation on the Great Lakes is a trade so peculiar to these particular bodies of fresh water, the men being always accessible to a port within a few hours at the most, that we have taken a broader view on what should be considered as a lost-time accident. In other words, if an injury is sufficiently serious to cause a man to leave his ship, he is only then a victim of a lost-time injury. In consequence, a bonus is paid to each of the six members of the safety committee provided such an injury has not occurred and provided also that the committee has held six meetings at monthly intervals.

I must confess that, notwithstanding the many years that this ship safety work has been going along, I have no means of ascertaining to what extent personal injuries of trivial or painful nature have been curtailed. Personal injuries, it seems, run in cycles. At times they will be increasingly numerous to be followed by a period of marked diminution in the number and this condition I can ascribe to laxity that is human and then to the human desire to make amends. We do know, however, that the number of fatal injuries sustained aboard ship or in the performance of ship's duty has been greatly curtailed. The fatal injuries due to men falling into the cargo hold, falling off ladders, falling overboard or to being caught in moving machinery, have been much less frequent since our ship safety method was inaugurated. I think our method of applying the bonus has had much to do with

bringing this salutary condition about for the hundreds of monthly meeting reports received during a season of navigation plainly point out the constant admonitions of the committee members against doing the very things which might result in one of the several kinds of casualties I have just mentioned.

When our full fleet is in operation there are about 220 ship safety committees functioning and since 1922, at least, there has been an average of about 100 committees which, by reason of having had no lost-time accident and having held the required number of meetings, have earned the bonus. As an example of how the matter has worked out through a period of seasons, I have taken nine of the principal fleets, operating about 170 bulk freight steamers all told, and for the four year period, 1927-1930 inclusive, I find a combined operation of 733 ship years. Of this combined total, 83 were eliminated by reason of having held an insufficient number of meetings and 232 were eliminated by reason of having had lost-time accidents. There were 650 eligible by reason of having held the required six meetings and out of this total 418 came through without lost-time accidents, or 64.31 per cent for the period and an average of a little better than 100 ships a season out of an annual total of 170. The trend is indicated by the percentage of eligible vessels which received the bonus during these four years as follows:

1927.....	61. per cent
1928.....	68.6 per cent
1929.....	59. per cent
1930.....	69.3 per cent

Because of lack of data I am unable to carry these comparisons back to the earlier years and consequently the trend is not as conclusively shown as it would be by similar records for a longer period. In 1929 the lake fleet operated under unusually high tension, having transported in eight months a total of 138,574,441 net tons of iron ore, coal, grain and limestone, which was 11,245,091 tons more than the fleet has ever moved in a single season.

Men Deeply Interested in Safety Work

While it is characteristic of a sailor to safeguard the person of a shipmate engaged in dangerous work and while there is an emolument to each ship safety committee member for each month's attendance in a committee meeting together with a prospective bonus at the close of navigation, these emoluments are not the chief consideration. As the men have gone along in this work and become cognizant of the personal benefits that have accrued to them by the elimination of unsound practices and the reduction of needless hazards, they repeatedly have said they would continue to serve, and serve gratuitously, rather than see the work discontinued. And that is where a sailor's pride in his ship comes in. He zealously and jealously endeavors to keep his ship in the list of bonus vessels through a continuity of years and there is gloom aboard the vessel when an accident occurs that puts a ship out of this honor roll. The fear of possible loss of the bonus continuity, necessitating the establishing of a new chain of continuous years, inculcates a spirit of coordination not only among the six ship safety committee members, but in an entire crew. To show how far-reaching this spirit of watchfulness has become I need only to cite the fact we have two fleets in each of which two vessels have been awarded the bonus for eight consecutive seasons of navigation. Assuming an average crew of 32 men and average seasonal operation of seven and a half months, approximately 55,000 to 60,000 working days have elapsed aboard each vessel without the misfortune of a lost-time accident. This record, for the four ships, is therefore representative of between 220,000 and 250,000 man-days' freedom from personal injury necessitating a single member of the crews to leave his ship.

Amplifying a little further the continuity of bonus payments, the following is the record as reported by three principal fleets covering payments made for two or more consecutive years:

Seven years—four vessels
Six years—nine vessels
Five years—seventeen vessels
Four years—thirty-two vessels
Three years—forty-seven vessels
Two years—fifty-eight vessels

These fleets aggregated an annual average of 131 steamers with an average crew list of 4,200 men.

I have no disposition to burden this paper with statistics but some of you men who carry sharp pencils may find entertainment for an idle moment in estimating the man-hours represented by the operation of these vessels, using as a basis an average season of navigation of 225 days.

Meetings Have a Psychological Value

The monthly meetings of the ship safety committees we consider of inestimable value for psychological reasons if for no other. A legislator takes a great deal of pride in a bill bearing his name, especially a bill which he has sponsored and which has been enacted into law. In the sailor's small world his ego is appealed to in like manner if he can make a suggestion that his committee deems worthy of adoption and transmission to the management and to the Lake Carriers' Association. There is a natural and worthy ambition on the part of every man to contribute constructive thought and it is wholly pardonable for him to "point with pride" to any contribution he has made to the good of his fellowmen that has won the distinction of general acceptance. This creates an incentive to the sailor, and especially to the committee member, to read thoughtfully the accident reports published in "The Bulletin", a monthly magazine of the Association which is distributed gratuitously to the men on the ships. Each issue records the accidents which have been reported since the preceding issue. The sailor, imaginatively re-enacting these accidents, visualizes the circumstances surrounding them, and applies the picture to his own environment. He may or may not see a way for the prevention of the accident. If he does, he has something to talk about—possibly a valuable suggestion. If he does not, he is at least becoming habituated to a natural watchfulness for his own safety and the safety of his shipmates. The furnishing of the accident reports provides the meetings with material for opening the discussion, thus "breaking the ice" and injecting life into the meetings at the start.

Our trade is especially fortunate in the facility with which we are able to distribute "The Bulletin" to the ships and keep the men supplied with vital evidences of the effects of carelessness and errors of judgment. The great merit of these news items is that they "strike home" with the men on the vessels. They are instances of actual occurrence and present a mental picture of actual happenings with the painful results actually experienced. The men see, not how it *may* happen, but how it *did* happen. While conceding to posters and slogans the full credit due them and appreciating the fact that in some trades it may be impossible to reach the men through any other medium, I am sure you will agree with me that it is the real dramas of life that make the deepest and most abiding impressions upon the mind.

Our code of recommendations for the prevention of accidents has been in effect for more than a dozen years. It has been supplemented with additional recommendations from year to year, so that it may now be presumed to cover practically every phase of ship work and equipment. Yet each year thousands of recommendations come from the committees. While few have sufficient merit to warrant their general adoption, the value of the psychological effect is beyond question. Nor is this all. The meritorious recommendations, and the reports of accidents are circulated to all ships, whether committee vessels or not, and the benefits accruing from these accident

prevention studies thus extend beyond the ships on which such committees are maintained.

Not the least of the benefits is the feeling of mutual helpfulness from this cooperation between the operators and their employees. The sailor is proud of the distinction of his selection as a committeeman. He knows his name goes to the office with the report of each meeting. The recognition appeals to his sense of loyalty and his interest in the ship and his concern reaches beyond accident prevention into the realm of conservation of the ship's property.

Discussion

CHAIRMAN HUNTER: Gentlemen, you have heard Mr. Marr's paper. He is well qualified to speak because of his long experience, and the remarkably good work which he has carried on on the Great Lakes. It seems to me that there are some factors in this paper that could be utilized in the Safe Practices Pamphlet already mentioned. Has any one any comment on the paper?

ARTHUR TUSE (The Texas Co., N. Y. C.): I feel we can safely say that the paper speaks for itself.

CHAIRMAN HUNTER: I feel the same way. It is very well put together, and states clearly the objects and how they may be accomplished.

MR. COGAN: When we first talked about drafting the pamphlet on organization safety, if you would approach an operator he'd say, "Well, how are you going to organize safety?" That is what we are driving at, to put a document into his hands that will explain to him our idea of how he should organize for safety. If we are going to tackle the bonus problem or even mention it, we must agree on what we are going to advocate as a bonus plan.

CHAIRMAN HUNTER: Could we not handle it the same as Mr. Gregory did in his paper and say, "Here are two different methods that are being successfully used." It will then be up to the person who adopts the plans to decide which one he prefers.

CAPTAIN HENRY BLACKSTONE (U. S. Protection & Indemnity Agency, N. Y. C.): For the past two years the Protection & Indemnity Agency has been organizing ship safety among all the ships under our coverage. That covers a big spread. Most all those ships have been organized for a period of two years or slightly less, and they have all been organized along the same lines. So far, the organization has proven comparatively successful. Its results have been a whole lot better than I ever thought they would be. That is a basic organization that could be built upon, and developed, because we have already educated a large number of officers along those lines.

WM. E. STEWARDSON (Colombian Steamship Co., Inc., N. Y. C.): One point that interests is the likelihood on the part of certain of the ships' officers to cover up an accident. I found that for some little time they forgot to turn in reports on cases of accidents in foreign ports. If a bill for medical services came in it was charged to the captain's personal account, and he paid it.

CHAIRMAN HUNTER: Did the captain change his attitude?

MR. STEWARDSON: At least, he did where medical attention was secured in a foreign port.

MR. COGAN: If and when we start this pamphlet, can we use the benefit of your experiences, provided we do not mention the name of the company? That was a handicap before. If we could get a few more representatives to give us their experiences, I think we could get together and make an interesting and instructive pamphlet.

CHAIRMAN HUNTER: Gentlemen, from the papers and discussions which we have enjoyed this year we have obtained information which should prove of value to us in endeavoring to do some of the things we have in mind. With the completion of the discussion of Mr. Marr's paper, we have come to the close of the sessions of the

Marine Section at the Twentieth Annual Congress. I feel that our program this year has been an exceptional one. The papers have been most interesting as well as worthwhile, and have been provocative of much comment that will prove of value to all those who are interested in the safety movement. We are deeply indebted to Mr. Flathers for the fine program which he so ably sponsored, and also to all those whose participation in the Marine Section's deliberations added so much to the value of the Congress. It is only as we are able to gather the combined experience of all that we can formulate plans for the furtherance of this most vital project, the elimination of accidents and the alleviation of human suffering. Cooperation is the keynote of the entire movement.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Meat Packing, Tanning and Leather Industries Section

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Tuesday Afternoon Session October 13, 1931

HUBERT L. CLOVER, Chairman
International Shoe Company, St. Louis, Mo.

The first session of the Packers and Tanners Section convened with General Chairman Hubert L. Clover presiding.

CHAIRMAN CLOVER: Our first speaker is Mr. E. Keebler of the Keebler Engineering Company, Chicago, Ill.

Guarding Equipment at its Source— Packinghouse Machinery

By E. KEEBLER

Keebler Engineering Company, Chicago

The subject of this article, Guarding Equipment at its Source, with reference to Packinghouse equipment, is intended to give some idea of the efforts the manufacturers are exerting in this direction, and to bring forth a coordination of ideas between the machinery manufacturer and the user or operator with the object of producing equipment which is of proper design, satisfactory to the purchaser and safe to operate.

The term "guarding" is often construed to apply to gears, chains, belts etc., without giving further thought to the safety of workmen and to the prevention of accidents through other sources.

Accidents, incurred in the operation of packinghouse machinery, may be caused by carelessness on the part of the operator, and by improper guarding, or the entire lack of guards.

The laws of many states now require that all gears, chains, belts, etc., be properly guarded, and in this respect, practically all packinghouse equipment is protected. It is true that the style of guards, and the method of applying same, as well as the ease with which these guards may be removed for inspection and other legitimate purposes, vary considerably, and in many cases can stand considerable improvement. These types of guards should be built into, and form a part of the machine, and not have the appearance of an afterthought.

Packinghouse equipment may be divided in two general classes. The first class, equipment which is handled by intelligent skilled operators, and usually isolated, such as powerhouse equipment, pumps and motors, need not be discussed in detail. The other class of equipment, namely that operated by the average workman, demands careful thought, even to the point of anticipating the actions of the operator. Naturally, observation of the equipment under actual working conditions is essential, as well as the analyzing of accidents which happen in connection with equipment.

There are doubtless in use today, in almost every plant, guards and accident prevention ideas, which should be incorporated in all similar equipment, but the manufacturer, either not having seen or not knowing of them, does not make use of them. Therefore, in the proper spirit of cooperation these ideas should be brought out for the benefit of all concerned.

Outside of the ordinary methods in common use for guarding gears, knives, etc., by far the greatest number of real safeguards have been conceived and put into use by packinghouse operating men. Naturally, the manufacturer should attempt to obtain and improve these ideas, and blend them into the equipment so as to produce a desirable, efficient and practical machine.

There are in use today in the packing plants of medium and large size, several hundred different kinds of machines; so that time would not permit of discussing each individual machine; therefore a few of outstanding importance will be briefly outlined.

On the killing floors, the use of various types of non-slip steel platforms and benches, in place of wood and smooth steel plates reduce considerably the hazard of slipping.

Guards for hand knives have also come into quite common use and help to avoid cuts. These guards are usually made of aluminum, on account of its light weight, strength and non-rusting features.

Automatic landing devices, for landing cattle on the bleeding rail have been developed and simplified, and are used to some extent. They speed up this operation and

eliminate somewhat the danger of a false landing, with the consequent danger of having the shackle and carcass fall on the operator.

The use of various forms of hand guards for the handles of two-wheel hand trucks helps to prevent hands from bumping against doors and door jams. These guards have come into universal use.

In the casing department, an ingenious device consisting of a cutout switch has been worked out for the hog casing cleaning machine, so that if the guards covering the scraper blades are removed, the motor is automatically shut off.

Equipment for the sausage department has been given much careful attention, and as a result most all machines may be obtained provided with every safeguard.

Stuffers can be obtained which are equipped with a safety device to prevent the piston from blowing out, should the air be turned on when the head is opened for filling or cleansing.

Bacon slicing machines have been provided with additional guards around the rotating knife which make it difficult for the operator to get his hands in contact with it. Automatic cutouts for the feeder carriage, to prevent it from getting too close to the knife have been improved considerably.

The rotating knives of silent cutters are now very thoroughly guarded, and the development of efficient plows, and automatic dumping or unloading devices further reduce the hazard of operating this machine.

Sausage meat grinders can now be obtained with large feed bowls, which make it unnecessary for the operator to force the meat into the bowl. This feed bowl may be further protected with a sheet metal enclosure, open on one side for feeding, so that it is impossible for the operator to get his hand or arm into contact with the feed screw. Another ingenious arrangement consists of an auxiliary feeder screw operating in a large open bowl which requires no hand forcing.

In the lard department, lard cooling rolls are now made with the entire driving mechanism enclosed, which is a marked improvement over the old style machines. These rolls, when direct ammonia expansion is used for cooling, are provided with safety valves which prevent excessive pressure from accumulating within the cylinder or drum.

In the rendering department, the dry rendering system has accomplished much toward the reduction of danger. In the past it was not unusual to have a wet rendering tank blow up, whereas the dry rendering system requires less equipment and is safer to operate.

There are countless switches used in connection with overhead tracking systems in the packinghouse, yet there are many which today lack the simple safety stop designed to prevent trolleys from falling off the open end of the track.

In general, the use of solid instead of open guards for gears, chains and other forms of drives eliminates danger entirely from this source and make it easier to keep the equipment clean.

The use of direct motor driven machinery has been a factor of extreme importance in the elimination of accidents, as well as improving the general operating conditions. Those who are using belt driven equipment will find that many of their machines can be brought up to date by the simple application of some of the many efficient enclosed gear reducers now on the market.

Much of the equipment in use today has gone through a gradual change or improvement in manufacturing details as well as in efficiency and safety, due to a better understanding of the problems and hazards encountered in the use or operation. New equipment has in many cases taken the place of old and dangerous machines.

HENRY D. TEFRT (Director Institute of American Meat Packers, Chicago, Ill.): Mr. Keebler mentioned the fact that very important and valuable suggestions on guarding are to be obtained from operators. Is there any direct way in which more of these ideas of operators can be brought to the public's attention?

MR. KEEBLER: I don't know of any at the present time. Perhaps some department or some sub-committee of this organization could do it.

LOUIS BARR (Safety Supervisor, Armour and Co., Chicago, Ill.): Mr. Keebler mentioned the use of cut out switches. We have had some bad experiences in the past few years with these switches on casing machines. In some new installations we found that water would get into the switch and short-circuit it. The machine would then be operated with the switch out of order. I wonder if the manufacturers have given any consideration to the elimination of this trouble.

MR. KEEBLER: That is a good example of what I mean by suggestions. I have had no complaint about this particular switch, but I see no reason why we can't get together with the proper electrical authorities and get a switch which will do the work.

E. D. KOPPELMYER (Safety engineer, Ill. Manufacturers Mutual Casualty Assn., Chicago, Ill.): Information on the hazards of various machines can be had from most of the insurance companies. We have in our own company a list of accidents on all machines and how they happened. We have made an analysis of them and know something about some of them.

CHAIRMAN CLOVER: I have found that the manufacturers of shoemaking and tanning machinery have always been glad to receive suggestions, not only from the insurance companies, but from the companies themselves. It is the duty of the user of the equipment to report its weaknesses to the manufacturer so that a proper guard can be made and installed in the machine rather than to use an improvised guard.

I feel that we can go a long way toward having the design of equipment changed to accommodate guards if we will cooperate with the manufacturers.

MR. BARR: Quite a number of our employees have struck the backs of their heels on the legs of meat trucks, especially in making a turn, with the result that there are contusions or sprained ankles which necessitate their staying home from work for several days. In our repair shop we have moved the truck legs back about six inches giving the operators a little more clearance for leg room. We find that this eliminates a large number of foot injuries.

MR. KEEBLER: That idea is good, but you must be careful not to move the legs back too far. It may unbalance the truck. The braces, which I believe are another point of interference, could be changed somewhat to give a little more clearance for the operator's feet. They could be brought up to the truck at a different angle.

MR. TERRY: I am particularly interested in this question of bringing out the developments made by the men operating the machines. We have a contest every year in the Institute and award medals for the best ideas presented by employees of member packing houses. The contest has been carried on for six or seven years, and has resulted in several hundred ideas being presented. However, I can't remember more than a dozen that deal with safety devices. We have tried to emphasize the development in safety devices, even specifically mentioning them in our awards.

CHAIRMAN CLOVER: Mr. Wilson Palmer of the United Shoe Machinery Corporation will tell us about some of the features his company has worked out to make the equipment safer for the men operating it.

Guarding Shoe Machinery at Its Source

By WILSON PALMER

United Shoe Machinery Corporation, Boston, Massachusetts

Safety is a subject of widespread interest and endeavor and is thought of from a scientific and humane standpoint today as compared with casual observation years ago. Modern engineers are given a well rounded education that they may better understand safety problems. It is with this thought that the Harvard Engineering School, of Harvard University, trains its students of sanitary engineering in medical courses to give them the point of view of the physicians who prescribe safety

measures in industry. Designers of shoe machinery are constantly studying the problems of the shoe manufacturer that they in turn may understand the point of view of the user of the machinery.

The United Shoe Machinery Corporation during the past few years has recognized the growth of the safety movement and has, one might say, taken the initiative not only to provide safe factories for its own employees, but also, through care in the development of machinery, to provide safe equipment for employees of its customers. This has been and still is no easy task, primarily because of the variety of machines and merchandise handled. Our largest plant alone manufactures over 400 different machines and when one considers that each machine may have 500 parts which must be manufactured and assembled into finished units to be used by thousands of customers over a greater part of the world, the magnitude of the problem becomes apparent.

You who have been closely associated with the safety movement know that fundamentally safety is an educational and advertising program. It is true that many accidents are caused by faulty or improperly guarded equipment, but the major portion are caused by carelessness of human beings. For this reason, machinery builders have less chance of helping the user of machinery in the elimination of accidents than the users themselves. Notwithstanding this, the United Shoe Machinery Corporation makes a real effort to promote the interests of safety.

Our safety organization might be of interest to you. At the Beverly plant is a safety committee which is composed of the various divisional heads throughout that plant, and which meets once a week. The efforts of this committee have reduced lost-time accidents within the plant from 6.0 to 0.9 per hundred men per year, this in a period of slightly over three years.

Of particular interest to you is the examination by the committee of each new machine produced, to determine the hazards to the operator which may develop after the machine is sent out to customers. In many cases, the designer or inventor of the machine may have neglected some safety feature. It is at this point that unsafe devices or features are eliminated.

Assuming that a hazard develops after the machine has been installed at a customer's plant, what is done to correct the situation, not only for this customer but others as well? The corporation maintains at the important shoe centers branch offices with service facilities at their disposal. When an accident occurs at a shoe factory, it is quite common for the shoe manufacturer to call in the machinery service man. The accident is reviewed thoroughly and a report made to the branch office which in turn reports to headquarters at Boston. With the facts accumulated, our experimental department takes the matter in hand and, if possible, designs the necessary device or guard to eliminate future accidents on the machine in question. When this is done the device is sent back to the scene of the accident in order that its effectiveness in accident prevention may be determined. If successful, the device is adopted and accordingly placed at the disposal of all the users of this type of machine. This, in brief, is the method of keeping in touch with customer's machine hazards.

The analysis of accidents in many factories shows that those of a mechanical nature are readily distinguishable from those of a non-mechanical nature, and that the latter class predominate as mentioned above. Further analysis shows that the bulk of accidents are of the nature of eye injuries, foot injuries and strains.

Let us examine the matter of eye injuries. A great many are caused by dirt and other foreign matter in the air. A few are caused by machines, an outstanding example of which is the tack puller which pulls tacks from welt shoes after the lasting operation. It has never been found feasible to design a suitable deflector which would direct all tacks in such a direction that it would be impossible for an operator to be injured. In other words safety devices to eliminate the danger of flying tacks have proved too effective in slowing up the work. Yet the operator's

eyes must be protected and for this reason safety goggles are provided with this machine.

The greatest hazards to eyes come from buffing and scouring machines which cause loose particles to be liberated into the air. These machines are provided with exhausters which collect all of this matter in dust proof containers.

In general, eye injuries can best be prevented by insisting on the use of modern safety eyeglasses on those operations where the slightest danger exists. Adherence to such a program will in the end prove an effective one.

Foot injuries are indeed perplexing since carelessness in dropping material on feet is the primary cause. Although this may seem an absurd statement it is none the less true and for this reason many shoe machines, such as stitching machines, are provided with a tray which has a low rail around it. This simple precaution is of great help in preventing people from dropping articles on their toes from the table. An additional safeguard is of course the safety shoe with a hard box toe. This is of considerable importance not only from the actual protection given the wearer but also from the advertising of foot consciousness.

Strains make up the third major group of accidents. These are caused primarily by lifting heavy objects and in a great many cases to some internal difficulty of people who should not be put on heavy work. One striking example of a strain caused by lifting was on the sole cementing machine, which, as the name implies, cements the sole to the shoe upper. This machine originally had a heavy iron frame which had to be lifted up by a handle in order to reach various parts to be adjusted. One bad strain was called to our attention. The machine was subsequently redesigned with due heed to balancing and lightening of the frame so that the amount of energy required to lift the frame of the new model is negligible.

So much for the three main classes of accidents. What others are there to be eliminated by the manufacturers of shoe machinery? These may be given a general classification with no particular type predominating. It is this particular class which causes considerable study and research, and notwithstanding these efforts, results in the discovery of hazards only after the machines have become well seasoned in shoe factories.

One type of machine which has certain hazards is that dealing with cutting leather. The Summit Sole Splitting machine is of this class. Soles are split in this machine to obtain a specified thickness. In view of a revolving roll and knife the possibility of getting fingers caught in the cutting mechanism is great. To guard against this, the machine is provided with a finger guard which prevents the fingers from being drawn into the machine, yet allows the leather to slip under the guard into the knife.

The clicking machine with dies for cutting out shoe uppers is another example of a cutting machine so designed as to minimize hazards to the operator. The leather to be cut is placed on the machine table, on top of which is placed the appropriate die. The striking arm then is swung around to a position directly over the die after which the operator trips a lever causing the arm to strike the die thus cutting the leather. From a safety standpoint the height of the die and the clearance of the arm and the die are such that it is very unlikely that an operator can get his fingers caught in the machine.

Sole cutting machines for cutting soles from heavy leather use a die about 3½ inches in height or more. The machine itself is dangerous in that the clearance between the striking arm and the machine table is great enough to allow an operator to get his hand caught between the die and the arm. To compensate for this feature, a safety flange is constructed around the top edge of the die, making it unlikely that the operator will allow his hand to slip between the die and the arm. At best this machine is none too good, but as yet no better design is available.

A peculiar situation arose at one shoe factory caused by an operator who had unusual tendencies. The situation developed while this man was operating a lasting

machine used for lasting a tennis shoe. The machine operated upon the tripping of a foot treadle. It so happened that sufficient space was left between the treadle and the floor so that the operator could get his left foot under the treadle while with his right foot he would trip the machine, thus effectively breaking a toe on his left foot. After this had happened, the shoe manufacturer called our attention to the matter. It was quite simple to place a sheet metal guard around the treadle so that the wandering left foot could not possibly get caught again.

Another unusual and unlooked for accident was caused by a visitor in one shoe factory. On a cement sole attaching machine is a link motion at the back of a machine far out of reach of the operator or anyone else who would come near the machine, so thought the designer. Actually there was just room enough for a man to place his foot in this space if the foot were held several feet off the ground. The aforesaid visitor in viewing the plant became weary and placed his foot on the frame of the machine at the point of the link mechanism. When the machine was tripped the visitor's toe was removed. This shows how unexpectedly an accident may happen despite the extreme care of the designer. In this case a guard was placed over the dangerous point thus assuring the safety of future weary visitors to this plant.

The cause of many accidents can be traced to the adjustment of machines while they are in operation or while the machine is in a position to be operated. In such cases the invariable rule is to shut down the machine completely, even to the removal of the belt drive or disengaging of the motor drive connection. In some cases our company has provided for this by incorporating in the design of the machine a clutch throwout. The heel and base assembling machine is an example of this.

The guarding of belts generally is recognized by machinery builders over the world as an essential part of proper design. Our general practice is to guard all belts over one-half inch in diameter or corresponding sizes of flat belts. Due to different requirements in our states and different wishes of customers, we are prepared to provide many belt guards which are not shipped regularly with machines. If you should have any specific problems in this respect it might pay to investigate available safeguards which we are prepared to supply.

A particular type of hazard not yet mentioned is that of flammable materials such as cements, box toes and others. All machines which use such materials are subjected to the most minute examination and design with all designs being approved by the fire underwriters. These machines, furthermore, are all grounded whether they are motor driven or not. You are probably all familiar with the dangling chains on gasoline trucks which ground the truck sufficiently to relieve all static electricity or other electricity which may be present. So in the case of shoe machinery a ground is provided to take away any stray electrical currents which might ignite flammable material. This minimizes the chances of explosions and fire. In some isolated cases we refuse to furnish motor drives as it is believed too hazardous to introduce electricity so near the machine. In other limited cases gas proof motors, such as are used in mines, are installed on machines of this general character.

The problems of safeguarding shoe manufacturers are many. It is our intention to keep alive the requirements of users of shoe machinery in the matter of safety, and even though accidents do occur, you who are interested in safety may leave this assembly with the thought that the United Shoe Machinery Corporation is meeting this question squarely and will continue to do so in years to come.

CHAIRMAN CLOVER: We send a careful report of each machine injury to the general manager of the St. Louis branch of the United Shoe Machinery Corporation, and to Mr. Thomas who is at the Beverley plant. This illustrates one method by which the industry may keep the machine manufacturer acquainted with what is needed in the line of guarding equipment.

At one time we were having considerable trouble with our skiving machines in the cutting department. When the operators of these machines cleaned out the skiving

dust they would sometimes put their hands in the machine before the circular knife had stopped. This was taken up with the United, and they worked out a guard which makes the machine almost fool proof.

The problem of getting girl operators to wear goggles is hard but we have partly worked it out. We selected a very light weight goggle, and didn't try to force the operators on the sewing machines to wear them. A pair was given to an operator here and there throughout the plant, and in a great many instances it wasn't long until others wanted those goggles. They appreciated the fact that the injury could be eliminated and that the suffering of having a doctor probe around in the eye was largely overcome through the wearing of these little light weight goggles.

R. V. JELINEK (Safety shoe store manager, Western Electric Co., Chicago, Ill.): I recently made a visit to several shoe factories. I was amazed at the lack of safety appliances adopted in the shoe industry. I have never had the pleasure of going through the St. Louis shoe plant, but here in Chicago it has always surprised me that the chap who works at the tack pulling machine still has his eyesight.

Mr. Palmer said that the company furnished goggles with each machine. These goggles should be adjustable. At one of our progressive shoe manufacturer's here in Chicago I have seen a young chap wearing goggles that evidently were much too large for him. He might just as well have been using that machine without any goggles at all for these were way down on his nose, like Grandfather reading a newspaper. Another thing: when goggles are passed from workman to workman they are often so ill fitting as to be irritating, and the man using them can't do his work as he could with a well fitting pair. At the Western Electric we fit a pair of goggles to a man, and those are his goggles no matter what job he goes to.

I also noticed that there are very few safety shoes worn in these shoe factories. We feel that safety shoes are so important that we are extending our campaigns among office workers. Only today I saw a draftsman, who had dropped an object weighing several hundred pounds on his toe. Fortunately he had safety shoes on. Otherwise there would have been a fracture.

Our employees now like safety shoes, and we are selling from 12,000 to 15,000 pairs of safety shoes at our Hawthorne plant in Chicago. All the people in our store have orthopedic training and we feel we can fit any type of foot. On cases of foot deformity we have special shoes made at no extra cost to the employee.

Mr. PALMER: What you say about passing glasses around is quite true. In our own plant we started out with the idea of having a little box on all grinding machines with a pair of glasses in that box. After we operated on that basis for some time we realized that we might as well go the whole distance and give everybody a pair of glasses. Now, any workman in the plant can, by application to the tool room, choose from half a dozen different styles of safety glasses just the pair he wants.

CHAIRMAN CLOVER: Mr. Jelinek, are your safety shoes the dressy type or the work shoe type?

Mr. JELINEK: We carry both the work shoe and the dress shoe. Our greatest sale right now is in the dressy oxford.

CHAIRMAN CLOVER: Does your dress shoe have an arched toe or is it designed with the box toe flush with the vamp?

Mr. JELINEK: It is slightly higher, but we try to carry out good looking lines. We have a 9/8 inch clearance from the sole to the top of the box.

CHAIRMAN CLOVER: Are drop tests required?

Mr. JELINEK: Both the impact and compression. We are now using a non-metallic cap, but just as soon as the manufacturer can start making a complete line of dress shoes with steel caps I think we will change to them.

A dress shoe with non-metallic cap is cheaper, which has been a good selling point with safety directors. You will find metallic caps in work shoes because there are only a few widths, but in the dress shoe you have all widths from A to E and some special sizes.

CHAIRMAN CLOVER: Some time ago the metallic cap with the metallic box toe was

frowned upon by safety men. Have you experienced any difficulty in getting the shoe off of the foot if a weight has dropped on it and mashed in the metallic toe cap?

Mr. JELINEK: The old type of metallic cap, where they welded the strip between the insole and the outsole and your toes were incased on three sides by steel, was such that when it did crush it usually took a couple of toes with it. Most of the manufacturers are now building a cup type cap that is not welded in. It can be extracted very easily, in fact more easily than the non-metallic cap, by just ripping the outsole and lifting it out. We have been experimenting with a 21 gauge steel cap and find that when it does crush it crushes along the side and will not injure the toe.

E. D. KOPPELMAYER (Safety engineer, Ill. Manufacturers Mutual Casualty Assn., Chicago, Ill.): I would like to tell you some of the experiences that the companies we carry have had with safety shoes. We have found in some plants, particularly where the common laborer is used to a large extent, that there is a strong objection to safety shoes, because the men don't feel they have the money for them. We find that they wear their shoes until they are not fit to wear on Sunday and then they have to wear them for work. They can't have two pairs of shoes and the result is that they don't buy the safety shoes.

In some plants the point has been brought up that there are objections to the metallic toe. The metal seems to affect the toes through rubbing, causing sores on the feet. Whether that has been overcome I don't know, but I do know that I have found that the manufacturers have been quite proud of the fact that they have been able to get away from the metallic toe.

CHAIRMAN CLOVER: Mr. Jelinek, is there a company from which metallic toes can be purchased without the manufacturer making a big outlay for lasts and dies and equipment to carry on that work?

Mr. JELINEK: I know of no such company.

CHAIRMAN CLOVER: Our next subject is "Electrical Hazards in the Packing and Tanning Industries." Mr. L. M. Rice, of the Liberty Mutual Insurance Company, will speak on this subject.

Electrical Hazards in the Packing and Tanning Industry

By L. M. RICE

District Chief Engineer, Liberty Mutual Insurance Company, Chicago

Electrical hazards in the packing and tanning industry are not, after all, materially different than other industries. True, the combinations of circumstances vary as the types of work vary, producing the same accidents—or shall we say injuries? There may be some safety men present who have witnessed cause and effect so many times that in their mind they are not accidents, any more than your master mechanic regards the burning up of a motor an accident or the failure of a flywheel; and you may be sure he does not discuss it in the light of an accident when he talks to his mechanic; it does not just happen.

If a grinder continues to grind without eye protection and he receives an eye injury as a result, we are in the habit of calling it an accident; but is it? The actuary points out with unfailing accuracy that over a given exposure we get so many first aids, so many impaired visions, and so many lost eyes, and they come with a startling regularity, all of which only go to show that they are not accidents.

These industries in many of their processes have a water hazard, but unfortunately it is not like the golfer's water hazard which is largely mental, but rather one so common to the employee that he gives it no thought and so increases his hazard.

An electrical shock in locations where the individual handling the equipment

is well grounded through dampness is very apt to receive a serious if not fatal shock.

We all know that during the primary processes, and for quite some time through the process of developing the product, dampness not only prevails but actual wetness is a dominate factor from the slaughter house on through the early stages in both the packing and tanning industries.

In the tannery the hides are wet from soaking in various liquid chemicals, and the floors are frequently flooded, if not by the janitor, then it may be a pinwheel or a tanning drum releasing its load on the floor.

The location of the plants, because of the nature of the work, is apt to be in more or less isolated localities where rigid electrical requirements do not prevail; and we often see open wiring on cleats with a drop cord to lamp and socket and usually within easy reach of the ground level. With a wet floor, damp clothing and a brass socket that may leak we have a combination which is apt to be fraught with serious consequences.

Sometimes when we refer to a small shop having a relatively low grade of electrical installation, we are informed that the little plant is rather infrequent and that the large industries produce the bulk of the product and have better equipment. He frequently does possess better equipment, but let us not forget that census figures indicate that nearly 80 per cent of our manufacturing plants employ less than 50 men. These small plants not only have a greater exposure due to sub-standard conditions, but they also produce the greater number of accidents.

The first step in protecting a plant against electrical accidents is the selection of suitable equipment and its proper installation. Unfortunately we find it necessary, due to economic reasons, to use the equipment already installed and it may not be either modern or altogether suitable for its present use. It may not be even properly installed in accordance with our present day standards, and since the plant can only exist if it makes money, we find it necessary to make the most of the situation.

It is the old story—if we play with fire we must expect to get burned, and if we have electric current we better anticipate electric shocks. Even if we do not admit such a thing as an accident, someone will sooner or later be subjected to an electrical injury, and we better prepare to meet it with trained first aid men well rehearsed in the prone pressure method of resuscitation. Incidentally, we will be prepared to meet both drowning and gas cases, and there are possibilities of both, as we know all too well. No doubt many of you can call to memory a vat drowning case or an electric shock. True, they are not frequent, but our actuary points out their occurrence over a given exposure with unwavering regularity.

Our next step is the gradual protection and improvement of the present equipment.

In most of the processes we are concerned with possible electric shock to the workman and in certain processes we fear flashes where there are flammable gases, and in still a few others short circuits that start fires.

We should provide for regular and frequent inspection of all electrical equipment and in making our suggestions constantly keep the development moving toward the most efficient equipment consistent with the industry.

We should convince all who may have occasion to handle this equipment that low voltage, such as we use in our lighting circuits, can and does cause death through electric shock. If you doubt it almost any utilities company selling electricity for lighting purposes can show cases where the victim met death through electric shock on low voltage.

We are informed that the body resistance varies widely and under damp conditions it is so very low that on 110 volts a fatal flow of current can pass through the body.

The electrical maintenance crew should be sold on the idea that it is dangerous to handle live electrical parts; and when the job makes it necessary to expose live parts where it is damp, special provisions should be made to insulate the operator, such as fiber fuse tongs and some reliable insulating material for the operator to stand upon. Insulating platforms should not be depended upon for anything except the work of the maintenance men and not for ordinary operation of the equipment in service.

Avoid handling live parts as much as possible by killing the current prior to work thereon; this goes for all motor voltages.

The average workman is likely to have more or less contact with the lighting sockets. We should eliminate the metallic type, and the non-metallic type should be checked to see that side edges or flanges are not long, so that when the lamp is screwed in place there will be no exposure of the metal parts of the lamp base which, of course, is alive when the lamp is in operation.

It is also desirable that such drop lights should be wired, not with the ordinary twisted cord, but rather by the reinforced cord of a modern type that does not have braiding on the outside, such as the rubber reinforced cord appearing under various trade names which is made for use in damp places. For portable electric tools this also is a desirable type of cord.

It is possible, although not very probable, that employees in the damp process departments might receive a shock directly from the wiring that is fastened on the ceilings or walls, unless the insulation remains dependable. When first installed the insulation insulates, but with age and perhaps mechanical injuries there is always the chance of exposed live wires.

This type of exposure is regarded as somewhat remote but a couple of cases comes to mind. In the one instance a resuscitation squad brought the victim back to consciousness. In the other instance the victim lost an arm. We should guard against such conditions, especially on circuits that run down near the floor level or are hanging dangerously near heads of operators who have occasion to go upon platforms near the low hung wires.

Naturally, we try to work toward installation of a complete conduit system, but in certain locations we find that dampness soon rusts them out. Likewise, we find it necessary to obtain switchboxes of special metal.

Open wiring on any motor control equipment such as starting compensators, switches, etc., even though the control devices are of the modern dead front type, if the wiring be open in the leads going to the control equipment it is decidedly worth while that they be maintained in excellent condition, especially since the voltages on motor circuits are usually at least 220 volts and up. Also, watch the little innocent loader in the yard. Not long ago two cases of a similar nature in widely separated plants occurred where the operators met death while operating the conveyor. Both cases occurred immediately after a heavy thunder-shower. It developed that the insulation on the wire where it entered the switch box had become worn and the live part touched the metal part of the box and the operator received a charge because of that and the wet ground upon which he was standing.

Many of the processes in both industries are developed on concrete floors, in many instances very damp and some fairly dry; but even though the concrete floor is painted over thoroughly it cannot be considered more than a partial insulation against shock. It is not to be compared in the respect of preventing electric shock with that of a wooden floor on ventilated upper stories of a building. It is true that any great amount of electricity cannot be passed through an ordinary concrete floor even when damp.

From our standpoint of electric shock, it must be remembered that only a very small amount of current—less than one tenth of an ampere—is all that we need to produce an electric shock of fatal intensity.

In the packing industry we find that the refrigerator rooms carry relatively high humidity and so we have to contend with dampness on the floors, walls and shelves just as we have them in any ice packing operation.

So far as the electrical control equipment goes, whether the wiring be open or in conduits, we should make certain in all instances that enclosures or frames of switchboards are permanently and adequately grounded and periodically checked against deterioration and mechanical injury.

Adequate grounding means the connection of the metal part through a substantial size of wire to a suitable ground, and the most reliable ground is usually a water pipe. Generally, fire insurance authorities allow connections to sprinkler pipes. This refers to the wet system only, as the dry system may be insulated from the ground for signal purposes. If the operating devices are conduit wired and the conduit is itself made up in the enclosing case of the operating device in a firm clamped connection, this will of itself provide an adequate ground unless the conduit chances to be an isolated run of conduit.

In general, the National Electrical Code requirements call for the grounding of conduit by the provision of special ground clamps and wires placed on all conduit runs where they come together at the service entrances.

The whole point is to see that the ground is dependable—no loose clamps or blind conduit lines.

CAPTAIN G. R. G. FISHER (Director of Safety, Illinois Manufacturers Association, Chicago, Ill.): Why is it that low voltage is more fatal than high?

MR. RICE: It may be because we do not regard it as dangerous and therefore expose ourselves to it without proper precautions. It is known that under very damp conditions 110 volts will pass a sufficient current through the body to cause a fatal shock. It is said that less than a tenth of an ampere will do the trick under the right conditions.

HAROLD TOOMER (Chief engineer, Armour and Co., Chicago, Ill.): What do you suggest in place of the extension cord when washing boilers? Ordinary flashlights are not satisfactory.

MR. RICE: There are rubber reinforced cords that are made for use in damp places. If these are kept in good condition and the sockets are rubber insulated, there is not much hazard in the use of extension cords. The principal danger is in the bulb breaking and letting the filament come in contact with the metal guard.

A. W. ROGERS (Safety engineer, Elk Tanning Co., Ridgway, Pa.): We have solved the question of lamp cords in a peculiar way. In some of our plants we have been using a miner's light for boiler work. We have found it to be very safe and to give plenty of light.

CHAIRMAN CLOVER: The equipment in our shoe factory is belt driven, and there is no electrical connection to it. The material used in some machines is highly inflammable, and we have had some cases of fire breaking out, particularly on the sole cementing machines, even though the machines are grounded. What is your opinion of the cause of the fires?

MR. RICE: It is hard to get a picture of such situations because I don't know all the details. Undoubtedly there was a static spark at some point or you wouldn't have had a fire.

CHAIRMAN CLOVER: Would the type of clothing a man has on develop the spark?

MR. RICE: Silk clothing could do so. Wool might, but it is not likely.

MR. KOPPELSYER: Recently in one of our packing plants an electrician had to replace a broken plug on a three phase motor. It was at the end of the day and he was alone. He connected the plug as he was accustomed to do, but in some way got the ground wire on the first phase. When he tested the motor he got hold of the top cable and the machine being in a wet location, he received a shock. He was discovered half an hour later by the superintendent who made every effort to resuscitate him. Unfortunately, he had been exposed to the current so long that he could not be revived.

We eliminated the hazard in this case by putting a rubber hose over the cable. But it shows the special danger in three phase circuits.

CHAIRMAN CLOVER: The next speaker on the program is Mr. E. E. Drews of Libby, McNeill and Libby.

Accident Experience in the Packers and Tanners Section During 1930

By E. E. DREWS

Libby, McNeill and Libby, Chicago

My paper covers experiences of members of the Packers and Tanners Section taken from data secured from the National Safety Council, which will give you a brief picture of the past and possibly an inspiration to turn in your reports to the Council if you are not already doing so.

Accident experience varies widely in the three branches of this section for which 1930 records were separately compiled—meat packing, tanning, and leather manufacturing. Progress which each has made in the past two years also varies. Injuries, in proportion to the number of hours worked, for instance, occurred most often in meat packing plants during 1930, but prevention work has been more successful in these plants than in other groups during the last two years. There has been little change in the injury rates of tanning and leather manufacturing plants during this period; their record, incidentally, is similar to the experience of other industries with comparatively low injury rates.

A group of six tanneries averaged 10.21 lost-time injuries per million hours worked during 1930, compared with 18.47 for all injuries; leather manufacturing establishments had a frequency rate of about 19.00 and meat packing plants 34.00. The differences in severity between groups, however, were smaller; tanneries averaged 1.48 days of lost time per thousand hours worked; leather manufacturing establishments, 1.04; and meat packing plants only 0.99. The severity rates of all branches of our section are noticeably lower than the average of 1.97 for all industries.

There are wide differences in the injury rates of individual establishments in each branch of the section. The best record among the six tanneries was made by a plant with over 900 employees which had a frequency rate of 3.21; the highest frequency rate was 20.51. Severity, on the other hand, ranged from 0.11 to 57.69; the latter was the rate of a small plant whose only injury was a serious permanent partial disability. Reports from such a small number of tanneries, however, do not give us a very reliable picture of the experience in that branch of the section. Among 43 reporting shoe and leather manufacturing plants, however, frequency rates range from 0 to over 100 and severity rates, from 0 to over 22.0. Four organizations employing from five to 250 people, did not have a single lost-time injury during the entire year. Reasonable injury rates for plants in this division are indicated to be less than 10.00 for frequency and 0.50 for severity, because 18 of the 43 reporting companies achieved them.

There is also ample room for improvement among meat packing plants, in which frequency rates vary from about 7.00 to over 100.00 and severity rates from 0.07 to over 8.00. Although the average frequency of lost-time injuries among meat packing plants is comparatively high, 34.38, 14 out of 67 plants had rates less than 18.0. On the other hand, a meat packing plant, to have a good record from the stand point of severity, according to 1930 experience, should have a rate well under 1.00 for only one-fourth of this group had rates above this figure.

In general, the large plants in all branches of the section have been the most suc-

cessful in reducing injuries. This is also true in other industries. It is apparent, therefore, that small plants should develop more adequate safety measures. Those that have done so can point to excellent results. I have already mentioned the no-accident records established by four leather manufacturing establishments with less than 250 employees during 1930; three meat packing plants, each with less than 300 employees, lead the meat packing industry in safety; and equally good showings have been made by numerous plants in other industries.

Progress in reducing injuries has varied from section to section. The records of over 1,500 plants reporting to headquarters in each of the last three years show that industry as a whole has reduced frequency 28 per cent and severity 8 per cent since 1928. The most hazardous industries have, in general, made the largest reductions in injury rates. The meat packing industry, with high frequency but better than average severity, has made excellent progress during this period, according to records of 11 of its members that have reported each year. These plants reduced frequency 51 per cent and severity 43 per cent since 1928. Their reduction in frequency was exceeded only by the laundry and rubber industries and their decrease in severity only by the ceramic and electric railway industries. This improvement has resulted from large reductions in temporary disabilities, because fatalities were more numerous in 1930 than in 1929, although less than for 1928 and frequency of permanent partial disabilities was higher in 1930 than for either of the previous two years. It is very encouraging to note, however, that the severity of permanent partial disabilities dropped in both 1929 and 1930.

Reductions by 35 three-year identical establishments in the tanning and leather industry during the last two years averaged 9 per cent, but their severity was sharply higher owing to increases in fatalities and permanent partial disabilities. The frequency and severity of serious injuries in these plants, however, was lower during 1930 than during 1929. This improvement, no doubt, will be continued during the present year.

In analyzing our experience with different types of injuries, I have shown our success to be greater in reducing temporary disabilities than more serious injuries. The experience of other industries has been similar.

Industries like cement and steel have attained very low frequency rates through continuous safety efforts during the last ten years, but have been unable to attain proportionate decreases in serious injuries. The rapid development of mechanical equipment and substitution of electric power for other types of industry during recent years may account, in part, for this difficulty. In addition, more accurate reporting, together with a greater willingness on the part of industry to make public data on serious injuries may also be a factor. Whatever may be the reason, special effort and attention should be given serious injuries in all industries. The National Safety Council has long recommended careful investigation of all accidents and wide publicity for serious cases so that their occurrence under similar conditions in other plants may be avoided.

The development of our statistics is steadily increasing the information about our accident problems. This year more members of the Packers and Tanners Section reported to headquarters than for any previous year. 1930 reports were received from more leather companies alone than from both tanneries and leather manufacturing establishments last year. Likewise, the records of 57 meat packing plants with an exposure of over 150,000,000 man-hours appeared in "Industrial Accident Statistics," 1931 edition in comparison to 18 plants whose employees worked 103,000,000 man-hours during 1929. Over half of our membership is now reporting, but we need the support of the remainder, if the statistical service of the section is to continue to grow and increase in scope.

ANTHONY J. DITTMER (Asst. office and credit manager, Guttman and Co., Chicago, Ill.): The accident record of our tanning plant shows a great deal of lost time, but I believe this is partly due to the men taking an extra day or so to recover from an injury. I think special records should be kept to show this.

Our insurance experience is good, the present rate being only 20 per cent of the manual rate.

CHAIRMAN CLOVER: Do you figure your lost time according to the National Safety Council method?

MR. DITTMER: Yes, but in addition we figure our experience to see how we match up with the insurance company's records. We also maintain separate records for the chrome tannery and the vegetable tannery and figure a separate rate for the laborers used in the yard. We have found that the rate for this last group is usually very high but during the past year they did not have a lost time accident.

CHAIRMAN CLOVER: Isn't it true that the tanning departments generally have fewer accidents than maintenance and other departments?

MR. DITTMER: The 1931 records do not bear that out. Toward the end of 1930 the demand for shoe leather increased noticeably. This continued through the spring and summer of 1931. We have had to hire new men, and my records show that the chrome tannery, where these new men are employed, has had five times as much lost time as the other departments that are still running slowly with a nucleus of experienced men. The cost of a lost time accident in the chrome tannery is \$93, as compared with \$18 for the other departments.

CHAIRMAN CLOVER: In our company there has been an increase in accidents during this summer. I think that the employment of new help and the disquieting mental attitude so prevalent among employees as to whether they will have steady work both have a bearing on the current accident situation.

MR. KOPPELMYER: During the period of the depression our experience has been that, with payrolls down 20%, our loss ratio is down 36%. This loss ratio is based on actual costs.

J. G. BACHMAN (Armour and Co., Chicago, Ill.): I believe that generally with decreased payrolls the loss ratio is going up to such an extent that the insurance companies are asking for increased premium rates. There was a nationwide emergency increase in rates established in September. I wish I could be as enthusiastic from the pure premium standpoint as you gentlemen are from the man hour basis. You show a continuous decrease in accident severity and accident frequency, but in dollars and cents the employer does not get any benefit out of it because the premium costs are constantly rising.

MR. DITTMER: I am glad to report that our compensation cost has not gone up and is now lower than it was four and five years ago.

MR. BACHMAN: Armour and Co., to date has kept its premium cost on a practically even keel. From 1915 to 1919 there was an increase of about 1 3/10 cents per \$100 of payroll. The following five years showed about three cents additional increase. The upward trend continued from 1927 to 1930 but at a rate lower than in the five years previous. Within the last ten years safety enters as a factor in the shape of reduced frequency and severity rates, but not as a factor in bringing down the insurance premium.

MR. KOPPELMYER: There has been an increase in the rates of all the insurance companies but this is due to an increase in the benefits called for by recent changes in the compensation law.

I have a number of questions that I should like to ask. It is a common practice among the engineers in one of our plants to tighten the ammonia valves in the refrigerating system by putting a wrench on them. Frequently the wrench slips and the man is hurt. I questioned the superintendent about the practice and said that it wasn't a safe way to do it. He told me that it was done in all plants. I should like to find out whether other companies permit the use of a wrench.

I should also like to know if knife sheaths are in use in any plants and if so what the results have been.

Here is a third question: we have had considerable trouble with hogs falling off the racks while they are on the trolley, and the men cutting the logs being injured.

I wonder whether any other companies are having this difficulty, and what their solution has been.

We had a fatality in a packing plant recently involving a soda and acid type fire extinguisher. A man was discharging the extinguisher so he could clean them. He turned them over the same way as he would if he were using them to put out a fire. The liquid failed to come out of one of them, so he took the thing up and shook it. As he did so it exploded and knocked him down against the cement floor killing him. An investigation showed that the opening was closed up.

CHAIRMAN CLOVER: It can be made a practice not to discharge the contents of an extinguisher but to take the cap off and empty it. In that way the canister is not subjected to any strain except at the time of a fire.

LOUIS BARR (Safety Supervisor, Armour and Co., Chicago, Ill.): In regard to protection from knife cuts, we have been experimenting for years trying to get a guard that will be satisfactory. Dr. Lowe of our St. Paul plant developed some years ago a metal mesh glove which was used on the left hand, but there were a number of objections to it, chiefly because of its weight, and it is not being used as extensively as it should be. Within the last year and a half we have been experimenting with a leather glove studded with steel clippings. It seems to be satisfactory, but we are still working to improve it.

CHAIRMAN CLOVER: What about hogs falling off racks while on the overhead trolleys?

E. KESLER (Kocher Engineering Co., Chicago, Ill.): This is probably in part due to increases in the weight of hogs coming to the packing house. On the few cases I have heard of, the gambreis were not designed to carry such a large weight.

ADJOURNMENT

Wednesday Morning Session

October 14, 1931

HUBERT L. CLOVER, Chairman

International Shoe Company, St. Louis, Mo.

The second session of the Packers and Tanners Section convened with General Chairman Clover presiding.

CHAIRMAN CLOVER: The first speaker is Mr. E. J. McCann, the employment manager of Jacob E. Decker and Sons of Mason City, Iowa.

Before and After Safety Organization

By E. J. McCANN

Employment Manager, Jacob E. Decker & Sons, Mason City, Iowa

Safety, as we have experienced it, is simply a matter of education, of learning the A B C's of safety. To emphasize my statement I shall cite a little incident in one of our "Safety First" tours of inspection.

A certain workman became very sarcastic and wanted to know what the "suggestive question" had to do with safety. It was hard at that time to convince him that inspection trips of this kind would help to reduce accidents. Today this same man would put himself out to report a hazard or an unsafe practice. This, however, is only one of several incidents which have actually happened in our plant. It might be surprising to you, unless you had been an actual safety worker, to learn that the above attitude does not apply to the common laborer alone. We have encountered the same stubborn resistance in men higher up who are supposed to be more liberal minded. However, the men at Decker's have since learned their A B C's and things have passed the initial stage.

During the first years of our safety program, we made a trip of inspection through the plant as often as once a week, then twice a month, and finally only once every thirty days. Our Safety First Committee consisted of a man in charge, and from three to half a dozen foremen or workmen from various departments. We would start at one end of the plant and make a thorough inspection of every floor and all suggestions were written down, no matter whom or what they involved. The suggestions were then read before a committee of three men in power: the president, the plant superintendent and our master mechanic. These men, in turn, passed on the suggestions submitted. They then became effective and were written up accordingly and a copy sent to our president, treasurer, plant superintendent, insurance carrier and master mechanic. The latter then issued orders to the foremen in charge of carpenters, millwrights and pipe-fitting departments to make the necessary changes, repairs or replacements that came under their respective jurisdictions. During our first trips we found so many suggestions that it kept one man busy writing them down. Today it is hard to find a half dozen to report, and our committee makes a trip of inspection only once in thirty days.

This brings us back to the initial factor—education. The foremen have become educated and they, of necessity, must be first, that they, in turn, may impress upon the workers the importance of working safely to avoid being injured themselves or injuring their fellow workers; also, the necessity of reporting injuries, no matter how slight, to our first aid department as soon as they occur. For instance, we know that a small scratch, if neglected, may cause more pain, suffering and deformity than broken bones. Therefore, we expect them to report all injuries to their foremen, because if the foreman has his men instructed to report to him immediately and he, in turn,

sends them to the first aid department for treatment, should something of a serious nature develop later, the employee will not have an alibi but will have placed the responsibility on the first aid department.

Then, too, pride enters the picture. The average foreman (and by far the greater portion of them in our plant) hates to have a safety suggestion or hazard turned in on his department, consequently he reports all needed repairs promptly. This is also true of the average employee.

Jacob E. Decker & Sons found that there were approximately five periods of experience in compensation insurance and first aid.

FIRST. Prior to 1920 when operations were lighter, the labor consisted of permanent employees experienced in the various jobs which they filled, and accidents were few. First aid was given in the superintendent's office by a member of the superintendent's staff. Records were not kept of experiences during this period of operation and any serious injuries that occurred were handled by the local hospitals.

SECOND. In 1920 we secured the services of a retired local doctor who administered first aid and also had charge of our commissary. Accidents were few and no records were kept of experiences under his supervision which lasted until 1923.

THIRD. In 1923 we replaced this doctor with an ex-service man, functioning in the same capacity as the former doctor up until 1926. No records of experiences are available covering this period of time. However, we do know that conditions were not serious.

FOURTH. In 1926 we began to feel the need of concentrated effort in first aid and decided to employ a nurse. We employed a woman who had had one year's training in a hospital and several years' experience in a doctor's office.

The first aid nurse played an important role in our safety program. We found from experience that a nurse must be kind and gentle and make the first aid room attractive and cheerful as it is well known that the majority of men are the biggest babies on earth when it comes to an injury, and must be treated as such.

Later we had some unpleasant experiences with some of our nurses taking too much responsibility upon themselves. By this I mean they relied on their own judgment in too many cases. For example, one of our employees injured his wrist. He visited the first aid department and our nurse strapped his wrist and sent him back to work, with the result that his case had to be opened in 1931 and he is now receiving compensation for partial disability. In checking up this injury and from what I have learned from a surgeon, this injury could have been handled at the time of occurrence for from ten to twenty-five dollars as an X-ray would have revealed a slight fracture which could have been splinted and the man would have a perfect arm today. We have also had several serious cases of infection that no doubt were mis-handled at the start.

One more point in connection with the first aid nurse. We have found that a nurse becomes irritable if kept on the job too long. This may not be true of a nurse who has had extensive experience in industrial nursing, but I have talked with heads of hospitals and clinics and they tell me that they have the same problem and the only remedy they have found up to date is to give the nurse a few days' vacation when she develops nerves. One can readily see how this might happen. Take a graduate nurse who has been doing private duty and bring her into an industry. Although she works shorter hours, has no Sunday or holiday duty, yet she deals with a larger number of cases and with all types of people. She answers their questions, gives first aid to their injuries and must be capable of handling serious cases promptly in conjunction with the doctor in charge.

The greatest hazard we have to contend with in the packing industry is knife cuts, bone scratches and bruises. These all require the nurse's immediate attention, and unless the nurse is firm but gentle in treating the injured, and in her orders to them as to when to return for further treatment, infection, which is a natural sequence of these types of injuries, where meats are handled, is almost sure to develop.

FIFTH. Our compensation cost had become very excessive prior to the year 1929 when it was deemed advisable to employ an industrial engineer to assist us with our safety problems. This man had had years of experience along this line. He had sponsored safety programs in several large industries similar to ours with wonderful success. He visited our plant twice a month for the first six months and once a month the rest of the year.

A meeting was arranged which was attended by the superintendent, supervisors and all foremen and the safety program outlined to them. It was explained that the company had decided to put on a very definite program of safety work, a graduate nurse had been employed, also a doctor, to supervise our first aid work and to examine all present and future employees. It was pointed out that the physical examination of present employees would not be made for the purpose of disqualifying them for continued service in the company, but was being done as a step forward in safeguarding the health of our employees, and was to their advantage as they would know after the examination whether they were in good sound physical condition. If not, they would have the advice of a competent physician as to the best procedure to follow to overcome any ailment that might exist. They were also told that a full time employment department was to be maintained where a record of each employee would be kept.

The foremen were instructed that in the future they were to make a daily absentee report to the employment office, giving the number absent from their respective departments and the reasons for absenteeism; that it would be up to them to inform their men of this plan and to ask them to cooperate with their foremen by letting them know when they were to be absent from work as much in advance as it was possible for them to do so; a record would be kept in the employment office and the employment manager would check up on all employees that were absent from work without notice. This would avoid future trouble. For example, if a man received a scratch or a bone puncture, and stayed away from work two or three days without medical attention, a serious case of infection might set in that would involve medical expense and further loss of time.

The foremen were also instructed to make a weekly report on the general condition of their departments, and were informed that a monthly report would be furnished them each month by the employment department showing the experience of all departments for the month so that they could show their men what the rest of the plant had done in the reduction of lost-time through accidents and absenteeism.

The safety engineer told them, in closing the meeting, that the company had gone to considerable expense in putting this plan into operation and that they were now placing it in the hands of the heads of the various departments and would look to them for results. The heads of all the departments of our plant entered into this program whole-heartedly as will be shown in the following figures.

In June, 1929, before we adopted a definite plan for safety work, along with twenty-five other industries of our city, we entered the June No-Accident Campaign sponsored by our local Safety Council. The rules of this campaign were for each industry to raise an American flag and a safety flag on its flagpole at sunrise on June 1, to be kept flying until there had been a lost-time accident, and in the event there was no lost-time accident the flags were to be removed at sunset on June 30, at which time the campaign closed. This was the first campaign of this kind ever put on in our city and we were only able to keep our flag flying three days. This was a severe disappointment to our president and general manager, and to the majority of the employees as they did not want to be outdone by other industries.

During this period we had 28 accidents—one fatal, costing \$4,320, and five costing \$349.10, with a medical cost of \$223.40; or a total of \$4,892.50.

In June, 1930, with an undaunted spirit we again entered this campaign and although we remembered our failure the year previous, we resolved to put forth our best efforts to make a better record, and with renewed energy and a better knowledge of

safety work we went through the month with 939 employees working 201,944 hours, 11 minor injuries and a medical cost of \$59.15, but no lost time.

Likewise, in 1931, the third year of this June No-Accident Campaign, we went through the entire month with 1038 employees working 201,242 hours, a medical cost of \$39.50, and no lost time. The other twenty-eight industries entered in this campaign also went through the month without a lost time accident, with a total for the month of 3,076 employees and 681,891 hours worked. This was the first time that all industries entered in the June campaign went through the entire month without a lost-time accident.

The out-of-pocket cash saving of expense is reflected in the following figures which show the remarkable progress made. In addition to the out-of-pocket saving we have the saving of the intangible cost due to lost time of experienced men away from the job and the cost incurred training men to take their places.

Compensation & Medical Cost Per \$100 Payroll
(October 1 to September 30)

	1928 to 1929	1929 to 1930	October, 1930 to June 30, 1931
Compensation Claim Paid	\$10,406.23	\$1,163.96	\$ 477.91
Medical Expense	3,693.95	2,207.05	1,133.15
Doctor's Salary		1,800.00	1,350.00
Physical Examinations		250.00	578.00
Total Cost for Period	\$14,100.18	\$5,421.01	\$3,539.06
Payroll	\$1,126,823.08	\$1,390,313.15	\$1,068,661.32
Cost per \$100 Payroll	1.25	.39	.33

While the above figures show direct and definite results in reducing the cost of operation, we know the intangible results are even greater.

In addition to the above we have a general improvement in quality of manpower in the plant, continued reduction of absenteeism, less time spent in the first aid and hospital, and the weeding out of unsafe and undesirable employees, besides the friendly competition that has developed between our department heads concerning their individual departments.

In building up our truck fleet we encountered accidents and continually endeavored to establish a system to overcome them. In January, 1931, all truck drivers were called together and given a talk on accidents, and several of the accidents that had occurred during 1930 were discussed and it was pointed out to them how these accidents could have been avoided. This talk was followed through with weekly letters to each driver concerning safety, courtesy, integrity and his duties as a representative of our company. At every opportunity we discussed the driver's problems with him, helping him in every way to become more proficient, with the result that thirty-two drivers covered 1,170,000 miles from January 1 to September 1 this year with but seven minor accidents, causing severe damage to one of our trucks but involving no personal injury or lost time.

Our safety program has been made successful through safety posters placed throughout the plant, the monthly tour of inspection, our mechanical department's prompt action in taking care of all orders given pertaining to safety, the untiring efforts of our superintendent, supervisors, department heads, doctor and nurse, and the full cooperation of every employee.

Our president and general manager, Jay E. Decker, has his heart and soul in our safety program, not only from the standpoint of cost of compensation, but also from the humane standpoint. Mr. Decker has worked in all branches of the industry and realizes to the fullest extent the physical and mental suffering of the man who has been injured. This is especially true of the married man with a family, as the com-

pensation law of our state provides that a man must be absent from his work two weeks from the date of injury before compensation starts. Mr. Decker requests a written report on every lost-time accident, giving all the details as to cause of the accident and what steps can be taken to avoid a recurrence of it, also a daily report of all lost-time accidents giving the names of the men, the number of days lost, and a notice from the employment office when the man has been released for work, explaining his general condition.

In conclusion, we realize that a good many larger companies in various industries have had more experience and no doubt have made greater progress. This brings to mind a story told of Mark Twain. One night at a party he was asked to make a conundrum. Consenting, he inquired: "Why am I like the Pacific Ocean?" A number tried to make answer but without satisfying the humorist, until finally the crowd gave up guessing and one of them said: "Tell us, Mark, why are you like the Pacific Ocean?" "I don't know," the humorist drawled. "I was just—asking for information!"

HENRY D. TEFFT (Director, Institute of American Meat Packers, Chicago, Ill.): Mr. McCann, if you didn't have many accidents up to 1920 or 1923 without any supervision, why did you change?

MR. McCANN: We had a larger force.

CHAIRMAN CLOVER: How many employees do you have?

MR. McCANN: We have 915 at present.

CHAIRMAN CLOVER: It is difficult to get a good safety program started in the smaller plants. However, Mr. McCann's report shows that it is a paying proposition.

LOUIS BARR (Safety Supervisor, Armour and Co.): I would like to ask Mr. McCann whether any records have been kept of the accident frequency and severity for those years.

MR. McCANN: No, there were none kept until the last year, 1930. Then we were 31st in a list of 67 packing plants.

MR. BARR: Does that include your office employees?

MR. McCANN: We are taking them in this year. We are also taking in our salesmen, in fact, our entire force.

MR. BARR: Has your company tried to eliminate knife cuts?

MR. McCANN: We are working on different guards. A few years back we had a great many injuries from unsheathed knives. In fact, we had about as many knife cuts in the dressing rooms and on the way to and from work as we did on the job. In the past year we have insisted that they use a pouch; in fact, we make it at the plant and charge them a fee of 25c for them. We have eliminated a lot of severe knife cuts in this way.

MR. BARR: Are there any objections made by the government inspectors?

MR. McCANN: We took the matter up with them before we put the pouch in the plant, and they are perfectly satisfied.

MR. BARR: We have had a number of objections made by the government inspectors and it was necessary for us to make a two piece pouch with a section that can be removed so that the inside of the pouch can be cleaned.

MR. McCANN: Ours is made so that the bottom can be washed out. The inspectors objected to the rubber belts, but they let us use them in the boiling department.

N. L. BRAINARD (Industrial Relations Dept., Swift and Company, Chicago, Ill.): Mr. McCann's paper is one of the best illustrations of the benefits of organized safety work that I have ever heard. I think it should have wide circulation.

MR. TEFFT: Is it in order for the Packers and Tanners Section to compliment the J. E. Decker and Sons on the excellent showing they have made?

MR. BRAINARD: I think we should do so. I move that we compliment J. E. Decker and Sons on the splendid showing they have made and express our gratitude

for giving us this information on the money saving possible from organized safety work.

CHAIRMAN CLOVER: There is a motion to compliment J. E. Decker and Sons, and Mr. McCann for the fine showing they have made.

(Motion was seconded and carried.)

CHAIRMAN CLOVER: You mention physical examinations for persons making application for employment. Is the examination made with the idea of acceptance or rejection of the application, or is it a matter of discovering the physical disabilities of a man and finding a job he can fill satisfactorily and going ahead and hiring him?

MR. MCCANN: It is to determine rejection or acceptance of the application. In Iowa there is no way of accepting a man's services unless he can pass a physical examination. You either have to accept him or reject him. In Illinois and Wisconsin they can employ a man regardless of physical condition. In Iowa they don't accept physical disability of any kind.

CHAIRMAN CLOVER: The next order of business is the report of the nominating committee and the election of officers. Mr. A. B. Drummond of Wilson and Co., Chicago, will read the report.

Report of the Nominating Committee

A. B. DRUMMOND (Wilson & Company, Chicago): Your Nominating Committee has the following list of officers for the coming year to submit for your approval:

General Chairman—HENRY D. TEFFT, Institute of American Meat Packers, Chicago, Ill.

Vice-Chairman and News-Letter Editor—HARRY W. EKINS, Brown Shoe Company, St. Louis, Mo.

Secretary—JOHN LAUERMAN, Armour and Company, National Stock Yards, Chicago, Ill.

Chairman, Posters, Slides and Safety Kinks Committee—LOUIS E. KAHN, The E. Kahn's Sons Co., Cincinnati, Ohio.

Program Committee Chairman—HUBERT L. CLOVER, International Shoe Co., St. Louis, Mo.

Membership Committee Chairman—B. M. BOYCE, The Cudahy Packing Co., South Omaha Station, Nebr.

Publicity Committee Chairman—J. L. NELSON, Tanners' Council of America, New York, N. Y.

Engineering Committee Chairman—HAROLD M. TOOMBS, Armour and Company, Chicago, Ill.

Statistics Committee Chairman—A. J. DITTMER, Gutmann and Company, Chicago, Ill.

Executive Committee—THE OFFICERS AND

N. L. BRAINARD, Swift & Company, Chicago, Ill.

A. B. DRUMMOND, Wilson & Co., Inc., Chicago, Ill.

E. E. DREWS, Libby, McNeill & Libby, Chicago, Ill.

W. F. MCCLELLAN, Armour and Company, Chicago, Ill.

DEAN MONEYSMAKER, International Shoe Company, St. Louis, Mo.

CHAIRMAN CLOVER: The meeting is open for nominations of others to office.

(Upon motion by N. L. Brainard and seconded the report was accepted. The secretary was instructed to cast a unanimous ballot for those nominated.)

CHAIRMAN CLOVER: At this time I want to introduce your next chairman, Mr. Henry D. Tefft, Director of the Institute of American Meat Packers, Chicago, Ill.

GENERAL CHAIRMAN TEFFT: I have been sitting here at the last two sessions thinking about the discussions I have heard between meat packers and tanners about hides. I am glad to see the two working so harmoniously together in accident prevention work.

I think that the group present at this meeting indicates that in the last few years there has been a lot of work done by former chairmen and that from now on we are going to reap the benefit of that work. I am sure we are going to need your assistance this next year. I hope I shall have it.

CHAIRMAN CLOVER: The next speaker on the program is Mr. Henry G. Schaffner, Secretary of Schaffner Brothers Co., Erie, Pa., and president of the Erie Safety Council.

Present Day Safety Problems

By HENRY G. SCHAFFNER

Secretary, Schaffner Brothers Company, Erie, Pa., and President, Erie Safety Council.

What a panorama of thoughts is brought to mind in the phrase "Present Day Safety Problems!"

Everything we do, whether we are working, playing, motoring, boating, flying, hunting, swimming or sleeping, presents its own safety problem. We must, as individuals, try to solve our own problems; but as a group we must endeavor to educate those who need the advice and the assistance of men and women who are endeavoring to give of their knowledge and inspiration in the education of the young and the old alike in the problems of safety which daily confront them.

Accidents are the penalties we pay for neglect, carelessness and thoughtlessness. In the prevention of accidents, our problem is to anticipate what may become a hazard, and so guard it and so correct it that it may never become a source of danger.

We must apply good common sense and sound principles to our safety problems and our accident prevention work, so that those whom we are striving to educate along the paths of safety, cannot question our loyalty or our integrity.

Let us do our duty in our shop, in our home, in the office, the street or the school just as faithfully as if we stood in the front rank of some great battle and knew that victory for mankind depended upon our bravery, strength and skill. When we do that, the humblest of us will be serving in that great army which achieves the welfare of the world.

I am a great believer in the teaching of safety to children, beginning in the early years of school. We speak of educating our children. Do we know that our children also educate us? Their influence upon us in pointing out dangers here and there serves to remind us of an impending hazard and we, too, derive the benefit of their safety education. What loving parent with good common sense will not respond in action, if his dear one comes joyfully home from school and shouts to the family, "Today, we learned an axiom by Benjamin Franklin, 'A place for everything and everything in its place.'"

That surely must make some sort of an impression on the family, and from that little child therefore emanates one of the fundamentals of safety—"to keep things in order and to set things in their own peculiar place so that they may never become a hazard or a danger."

Some people act first, think afterward, and then repent forever. It is our duty to teach people to think first and then act, so that there may be no need of repentance.

Our present day safety problems come under a special heading, that of industry, especially the industry closest to our chosen lines, and I take it that your interest will be more closely related to the meat packing industry and its allied industries than any other.

Let us consider ourselves a party of tourists traveling through a little principality, a part of a busy world, and our guide, an affable fellow with his mind made up to

point out to us as well as he can the problems of safety that ever confront us in this principality of ours, "the packing house."

We begin our tour in the stock yards, where many cars and many trucks of livestock are handled daily. The problem of safety begins right here in the handling of these animals, which after long, weary and none too comfortable positions in their ride in the railroad cars, become irritable and sometimes unmanageable, and the greatest of care must be exercised in their handling. Chutes must be made secure, gates must be closed or well guarded and runways made as safe as possible so as to prevent slipping, not alone by the animals, but the attendant as well, for a slip and fall in the path or in between a load of livestock invites disaster almost immediately.

Another of our present day safety problems is the handling of livestock by truck.

This method of transportation is becoming more and more universally used and presents in itself many new safety problems. First, the driver must have a trained mind in the handling of this ever shifting load so as to safeguard himself and others on the road. In the unloading from trucks, extra precaution must be used, as animals, especially cattle, after being cramped and shaken up, are prone to charge, to kick or to jump as soon as released, and care must be used in getting out of their way and guarding well points of escape, for much damage can be done by animals running wildly through city streets. These accidents have happened, in almost every instance, through the carelessness of some thoughtless worker, and have resulted in many serious accidents. Advise your yardmen of these dangers. It may prevent serious trouble in the future.

From the stock yards, we proceed to the killing floors, where many hazards are to be found. The knocking pens where so many accidents are liable to occur is first considered. Animals after being stunned are very apt to rare and kick, and while shackling takes place, the greatest of care must be exercised to prevent injury under these circumstances. The shackle chains should be securely fastened so that in hoisting, slipping and falling are reduced to a minimum.

Hoisting chains should be inspected regularly, as well as rails and hangers. Floors should be kept as clean and as free from grease as possible to prevent slipping and falling of workers, as most of them carry knives either in their hands or pouches, and a fall may prove to be a very serious accident.

Inspect gambrels, rollers and hooks frequently and have repaired or discard any that show excessive wear or flaws, as many serious accidents occur from falling hooks.

Great care should be exercised by workers engaged in hog scalding as these scalding vats are a hazard and bear everlasting vigil. The filth and grime in these vats present an additional danger of infection in the event of scalding and any injury needs immediate first-aid treatment as well as skilled medical care. The slightest injury or cut received on the killing floors, which are naturally alive with all sorts of animal life and disease germs, should receive prompt "first-aid" and if necessary, professional treatment.

We next enter the chill rooms, perhaps cooled by a spray system of salt brine. The continuous spray of this brine over the rails and beams tends to rust or corrode the rails, and if there are wooden beams, these become soft and soggy and unable to carry the tremendous weights placed on them. Make inspection of these hazards so as to prevent loaded rails from tumbling down in a dangerous mass.

Follow through to the larger coolers and make frequent inspection of switches, guard rails and racks, as well as hangers and beams. Do not neglect to make frequent inspection of ammonia coils, so as to prevent the danger of bad leaks, burns and asphyxiation.

From here, we enter the pork cutting department with its array of sharp knives, welding cleavers, rotary saws, rollers and skinning machines, all hazards if not carefully guarded with mechanical devices and human ingenuity. Impress upon your workers the importance of being careful around these many dangers.

Now, to the curing cellars where tons of meats are piled in dry cure or packed in mammoth barrels of brine. It is up to the foreman to see to it that piles are safely

stacked and barrels are correctly placed. Keep the floors clean and free from grease. Watch also for ammonia leaks as all too often these curing rooms are below ground and offer additional hazards in escape, should something happen.

Now, to the smoking department where the smoke houses offer us the greatest fire hazard in the plant. The continued drip of grease from the hams and bacon opens up a dangerous fire peril. Keep the walls and grates clean. Make frequent inspection and clean often. If gas is used in combination with sawdust, make sure that gas connections are secure and that safety valves are easily accessible. Keep a keen eye on sawdust pits so that there is no chance for sparks to start a fire within the bins. Fire prevention goes hand in hand with safety and here is your chance to work the two in common.

Now, we go on to the sausage kitchens with their many machines. First of all, make sure that guards are placed on all grinders, choppers and cutting machines. With the high speed, electrically-operated knives and grinders, the hazard here is particularly great and needs constant education on the part of workers as well as an everlasting vigil on the part of the foreman. Inspect regularly the sausage trees and racks so that falling is reduced to a minimum. Precaution should be urged in the operation of boilers and steam cookers so that steam valves and covers are always in good condition. Steam scalds are very painful and dangerous and prevention of scalds is an important part of safety work in the sausage kitchen.

From here, we travel to the casing department with its rotating and revolving washers and scrapers, each with its own peculiar danger. Safeguard these machines and safeguard the employees in this department who are constantly exposed to grime and residue which open the way to many infections.

Now, to the rendering plants where giant steam and electrically operated tanks add their bit to the many hazards in the packinghouse. Again, we must use great care in watching steam pressure so as to prevent explosion and running over of hot greases so dangerous to the worker. Check safety valves often and instruct workers to be on their guard.

From there, we go to the engine room in charge of a chief engineer under whose responsibility so much of the safety of the plant is placed. Hazards of steam, electricity and ammonia are under his care. Guards for fly wheels and fast moving machines are absolutely essential and should be frequently checked. Boilers should be regularly inspected and necessary repairs made without delay. Explosions and shut-downs are costly and extremely dangerous.

Check up with your chief engineer often, make him also a safety engineer.

Down we go to the hide cellars where tons of hides are cured in piles many feet high. The foreman should see to it that they are piled safely and keep the place as clean as possible to prevent an accumulation of breeding places. Use disinfectants and insecticides liberally to prevent breeding, and if the workers have any open wounds, give immediate attention. Many cases of dermatitis or other skin affections are traceable to hides, and rashes or redness of the skin should have immediate care from a good physician or skin specialist.

Traveling farther, we pass through the warehouses, packed with barrels, tubs, boxes, paper, burlap, cotton sacks and hundreds of other articles common to a packing house. Herein lies another great fire hazard and must be constantly watched. Carelessness has no place in a stock room or warehouse and it must be constantly guarded against.

Again, we enter the plant itself and find ourselves amidst the hurry and bustle of the packing and shipping department. Care must be exercised in lifting heavy articles, ruptures are dangerous. Trucks should be operated with great care to prevent toe and foot injuries. Where wire-bound boxes are used, wire scratches should not be treated lightly. They are extremely dangerous, as well as injury from nails, etc. which may be strewn on the floor; sometimes stepping on a nail leads to one of the most serious of infections. Guard against them.

Out on the loading platform trucks are being loaded ready to be hurried to their destination. Load them carefully and securely; and last, but not least, instruct the driver in safe driving on the road; he can carry with him the lessons in safety taught him in the plant safety meetings and Safe Drivers' Clubs.

Our tour has ended and our guide tells us that he advocates a safety committee to work in conjunction with foreman and superintendents to foster safety throughout the plant, and we all agree with him.

Following safety, comes first-aid, and too much cannot be said of the remarkable saving in health and life first-aid has given us. Why not have first-aid classes throughout your plant? They turn liabilities into assets, and what better assets have we than human life?

Our modern methods of safety are many, and as we live, so do we gain experience in many ways of accident precaution. Let the fear of a danger be a spur to prevent it.

We learn caution by the misfortune of others and we can caution others of approaching dangers.

"We should so live and labor in our time, that what came to us as a seed may go to the next generation as blossom, and what came to us as blossom may go to them as fruit."

This is what we mean by present-day safety progress.

B. M. BOYCE (Assistant to the General Superintendent, Cudahy Packing Co., South Omaha, Neb.): Mr. Schaffner mentioned wire bound boxes. I would like to ask him if he has had any experience in cutting the wire short or leaving it long.

MR. SCHAFFNER: We have had injuries due to wire bound boxes, especially after they have been in the warehouse and have been subjected to dampness. The end of the wire becomes brittle. We have had several minor wire scratches which became serious infections. Six months ago we made the rule that every man who receives a wire scratch must immediately report to the first aid department, and we in turn send him to the doctor for injection of tetanus antitoxin. We have been quite fortunate in that several of the blood poisoning cases didn't turn into lock-jaw, but we felt they were just on the verge of it. So we made this rule.

Does that answer your question?

MR. BOYCE: I wanted to know if you had had any experience between the two methods of cutting the wires.

MR. SCHAFFNER: We use the twisted wire and find that if we cut them off short and bend them over, we have the least danger. Some of the boys in the shipping room like to wire them for the convenience of the customer, so he can reuse the box. We have discouraged that because the driver in carrying a box will throw it to his shoulder and either scratch his wrist or his hand on the long wires.

DR. J. P. LEAKE (Senior Surgeon, United States Public Health Service): The matter of the use of tetanus antitoxin has come to me rather forcibly occasionally. I think we should discuss just how much we should use it. Since 1929 the tendency has been to use it rather freely. I wonder if we haven't gone a little too strong in that direction. How many actual cases do you get?

DR. V. S. CHENEY (Medical Director, Armour and Co., Chicago, Ill.): In our experience of 16 years or more, and covering 60,000 employees, we have had three cases of tetanus. It is questionable whether or not the incidence of tetanus has been lowered by the free use of antitoxin. We use it very freely on all injuries of a crushing nature and on puncture wounds. There is no way of knowing just how much tetanus that prevents.

MR. BRAINARD: In my contact with our Medical Department cases of tetanus are exceedingly rare. I don't recall any within the last 7 or 8 years. It is our practice to use tetanus antitoxin if there is any question whatever.

DR. WM. BAUER (G. H. Hammond Company, Chicago): In the 18 years I have been with the Hammond Company I have come in contact with no tetanus cases.

I do some work for Miller and Hart and I had one case there that died. It was a neglected puncture wound of the foot.

MR. TEFFT: Is there any reason why you shouldn't use tetanus antitoxin freely?

DR. LEAKE: I certainly feel that one should in the case of dressing puncture wounds of the foot, but whether we should use it quite as freely as is done in many of our hospitals is to me a question. The nervous sequelae have not generally been severe, but they are very frequent and undoubtedly sometimes cause a good deal of lost time.

We should use the antitoxin with severe puncture wounds, with lacerations of tissue, etc., there is no doubt about it, and certainly this group should think more seriously of it, because of the presence of the bacillus so frequently found in horse manure or anything of that sort. I don't want to infer that we should abolish the use of it. We certainly need it.

MR. TEFFT: Are there any bad effects from the use of it?

DR. LEAKE: The tetanus antitoxin isn't generally as refined as the diphtheria antitoxin and we get serum sickness from it.

Of course, ordinarily in what we call hives, we get high temperature, sometimes glandular enlargement, joint disturbances, and often nervous disturbances as well. These are very distressing.

DR. CHENEY: The research laboratory of the University of Illinois has recently perfected a serum which they think will be free from reaction. They called me up just last week and wanted to know if we would be willing to try it out. I told them that we would be very glad to, because the severe reaction occurring is what has made us occasionally hesitate to use the antitoxin as freely as we would like to. If they have solved that problem we can use it as freely as diphtheria antitoxin is used now.

DR. LEAKE: Just recently we have learned that one dose of 1500 units often isn't enough. In New York, for example, they increase the preventive dose to 3000 units. It seems to me to be a little more simple to give a small dose at first and another dose if the wound seems to be tetanus prone in ten days.

H. E. GATEY (Division Superintendent, G. H. Hammond Co., Chicago, Ill.): When should the tetanus antitoxin be given, right after the injury or after a day or two?

DR. CHENEY: Immediately after the injury.

MR. SCHAFFNER: I have had various opinions from different doctors. Some say it should be given right after and others say it is all right to wait a few days.

MR. BRAINARD: Mr. Schaffner mentioned first aid rooms throughout the plant and the training of employees in first aid. I think this should be considered with some caution. Where a doctor is available and where a plant is equipped with medical service there should be no first aid equipment. There is too much of a tendency to use first aid methods and not to get the medical attention which is desirable above all else when it can be obtained.

MR. SCHAFFNER: I didn't mean to infer that we should have first aid stations throughout the plant. What I suggested was to have some of the employees trained in first aid work. That is for emergency work only, to get the injured person taken to the emergency room.

DR. CHENEY: In our organization we have always fought against first aid stations. Even a trivial wound should have the care of a physician, especially in the packing industry where infection is so prone to occur. I also agree with Mr. Schaffner's amplification that individuals should be trained in first aid throughout the plant for the purpose of knowing more what not to do than how to do things. It is also necessary for the purpose of transportation.

CHAIRMAN CLOVER: Our next subject will be presented by Dr. V. S. Cheney, medical director of Armour and Co. He has had a good many years of service in industrial work.

Keeping Industrial Employees Healthy

By DR. V. S. CHENEY

Medical Director, Armour & Company, Chicago

The economic loss due to illness in the U. S. is estimated to be \$5,000,000,000, two and one-half times the estimated loss due to accidents. Most of this burden falls upon the individual in loss of wages and medical expense, but a considerable portion must be borne by industry through decreased efficiency and its inevitable effect upon production. Twelve times as many absences for sickness as for industrial accidents among men employees of the Edison Company of Boston in a ten year period proves the urgent need of some definite health program.

While it is not within the province of industry to assume the responsibility and bear the entire burden of expense in maintaining the health of its workers, still some large industries are convinced that it is a sound economic policy to furnish a complete medical and surgical service to their employees and their families. Then there are others that go to the other extreme and furnish only a service sufficient to meet the requirements of the compensation laws. One gives too much; the other too little. Between these two extremes there is a happy medium; more consistently in line with the ideals of our democracy. The trend in industrial health service today is toward preventive medicine and health education. Such a service "helps the employee to help himself", for health, good or bad, is still, and always will be, largely a matter of individual effort.

First—A Clean Bill of Health

It is industry's unchallenged prerogative to exact from the applicant for employment a clean bill of health and physical fitness to perform efficiently the duties of his employment. After accepting him for employment it is industry's responsibility to assist in maintaining his good health by surrounding him with an environment in which he can work without endangering it.

None of the functions, processes, methods of conduct or activities of industry today are activated by altruistic motives but are carried on for purely economic reasons: they help to pay dividends. If they do not pay they are promptly discarded. Most large industries who carry their own insurance against accidents have realized that the good health of their employees is an important factor in the efficient and economic conduct of their business and a most potent factor in safety and the prevention of accidents. For this reason, because it pays, they have instituted health programs to help in conserving their man-power.

I am not in favor of the paternalistic forms of health service. They do too much. They usurp the functions of the general practitioner and of other health agencies, public and private, and tend to pauperize the employee. Unless carefully supervised the quality of the service rendered is very low. Likewise I am not in favor of the other extreme. They do too little. They are shirking a great responsibility and passing up a wonderful opportunity to increase the efficiency of the employees.

The program for keeping employees healthy that I am about to describe to you is fraternalistic; a friendly, brotherly service.—such a service as a physician would render to his own family; treating emergencies and minor ailments such as colds, headaches, indigestion and the like; keeping a watchful eye upon the hygienic habits of the individual members; in serious illnesses ascertaining that the doctor in charge of the case is competent and cooperating with him; and assisting in securing financial aid to cover medical expense and lost wages.

First:—It is very necessary, in order to join this large family, that the condition of health and the physical defects be known of those who want to come into it. So, first, we have the preemployment examinations. These are not for the purpose of rejecting the physically handicapped, but, in cooperation with the employment department, to place them in suitable occupations. At the same time vaccination against smallpox is performed if the applicant has not already been protected.

Second:—Periodic examination of employees for the early recognition of disease.

Third:—Examination of employees for

- (a) Those returning to work after an absence on account of illness.
- (b) Re-examination because of some preexisting condition discovered at time of medical examination.

In pre-employment examination we accept men with hernia provided they wear a well fitting truss and are placed in a position where they will not be endangering their health or aggravating the condition. But we check up on these men to see that they are wearing the truss. Only yesterday I saw a man who, on his way to work, came in for an examination, and he didn't have his truss on. He said, "I put it on when I go to work." I impressed upon him the necessity of wearing it.

- (c) Those seeking medical advice because they have learned to use the doctor's office or have been referred to Medical Dept. by their Superintendent or Foreman because they "look bad" are "slowing up" in their work, or frequently absent from work.

I always consider it a high compliment when a man will come in to me for advice. I consider it that way when it is on a medical subject, but I consider it a still higher compliment when he comes to me for advice on something outside of medicine, some family trouble. And you would be surprised how frequently that occurs. The men know you as a doctor and they have confidence in you as a physician or they have confidence in you as a fellow man. If they have a little trouble in their family they come to you for advice. It is a wonderful compliment and it is something that we have always striven for and it is something that we still have.

- (d) Examination for Pension and Service Rolls.

The thought occurs to me here of how this examination can be abused. It almost occurred in our own industry. Some of the old men were sent in to us for an examination to see whether they were failing or slipping or if we could in any way help them to regain their apparently lost efficiency; and a letter went out in some instances saying that because of their physical condition they were going to be retired. I didn't know of that letter until one man, who had been recommended as being able to continue in his employment, brought it to me and said, "I thought I was passed by your department, and now they say that on account of my physical condition I have to be retired."

That was an abuse of the medical department. It was an abuse that was rectified very quickly after it was discovered. It was destroying the confidence that the men had in the physicians. They didn't want to come up to us. They said "No, I am going up there to be retired. They are going to get rid of me." That is an attitude that we do not want at all.

- (e) Monthly examination of all exposed to occupational disease.

This, of course, is an examination that is exacted by the state, particularly of those handling lead or lead products.

Fourth:—Emergency medical care for the acutely sick or for those with some temporary condition which medical treatment will relieve at once and allow them to return to work.

Fifth:—Medical treatment and sanitarium care for tuberculous employees.

Sixth:—Friendly medical supervision of all cases of severe illness or disabling injuries incurred outside of their employment.

I know that if I were reading this paper in a meeting of doctors they would take exception to that clause. They would say that we were going outside of our territory. I don't think so. As I said before, our industry is a large family and I hope to be the medical brother. In our own families we do not treat the members for serious illnesses. We call in some other doctor. But we have a very acute interest in the progress of that case in the treatment. We are sitting on the side lines and watching. The men in the industry are very close to me. They are members of our family, a large family, and I believe that I have the right to call up their doctor and see how they are progressing. I believe that I have a right to know just what treatment is being extended to them or given them. It is my right and the right of the industry to know, so I would not take back anything in that clause. It isn't a hard thing, either, and you would be surprised the way it is met by most doctors. You call them up and you express an interest in their patient and even though they don't know you, they will tell you and explain to you just how the case is getting along, and almost invariably they will add, "Doctor, if you want to go out and see him do so. We will be glad to have you." It is all in the method of approach to the doctor.

Seventh:—Medical advice and consultation for sick members of employee's family.

A great many of the future employees of Armour and Company are coming from the members of the employee's family. We have in that way an interest in them. We have another interest in them, because any sickness in the employee's family reacts upon that employee and it causes him to worry and it makes him inefficient, and of course, efficiency is what we are now striving for in industry.

I believe in extending to the employee's family the medical service of which your medical department is capable. Some can give more and others less. In our own industry we encourage them to bring their children or other members of their family in for examination or consultation. We give them x-ray examination and laboratory examinations and may go so far as to make a tentative diagnosis, but we will not treat. That is beyond our province. We will give them the data that we have acquired during the examination or throughout the consultation and we will tell them to take it to their own doctor. If they know of no doctor or have no family doctor we may recommend one or several, and if they can not afford the services of a doctor we will tell them where they can obtain the medical attention necessary. In doing that we help the man, we relieve his worry, and we increase efficiency.

Eighth:—Periodical sanitary inspections of the plant, lighting, ventilation and sanitary conditions.

Ninth:—Cooperation with safety inspector in the prevention of accidents.

I am sorry to say that we don't always do this. Press of business often prevents me; but we have a very good sanitary committee who make frequent inspections of the plant. We also have an unusually good and efficient safety organization who are competent for making sanitary inspections. The most that I could do would be to go along as a consultant.

Tenth:—Health and accident prevention talks, bulletins and articles for plant periodicals.

I think that is going to be a very important part of health programs, because the success of any program will depend upon the education of the employee; in fact, the maintenance of a good healthy condition is purely a matter of education.

Eleventh:—Cooperation with Municipal, State and Federal Health Agencies also Community Health Centers.

Twelfth:—Arranging for loans that are repaid by weekly installments to pay for hospital, medical or dental services.

Thirteenth:—Laboratory examinations including urinalysis, blood analysis, sputum examinations, bacteriological examinations are furnished free to employees at their request or the request of their physicians. For skiagraphs and dental films a nominal charge is made, an amount that just covers the cost of the film.

We try to save as much as possible of the cost of medical service to the employee. We believe in extending, as I said before, the facilities of the medical department to their limit to the many employees. We have very little difficulty in cooperating with the doctors. I think it is because we try to observe the Golden Rule, and the doctors understand that and frequently call us into consultation and ask for our cooperation. They will also call up and ask if they can have an x-ray examination of a certain man and sometimes a bacteriological examination, all of which we are very glad indeed to furnish.

Illness Due Usually to Errors in Hygiene

Most illnesses are preventable, 60 per cent, and are generally due to errors in hygiene: faulty habits of eating, drinking, sleeping, exercising, etc. Ignorance of the laws of hygiene is the most frequent excuse for their transgression and the answer to that is—education. "Health habits that are formed in the factory become the health habits of the home."

Small industries, not large enough to warrant employing a part or full time physician, might be able to secure adequate medical services through the casualty company carrying their insurance. If medical supervision is profitable to the large self-insurers, it should also be profitable, if properly conducted, to the commercial insurance companies.

In our physical examinations particularly the preemployment ones I have been forcibly struck by the evidences of chronic fatigue presented by nearly all applicants. I attribute it to the early starting hour; seven o'clock, with consequent lack of sleep. These men in order to get out to work at seven o'clock must necessarily arise at five or five-thirty. That means going to bed at nine or nine-thirty in order to get sufficient sleep, eight hours. It isn't done in this day of the automobile, picture shows, radio and daylight saving.

Another thing that is conducive to the production of chronic fatigue is overtime. Years ago when the employee was not forced to work at such high speed and tension, the evil effects of long working hours were not so noticeable. Perhaps the elimination of overtime would not only help to reduce the chronic fatigue now so prevalent but would also serve to restrict overproduction which is attributed as being the cause of the present depression.

I believe that such an early starting hour should be abolished by legislation or at least such a severe penalty attached to it that it would make it prohibitive. I know that industry won't agree with me on that, but wouldn't it give more men employment if we were to do it? Our steel mills run on three eight hour shifts. We could run our packing houses that way on an eight hour shift if we wanted to increase production, and much more efficiently, for no man should work more than eight hours, especially at the tension and at the speed at which they are working nowadays.

Here is a little clipping that I took from the "Bulletin of the American Association of Industrial Physicians and Surgeons."

Fatigue? From What—?

Accidents happen more frequently to the tired person. Tired brains, tired muscles, and tired nerves are a menace to the workman.

But—a person may be chronically tired from illness, or always tired from lack of sleep, or occasionally tired from too much week-end recreation or because he doesn't know how to relax during or after work. Again, he may be tired from worry, anxiety, or something that has broken his "nerve." Perhaps he hurries and his fatigue is due to high tension.

Every employee who does poorly, is sick often, has too many accidents, is a study by himself. Moral: *An industrial health examination by a competent industrial physician.*—*Man Power.*

Dr. A. BAIER (Medical director, Western Cartridge Co., East Alton, Ill.): I was associated with Dr. Cheney for about five years at Armour and Company where the policies of that company were so thoroughly drilled into me that I took it upon myself, upon his recommendation, to take the directorship of an ammunition concern. The work of this concern involves practically all occupational disease hazards. We are engaged in giving treatment for lead fumes and gases. If there ever was an industry in which physical examinations are stressed it is in this one. The men have to be absolutely physically fit; otherwise, they are soon eliminated.

These men, under the state occupational disease law, must be examined every month. You would be surprised to find the number that are sometimes taken off for a week or two for recuperation. When we find a sick man we get his occupation changed until he has recuperated sufficiently to go back to his regular job.

Dr. Cheney mentioned these examinations being done in a haphazard way because the employee isn't stripped. I think he is right. It is carelessness on the part of the physician or the examiner. An examination in which the man is told to strip is much better, for the examining doctor can see much more at a glance than he can find out in conversation with the man for ten minutes.

The doctor's office is the only medium in an industry through which the plant and the employees have a very personal connection. The relationship of the doctor to the employee and to the employer should be kept in mind.

Dr. J. P. LEAKE (U. S. Public Health Service): I think I have been well repaid for coming to this meeting. We all think so much of Dr. Cheney, and I think the suggestions he has made all sound reasonable. I hope he carries them out.

In regard to the question of medical ethics, as to how far we should go in trespassing on other doctors' work, etc., it seems to me just as he said that it is wholly a question of the Golden Rule. We think of the employer and of the other doctor, but our first concern is for the sick man and how to get and keep him healthy.

Dr. R. H. SPACKMAN (Lumbermen's Mutual Casualty Co., Chicago, Ill.): I would like to hear some comment on the importance of the proper kind of footwear in relation to maintenance of health.

CHAIRMAN CLOVER: Dr. Cheney, has your company gone into the question of proper footwear for the health of employees in their work?

Dr. CHENEY: I have been interested in feet for a good many years. I want to tell the shoe men here that I haven't seen a shoe, as it comes out of the store, that I thought was proper for a child or for anyone to wear. You can place most shoes on a flat surface and look at them from behind, and see that they have a tilt toward the inside. This is absolutely wrong. The tilt should be toward the outside. I believe that a lot of our flat feet are caused by the wearing of the ordinary shoe which tilts the foot inward. With children (and that is where you have the beginning of flat feet) I have advised them to have a Dutchman placed in the heel on the inner side which would turn it the other way. This frequently gives relief from pains in the legs and even in the back.

If a patient wants to correct flat feet I would advise him to stand with the feet everted and to walk along an inverted trough. This will strengthen the muscles and tendons.

Miss FRANCES E. SILBAUGH (Industrial Nurse, Oscar Mayer and Co., Madison, Wis.): What do you do about shoes for the men in the pickle cellars and the

killing rooms? I don't approve of rubber boots all day long, but it seems that the men must have them to keep their feet dry.

W. F. McCLELLAN (Safety Supervisor, Armour and Co., Chicago, Ill.): We have a shoe department in our plant where we have a full line of shoes and boots. We now have fifteen pairs of boots out on test. These have the safety toe in them. We have hammered away at the manufacturer for that and we now have samples of them.

The men can use wooden soled shoes in the pickle cellar and places of that kind. We also carry those in stock. In addition we carry the rubber boot for wear in those places. All of these shoes we sell to the employee for what we pay for them in order to induce him to wear them.

N. L. BRAINARD (Industrial Relations Dept., Swift and Co., Chicago, Ill.): We have had considerable success lately in getting the employees to return to the old style leather boot which was commonly seen in the packing houses thirty or forty years ago. This is doing away with the harm that the rubber boots did the foot and it is also eliminating the slipping hazard to a great extent.

CHAIRMAN CLOVER: Do the boots you mention have leather or rubber heels?

Mr. BRAINARD: They have leather heels.

A. J. DITTMER (Asst. Office and Credit Manager, Guttman and Co., Chicago): We find that there are two types of boots used in the wet departments. One is a leather high boot, made by the Young Shoe Company in Milwaukee. It is very nearly water proof, and, where there is not too much water on the floor, it is very satisfactory. The other is a rubber boot, which we find is the best for use in departments where there is running water and considerable grime.

ADJOURNMENT

Thursday Morning Session
October 15, 1931

HUBERT L. CLOVER, Chairman
The International Shoe Company, St. Louis, Mo.

The third session of the Packers and Tanners Section convened with General Chairman Clover presiding.

CHAIRMAN CLOVER: This morning we are going to have a moving picture, sent to us through the courtesy of the Aulson Tanning Machine Co., Waukegan, Illinois. Mr. Edward R. Aulson, treasurer of the company will present it.

(At this point Mr. Aulson presented a motion picture produced by the American Leather Producers, Inc., entitled "The Story of Leather.")

MR. AULSON: I have been asked to say a little about patent leather. Patent leather is stained and carried through the same processes as all upper leather. Its base color is black. The hides are then tacked and dried and the fibers worked up so that they are nice and soft and pliable. Then the grain is buffed off. The first coat applied to patent leather is linseed oil boiled down to the thickness of jelly and then thinned out with naphtha under a temperature of 550 degrees. After this has been placed on, the leather is baked and given a coat of varnish, in some cases three or four coats. It is necessary to put the hides out in the sun to dry as sun light is the only thing that will cure the varnish properly.

MISS FRANCES E. SILBAUGH (Industrial Nurse, Oscar Mayer and Co., Madison, Wis.): Isn't there a great fire hazard from the linseed oil and naphtha?

MR. AULSON: There is a fire hazard but not necessarily a great one. We have installed cold water coils at our plant in Waukegan so arranged as to condense the naphtha vapor. We are losing only about a quarter of that thinner. The old method was to do the whole operation in the open, and the loss of the thinner was about 50 per cent. Also, the vapor will travel along the ground, and it has been known to go a long way and start a fire.

CAPTAIN G. R. G. FISHER (Safety Director, Illinois Manufacturers Association, Chicago, Ill.): Are the fumes dangerous to the workers?

MR. AULSON: No.

GEORGE CLARK (Safety Engineer, American Mutual Liability Insurance Co., St. Louis): What is the chief hazard in the greasing of skins?

MR. AULSON: I see very little hazard in it. It is possible to get too much pressure on the drums if the safety valve doesn't work. In a good many tanneries sheep skins are greased with kerosene. There isn't much danger in that.

MR. CLARK: How about the use of naphtha and gasoline?

MR. AULSON: The buildings where naphtha and gasoline are used are out by themselves and are steam heated. No electric motors are used and all fire hazards are kept at a minimum.

CHAIRMAN CLOVER: The next speaker is Mr. George Clark, safety engineer of the American Mutual Liability Insurance Company, St. Louis.

"What Are You Going to do About Them—And When?"

By GEORGE E. CLARK
Safety Engineer, American Mutual Liability Insurance Company of Boston,
St. Louis, Missouri

"What are you going to do about them and when?" The most natural answer to such a question is a question: "About what or whom?" About the elimination of certain hazards which are producing accidents, untold suffering, misery and sadness—things that cannot be measured in dollars and cents.

In many instances in the movement for safety, I am reminded of the tale of the small boy who fell out of bed one night. The following morning, after lengthy questioning by his mother as to the reason for the fall, he replied: "Well, mother, maybe I went to sleep too close to where I got in."

Of the making of books it has been said there is no end. This is also true of the hazards which arise from day to day, hour to hour and minute to minute. Hazards which must be eliminated if the life and limb of the worker are to be preserved, and production is to be maintained on an efficient basis.

There are countless sources from which these hazards or accident causes, if you will, arise. For the sake of simplification, let us treat them under two headings: the mechanical and the non-mechanical.

Forty Per Cent Are Mechanical Accidents

In a recent analysis by our company of 2,544 lost-time accidents in the boot and shoe industry, it was found that 40.32 per cent were produced through mechanical hazards. Non-mechanical causes accounted for 59.68 per cent. The total number of accidents involved 43,847 days of actual lost time.

The elimination of mechanical hazards will be found along very definite lines of engineering. To some extent the yard-stick of engineering must be applied to certain non-mechanical hazards. In our analysis we found that many of the non-mechanical causes could be erased through some mechanical improvement. The changing of a process, the introduction of new and up-to-date methods or a rearrangement of production lines. In many cases arising from electrical causes it was found that a mechanical correction would have eliminated a hazard. In other cases such as falling objects mechanical improvements might have prevented much lost time. At one plant using a conveyor system it was discovered that building up the sides along the conveyor prevented falling object cases. Just a small mechanical improvement which corrected and eliminated a non-mechanical accident cause.

We find the mechanical engineer, with his wide experience and knowledge of machinery and machine equipment, entering the field of safety. His valuable assistance will do much in the eliminating of mechanical causes and of many of a non-mechanical nature. His advice should be sought and he should be consulted freely. There is much work yet to be done in the development of mechanical guards.

The superintendent, master mechanic, or foreman should have no difficulty in recognizing a hazard. When it is recognized, no time should be lost in its elimination. In going through various plants, it is not unusual to hear the remark, "Why, I've passed that day in and day out, never thought much about it producing an accident." It's just the old story of familiarity breeding contempt. That unnoticed small detail will, sooner or later, bring about a serious accident.

I recall a case where a belt and pulley guard had been installed. The builder had very conveniently left an opening about 2 inches in diameter in order that the moving parts might be oiled. One day as the operator of the machine bent over to pick up a piece of work, his eye came into line with the opening. At that moment the belt beneath the guard broke and one end whipped out, hitting the workman in the eye. Needless to say, the eye was removed and a glass one substituted. Just another case where a hazard which was supposed to be adequately guarded produced a very expensive mechanical accident. Too much attention cannot be given the unguarded mechanical exposure. I do not believe it is necessary to bring to your attention the terrific cost of mechanical accidents as compared to cases arising from non-mechanical causes.

There are countless operations within your plants creating hazards. Among them will be found the machine point of operation and the moving parts. These points are important and deserving of your utmost consideration. I make bold to state

that in not recognizing the importance of mechanical hazards, any man who ignores them is a fit subject for one of those institutions where the inventors of perpetual motion and kindred things, are housed.

There are many conditions which affect both the guarded and the unguarded mechanical exposures. How is the housekeeping? Are lighting conditions good? Is there a confusion of operations? Does material pass along the line of production smoothly?

Often have we heard it said that the best safety device is a careful man. This may be true in a sense and yet there are times when we allow carelessness to creep in. Times when conditions arise over which the individual has no control. It is at these stages when the unguarded mechanical hazard extracts its heaviest toll.

Of the non-mechanical hazards there has been considerable discussion, both *pro* and *con*, as to the education of employees. To me it seems that educational effort which will produce the best result lies in improving the mental condition of a man. If a man thinks right it is not reasonable to believe that he will do his work right. After all, the right way to do a thing is the safe way and it follows that the safe way is the right way. Your job, my job, our success or failure depends on trying to help men to help themselves. This will be accomplished through efforts which will improve the mental attitude of the men with whom we come in contact. If with continued work you are able to get the right thoughts into a man's mind and keep him continually impressed with those ideas—is there any reason why he should not practice his safety in an automatic manner?

Learn Safety as a Child in School

To me this inculcating into an employee's mind automatic safety is much like the child in school. Starting in the lowest grade, day after day, as the little tot attends class, impressions and thoughts put in the mind have a deep and lasting effect. Without thinking, the child in a short space of time is able to answer automatically such questions as, "How much is two times two, or three times three," etc.

I know of no reason why this line of automatic thought cannot be developed in the minds of our workers. As you step to the curb to cross the street you instinctively look both ways. If on the highway driving an automobile, approaching a railroad crossing, you automatically look up and down the tracks. So it must be with the worker. His mental condition must be such that before he starts any operation he automatically looks up and down the track as it were, to see if the right of way is clear.

Let us consider for a few moments the young lad who enters a shoe factory as an apprentice. Whether his aim in life is to cut soles, stitch uppers, turn, or whatever operation in which he chooses to acquire skill, it is very important, in order to produce the maximum in both work and wages to which he is entitled, that he work in a safe manner. From the moment the apprentice enters the employ he should be impressed continually with the importance of working safely—thereby avoiding injury. These impressions should start in the employment manager's office, and this man in many cases is supervisor of safety. Upon being introduced to his foreman, it then becomes the foreman's job to educate this lad in safe practices, which with proper development will improve the mental condition of the boy and produce within him automatic safety.

If you will accompany me into the Scriptures, you will find no better solution for the elimination of hazards or the creation of automatic safety than is found in the 16th Chapter of Proverbs, a portion of the 9th verse, wherein we are told that, "A man's heart deviseth his way." Further along in the same chapter, the 23rd verse, we learn that, "The heart of the wise teacheth his mouth and addeth learning to his lips." The big job is correcting the heart and the mind. When this is done we shall have created workers who do practice safety in an automatic manner.

Instructions should be definite, simple and to the point. Why he should avoid an accident and how he can avoid one should be fully explained. The instructions by the foreman and the actions of the apprentice should be checked regularly by either the superintendent or safety supervisor. When errors or omissions have been found corrections should be made at once. If the foreman has not the whole-hearted support of the organization, reflection will be had in the instructions and the desired results will not be produced. Let no one ignore to any degree the important role the foreman plays in the creation of automatic safety.

In the improvement of an employee's mental attitude there is more than the part the foreman plays. Has the management provided a light and airy place in which to work? Have the walls and windows been kept clean? Is the sunshine allowed to filter in? Is the artificial lighting good? If the place is painted, is the color attractive or does it appear as the interior of a morgue? Is the operation one where the employee might produce more if he were provided with a stool or chair instead of having to stand at a bench? A tired body produces a tired and sluggish mental reaction. The importance of a dash of paint, clean windows, and pleasant surroundings have a large bearing on accident frequency. Has management provided these things? If they have they know that the efficient plant is the safe plant and the safe plant is the efficient plant. Safety must be included in production plans. The management that has not included safety in its program has yet to learn the importance of it in the economic picture of today. The value of man power cannot be estimated in dollars and cents.

Is there any of you who can place a value on a man's hand, arm or life? There is nothing more valuable than human life—it transcends all else. Our's is the responsibility for the preservation of it. Too often has the thief of all time—procrastination—been the cause of accidents and deaths. The hazard exists now and now is the time for its elimination. Tomorrow may be too late!

Discussion

CAPTAIN FISHER: There was some discussion in the Industrial Health Section of the mental causes of accidents. It is amazing how much this really enters into the situation. How many times is the question "How did it happen," answered by "I don't know." The Safety Council gives us two reasons. They think the first is the speeding up due to rush orders. The next is the hiring of green or young or untrained help and not giving them the proper amount of instruction because of lack of time. The insurance safety man sees things that he dare not speak about. I know of a boy who had lost both thumbs within twenty minutes after the time he was hired.

In my talks in factories and shops I am adding a third reason. It is worry. When I came back from overseas I was with the Red Cross for three years in Omaha where I had the supervision of all the industries. I traced one accident there where the direct cause was a quarrel that the man had with his wife before he left home in the morning. I am trying to impress upon the foremen, when I talk to them, to keep their eyes peeled, and if they see a man that is looking a little worn or tired or anxious they ought to take him off the job for a few minutes and talk to him.

EDWARD R. AULSON (Aulson Tanning Machine Co., Waukegan, Ill.): I want to bring out one thing in designing a machine guard. It must not decrease production. One of the most vital things in getting it used is that the men like it. You may say, "Well, we can make them like it." But in nine out of ten cases where production is the vital thing in a man's payroll, guards are removed and they stay off until the men are forced to put them on.

Also, the management must approve of the guard. As an example, there is a tanning embossing press guard which consists of a platform on which the man stands. When the machine closes he rides away from the machine. When it opens he is brought back to the loading position. Heads of factories with whom I have talked

thinks that it would look funny for a man to ride back and forth. But the men like it and it increases production by about 80 skins a day.

J. T. MALONY (Safety engineer, American Mutual Liability Insurance Co., Chicago, Ill.): Fatigue, also, is a cause of accidents. One morning at about 8 o'clock, a girl got the end of her first finger on her right hand cut off by a punch press which she was operating. The foreman asked her if she could explain how it happened.

She replied, "Last night I attended a dance and got home at 4 o'clock this morning. At 6 o'clock my mother called me. I didn't have time to get anything to eat, and I am mentally and physically knocked out. That was the real cause of the accident."

FRANKLIN ZELLMHOFFER (Industrial Engineer, Koehring Co., Milwaukee, Wis.): Is there any one in this group who has used or has thought out any sort of systematic procedure for getting across to the individual the idea that automatic safety-mindedness is the thing he must work for?

MR. CLARK: This is the procedure being used in a large plant, employing from 2200 to 2500 people, which I visit. The employment manager is also the safety supervisor. When applicants come in he inquires about the extent of previous injuries. He then takes them to the department where they are to work, and introduces them to the division superintendent. He talks safety to them. Then they go down and meet their foreman. The foreman shows them their job and explains how to avoid the various hazards. After the foreman has spent thirty minutes doing this a member of the safety committee in that department appears, probably within the next hour, and talks a little further with each man. A little later in the morning a second member of the safety committee talks with him. By noon they have the "new bird" so saturated with safety ideas that he is thinking about it all the rest of the day. He is required to attend the first safety meeting that occurs after the day of his appointment. This is to let him know what goes on and what the problems are.

The result is that this plant, with its workers subjected to terrific hazards, went without a lost time accident for 127 days.

MR. ZELLMHOFFER: What system of repetition do they have?

MR. CLARK: Unknown to the foremen, the division superintendent, the employment manager, or the safety supervisors, someone gets this fellow aside where no one will notice, and says to him, "Now, Jack, what about this, and what about that?" If the man says he doesn't know, he is asked why he doesn't know. If the man says, "No one told me," the inquirer notifies the superintendent and the foreman.

MISS SILBAUGH: Every man who is hired in our plant is sent to the medical department, where I have a talk with him. I tell him about health. I give him a safety button and tell him to wear it. I point out that everybody is working for safety. I tell him about our safety shoes and the knife cases and the different safety devices we have that the men are asked to use.

MR. ZELLMHOFFER: Do you have any system of repetition?

MISS SILBAUGH: I go through the plant about two or three times a week and talk with the men. I try mostly to talk to the new men.

MR. MALONY: Getting back to the leather industry, isn't there some application that goes on patent leather that would poison the skin.

MR. AULSON: No. The only thing that we have to contend with in the tanning industry is dermatitis. That comes from the hides. However, the hides are passed through a process to kill the germs, so there are very few of these cases in the tanning industry.

CHAIRMAN CLOVER: Skin diseases appear in other industries than ours. I think you will find that if the operators keep their hands clean you will have little trouble of that kind. You will have some, of course, because some workers have more sensitive skin than others.

MR. MALONY: The tannery I have in mind is just a small place where they apply a solution to patent leather to bring out certain colors. I heard the owner of this in-

dustry say that he had one man whose whole arm had become infected from a sore on the hand.

MR. AULSON: I think you should see Mr. George Price. He is an expert in chemicals, particularly in those used in the leather industry.

CHAIRMAN CLOVER: In the handling of all our acids the man must wear an apron, boots, gloves, and goggles, and in addition the acid is transported in a Monel metal safety can.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Metals Section

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**Tuesday Morning Session
October 13, 1931**

H. G. HENSEL, Chairman
The Youngstown Sheet and Tube Company, Chicago, Ill.

The first session of the Metals Section convened with General Chairman H. G. Hensel, The Youngstown Sheet and Tube Co., Chicago, presiding.

Committee Reports

By H. G. HENSEL
General Chairman

The first session of the Metals Section was held at the 1916 Congress. It was then known as the Iron and Steel Section, and, as you know, has since been changed to the "Metals Section." Our section has had a meeting every year since that time, with a total of sixteen (16) sessions, including this session. The first chairman of our section was J. M. Woltz, safety director of the Youngstown Sheet and Tube Company, Youngstown, Ohio. Since then many of our friends and supporters of the section have served as chairman.

Accident Facts

There have been wonderful strides made in Industry towards the reduction of accidents, but when we read the reports for a year's accident records we know that there still remains a lot to be done.

Many of you, no doubt, are aware of the figures showing the fatalities due to accidents for the year 1930. For those who have not had this information, I will quote from the publication "Industrial Accident Statistics", 1931 edition, issued by the National Safety Council:

Origin of accidents	Total number fatalities	
	1929	1930
Motor vehicles	31,215	33,000
Industrial	20,000	19,000
Home	30,000	30,000
Public not motor vehicles	20,000	20,000

(There is a duplication of 3,000 in the figures for Motor Vehicles and the figures for Industrial fatalities due to the fact that there were 3,000 motor vehicle accidents to persons working in industry.)

Thus it can be clearly seen that there is still much to be done in accident prevention.

It is agreed that accidents are a waste, and still it is estimated that in 1930 accidents cost us \$3,000,000,000. Direct cost only.

Report of Membership Committee—S. W. Doran, Chairman

The Membership Committee reports 683 members as of October 7th, 1931. We had 800 members as of October 1st, 1930. There have been 160 cancellations and 44 new memberships.

Report of Poster Committee—J. K. Stafford, Chairman

The Council has continued the practice of issuing three Metals Section posters per month throughout the year. The average circulation of these has been 3,650 copies per poster. The poster most in demand was No. Me. 217, which shows a worker turn-

ing in mushroomed tools at the toolroom and which carries the wording "It's up to you to return mushroomed tools to the toolroom." The circulation was 7,710 copies. The one least in demand was No. Me. 218, which shows a blooming mill in operation. The circulation of this one was only 600 copies.

These circulation figures are the best barometer we have as to the effectiveness of the posters and it is quite apparent from a close study of this year's experience that they must continue to deal more and more with the outstanding common hazards of the industry if we are to get the best measure of service from them.

The chairman of this Committee, as well as the general chairman of the Section, wishes to take this opportunity of thanking those who served on the Poster Committee last year. Some very fine photographs were furnished and the Committee showed a fine spirit of cooperation.

Report of Publicity Committee—Benjamin C. Hanson, Chairman

During the year we did not have an over-abundance of material for this Division. However, we are certainly indebted to those who have contributed, and the articles that were contributed are as follows:

Blast Furnace & Steel Plants—February 1931, issue, an article on "YOUR RESPONSIBILITY IN ACCIDENT PREVENTION", by H. G. Hensel, General Chairman, Metals Section, National Safety Council.

Also an article on "WHAT PEOPLE WISH TO KNOW ABOUT SAFETY", by Robert L. Schmitt, Secretary, Metals Section, National Safety Council.

Heat Treating and Forging—Used the same article on "YOUR RESPONSIBILITY IN ACCIDENT PREVENTION", by H. G. Hensel, General Chairman, Metals Section, National Safety Council.

The Welding Engineer—June 1931 issue, an article on "HOW THE WELDER CAN DO SAFETY WORK", with three photographs based on Safe Practices Pamphlet No. 41 "HAND TOOLS."

Machinery—Aug. 1931 issue, a review of the Safe Practices Pamphlet "SAFETY IN STRUCTURAL AND SHEET METAL FABRICATION."

Report of Engineering Committee—J. E. Culliney, Chairman

The Engineering Committee for the Metals Section prepared a list of safe practices pamphlets for the Metals Section. In preparing this list, which contained 40 titles of pamphlets, every effort was made to cover all operations in which members of the Metals Section are vitally interested. The program of publications which has been prepared is not complete—yet we feel that this program is an excellent basis on which to develop the work for our Section. This list of course is not complete, and your Engineering Committee will welcome at any time additional suggestions.

You will be interested to know that at the present time four pamphlets in the Metals Section have been completed. These are:

1. Me. 1, "Cleaning and Finishing Rooms in Foundries."
2. Me. 2, "Blast Furnaces."
3. Me. 3, "Safety in Structural and Sheet Metal Fabrication."
4. Me. 4, "Rod Mills."

No. Me. 4, "Rod Mills," was prepared by Homer Weeks of the American Steel and Wire Co. and was printed during the past year. No. Me. 5, "Safe Practices in Operating By-Product Coke Plants" is in draft form having been prepared by H. V. Evans, Assistant Safety Director, The Youngstown Sheet and Tube Company, at Youngstown, Ohio. This draft is now being prepared for distribution to the various committees, and in all probability will be ready for publication before the first of the year.

By planning our work carefully we can develop publications of interest for every one of our members. Of course such a program can not be accomplished in one year,

but it is well to organize such work on approximately a period covering five or more years.

The News-Letter—Robert L. Schmitt, Secretary and News-Letter Editor

A News-Letter was issued for the Section for every month, including October, 1930, and October, 1931, a total of thirteen issues since the last Congress. Approximately 1500 copies of the News-Letter were issued per month.

I believe everyone will agree that the News-Letter during the past year has been an outstanding feature and that our editor worked very hard to make the News-Letter interesting.

I suppose many of you have received the October issue, which carried, on the front page, a roll of honor wherein the names of all the members of our Section who contributed to the News-Letter throughout the year are listed, and there is shown, opposite each name, the number of contributions that each member sent in. Our News-Letter editor went so far, on the October, 1931 issue, as to include a map of this section of the city, showing the location of the Stevens Hotel, so that any of our members not familiar with the city can locate themselves.

I am sure we have all enjoyed the many articles signed by "Eddie Tar", who is none other than our News-Letter editor; and we owe Mr. Schmitt a vote of thanks for the effort he put forth during the past year to make our News-Letter an outstanding feature and to tie the Section together from Congress to Congress.

I think the October Letter, which contains a writeup covering each speaker of the present program, was a unique idea, and now you know something about your speakers before they appear. You have, at least, their background.

Report of Health Committee—Dr. R. C. Engel, Chairman

Dr. Engel reports as follows:

"I have made gratifying contact with organized medical groups in behalf of Industrial Medicine.

"As Chairman of the Committee, I have contributed articles to the Industrial Health Division's Stethoscope and our News Letter.

"I have also answered correspondence relative to health subjects, pertinent to Metal Industry, and cooperated fully with our efficient and genial Industrial Health Division Director, Dr. C. O. Sappington.

"In closing may I say that I have enjoyed contributing my "bit" to the cause and again thank the Section for the opportunity of serving as Chairman of the Metals Section Health Committee."

Report of Foundry Research Committee—F. G. Bennett, Chairman

I will not attempt to report on the activities of Mr. Bennett's committee for the reason that the Foundry Session, of which Mr. Bennett is the Chairman, will hold forth on Wednesday afternoon of this week in the Tower, number two ballroom, on the fourth floor, and I am sure that at that time Mr. Bennett will give you a very clear idea as to how his committee has carried on during the past year.

Report of Slides and Safety Kinks Committee—J. A. Oartel, Chairman

I am sure that the program as prepared by Mr. Oartel, which will be shown on Wednesday afternoon in the Foundry Session, will speak for itself.

Our sectional officers, and particularly those who will be in charge during the coming year, will be very glad to have your suggestions as to what you desire to have shown on slides and by film at the next Congress. I am sure the new chairman will

be very glad to receive letters from all of you and suggestions about this feature of next year's program.

Report of Program Committee—P. J. Brand, Chairman

In talking with Mr. Brand about a report for his committee, Paul simply said, "Let the program speak for itself."

I can assure you that the Program Chairman does not have an easy job, and that outside of the fact that he has many disappointments in trying to secure speakers, it is quite a task to outline a program that will meet with the approval of the entire Metals Section, and, without saying more about the work of that committee, I am going to "let the program speak for itself."

I want to take this opportunity, however, of thanking the entire executive committee of the Metals Section for their wholehearted cooperation during the past year, and I also want to thank the many members of the Metals Section who were not members of the executive committee but who were very willing to help out when called upon, even though some of the calls were on very short notice.

CHAIRMAN HENSEL: The first speaker this morning was suggested to us by an old friend of ours. This man has been County Clerk of Cook County for a great number of years and has always been interested in safety work. I take great pleasure in introducing to you Robert M. Sweitzer, County Clerk, Cook County, Chicago.

Responsibility and Opportunity

By ROBERT M. SWEITZER

County Clerk, Cook County, Chicago, Illinois

Responsibility and opportunity, in the sense that it refers to universal safety, is indeed a broad subject. I shall not attempt a technical discussion; first, because I am lacking in information and the experience to do so; and secondly, because I suspect you would much prefer the impression of a looker-on who as a public official feels some measure of responsibility for public safety.

The appalling number of accidents occurring each year, exacting a toll of lives and permanent disability of the men, women and children of the nation, demands thoughtful consideration to the end of evolving teamwork on the part of all to quicken a sense of individual responsibility.

I am told that more than 33,000 deaths occurred during the past year as the result of automobile accidents, and that nearly 100,000 people were killed by all forms of accidents in the United States during the same period, and that many millions of disability injuries were likewise attributable to accidents.

It is a striking commentary that the increase in automobile fatalities seemingly is keeping pace with the improvement of our highways. It was thought that when the principal arteries of travel were paved and made as smooth as the traditional billiard table that it would make for a greater degree of safety for automotive and vehicular travel, as well as pedestrians. It seems, however, that the average automobile driver finds it quite impossible to resist the temptation of a long stretch of even pavement to ascertain just how fast the "Old Bus" will go. Many of these embryo Barney Oldfelds believe that the United States Government, with the cooperation of various states, has built a series of race tracks for speed demonstration purposes.

The great factor in this disregard for the safety of others is the inherent selfishness of the human race and the utter failure of most of us to consider the safety of others. Who has ever heard of an accident where the other fellow was not to blame? The fact that either or both parties to the accident were guilty of contributory negligence never enters the mind of either except to accuse his neighbor of being the guilty

party. Is it possible that the average citizen still holds the ancient idea that an accident "is a visitation of the Lord?"

While this awful record has been climbing up on the highways of the Nation, it is impressive and encouraging to note that in the industries represented by the delegates here present, there has been, through an adoption of safety appliances and the dissemination of propaganda, a gratifying decrease in the number of deaths and injuries. This achievement is the result of intelligence, persistence and sacrifice. This is familiar to all of you and it is to your everlasting credit that you are not satisfied with the results of your pioneering, but through conventions of this character, and in every other way, are constantly seeking appliances and methods to conserve the lives of your fellow humans.

It occurs to me that you have sensed the real spirit of responsibility. You appraise responsibility not as a simple knowledge of a condition but as an obligation for the conclusion of a task. I do not believe that your determination in this regard was materially advanced by the enactment of the so-called Employers' Liability Statutes by many of the states. In fact, unless I am incorrectly advised regarding the history of your organization, your pioneer work for the safety of your employees antedated the enactment of these laws by practically any of the states. Your executives have demonstrated a vision and courage as well as a cooperation which, particularly in these days of tribulation, should be appreciated by your workmen. It may be, however, that most of them take it for granted that your thoughtfulness for their safety is coming to them anyhow, and appreciation may consequently be lacking.

There isn't a doubt, under this financial depression through which we are attempting to struggle, that conditions have become the more perplexing. Economic conditions are very much out of joint. It takes the right spirit of humanity to continue your endeavors and keep trying to find some additional means whereby you can more fully conserve the lives of those who are in your employ. This spirit of looking after the other fellow—this really human impulse which all of you express—should be an inspiration to those who otherwise, because of lack of work, might be disheartened and discouraged.

I presume it is a practice with the various units of your organization to, at least occasionally, have "Safety First" talks with your men, in which they are reminded of your interest in them and urged to extend similar consideration to their fellows. It should mean much to these men, in these days of unemployment, to know that they are not only in a position of employment, but that every safeguard possible is placed about their work so that their employment may continue and that the members of their household need have no fear while they are at work, and may confidently look forward to their return to their domiciles at the conclusion of their day's work.

I was much edified recently in reading the speech of the head of a great industry in our country, advocating measures for the permanent employment and protection of men, not only in his industry, but in the great industries of the Nation.

His suggestions were courageous and patriotic, and I am hopeful will come into full fruition. If so, we need have no fear of the future.

Communism and its principles will not have its present more-or-less fertile fields of operation, and will be exiled as a force of influence in the community for all time to come.

This splendid program will necessitate that same degree of mutual consideration and cooperation which has distinguished the National Safety Council from its inception. This is one of your great opportunities.

It is inconceivable that Legislative enactments will build up the consideration of the average man for his neighbor. We are often reminded that you cannot legislate morality into the people.

It would be a far better and more useful program if this principle could be brought more strongly to the attention of our school children in their early youth. Something along this line is undoubtedly being accomplished in many communities, but if the

youth of the land is sternly taught to accept responsibility if injured, or at least until he can prove himself innocent, it may do much to instill a sentiment of caution and a willingness to give the other chap a break.

It is, perhaps, all right to offer this suggestion in a general way, but if we are to get anywhere it must be through intelligent unselfish leadership. The leadership must come primarily from your organization. You have pioneered the field; you have done much. Your example should prove a stimulating encouragement to those really concerned for the safety of others. In the hustle and strife of our day and age, we are prone to forget everything but self. Nothing but the everlasting keeping at it will count. Through the ramifications of this organization it is possible for you to reach members of the legislature, executives of municipalities, school boards and every other agency through, and by which, safety propaganda can be disseminated.

The Golden Rule should enjoy a renaissance and be made the great stimulating force to bring back to all men the "Spirit of brotherhood of man and the Fatherhood of God."

CHAIRMAN HENSEL: We owe Mr. Sweitzer a vote of thanks for bringing this wonderful inspirational talk to us and the Metals Section can assure him that we realize our responsibility and that we are going to take renewed interest and go ahead with greater effort than ever to prevent accidents.

We continue with the subject, "Metals Section Statistics for 1930" and a friend of mine and of this Section has agreed to give us a brief report.

T. A. SCHENDEL, safety director for the Caterpillar Tractor Co., Peoria, Ill., will address us.

Metals Section Statistics for 1930

By T. A. SCHENDEL

Safety Director, Caterpillar Tractor Company, Peoria, Ill.

I know you will all be glad to hear that the Metals Section had, during 1930, one of the safest years in its history. Excellent records were made by many members, with the steel industry low with 11.99 lost-time injuries per 1,000,000 hours of work. They thus rank fifth in frequency among 28 major industries, included in the Council's annual report.

The foundry industry shows the other side of the picture—high frequency of 32.11. Smelting, refining, fabricating and non-ferrous metals had a more favorable experience. Their average frequency was 17.14. Combining the experience of these three groups shows 15.86 lost-time injuries per one million hours of work, or 14 per cent lower than the rate for all industries.

As to severity—not so good. Lost-time injuries per 1,000 hours, 2.38 for the Metals Section compared to 1.97 for all industries. Steel had the highest severity rate, 2.47, with foundry crowding them at 2.23, and the non-ferrous metals coming in with 2.03. Of course, our high severity in contrast to low frequency, shows a high ratio of serious injuries to temporary disabilities. Fatalities alone are responsible for 1.37 days per 1000 hours work, or 58 per cent of our total severity rate, and that should give us all reason to pause and consider that figure. It is serious, gentlemen.

The elimination of serious injuries is one of the major problems which confront industry. The records of over 1500 establishments that have reported in each of the last three years show that, while frequency decreased 28 per cent in comparison with 1928, severity was down only 8 per cent. The reason for the comparatively small decrease in severity is found in the decline of only 10 per cent in the frequency of fatalities, and a slight increase in the frequency of permanent partial disabilities. The records of plants reporting for five years also indicate a pronounced decrease in the frequency and severity of temporary disabilities but much less success in

eliminating serious injuries. Notable exceptions to this general situation are found in the public utility industry which has reduced fatalities 25 per cent and permanent partial disabilities 20 per cent during the last two years, and in the paper and pulp industry.

It is well known that periods of rising employment necessitate the training of new men, shifting of employees from one job to another, and other actions which are apt to be unfavorable from the standpoint of safety, whereas, during periods of reduced employment, many of these adverse conditions disappear. Industry has demonstrated, however, that all injuries, excepting permanent partial disabilities, can be reduced regardless of changes in industrial activity.

From 1928 to 1929, working time in 1500 industrial plants increased 11 per cent but the average fatality rate decreased almost 5 per cent and the frequency of temporary disabilities about 4 per cent. A decrease in working time of 17 per cent from 1929 to 1930 was then followed by a drop of 24 per cent in the frequency of temporary disabilities and a 5 per cent drop in fatalities.

The experience of our section has, in many respects, been similar to this. The records of 162 plants in our section that have reported in each of the last three years show a drop in frequency of 35 per cent from 1928 to 1930; most of which was made during the last year. Severity in these plants, however, rose about 21 per cent from 1928 to 1929 and decreased about an equal amount from 1929 to 1930. Variations in the frequency of fatalities largely account for the fluctuations in our severity. While the frequency of permanent partial disabilities has been up and down during this period, the severity of these injuries has steadily decreased, particularly during 1930.

The most consistent improvement in the section during the last two years is in the steel industry. Among 71 foundries the total frequency rate increased from 1928 to 1929, but was down sharply during 1930. The frequency of fatalities and permanent partial disabilities has increased steadily since 1928. Consequently, severity has risen from 1.51 to 1.88, and, in 1930, to 2.28. Although injury rates for similar establishments in the non-ferrous metallurgical industry were very high during 1929, 1930 rates compared quite favorably with 1928.

Seventy-three plants in the steel industry, on the other hand, decreased frequency 39 per cent and severity 15 per cent in comparison with 1928. Severity was higher in 1929 than in either 1928 or 1930 but frequency declined in each year of the period. The industry's fatality rate was highest in 1929 and lowest in 1928, but the frequency of permanent partial disabilities declined in each year of the period, the total decrease being 20 per cent.

This improvement was general throughout the various departments of the steel industry. Departmental records, available from 1929 and 1930, only, show that, out of 22 departments, frequency dropped in twenty and severity in eleven. The reductions in frequency and severity by structural and rail mills, seamless tube mills, plate mills, tin plate mills, and general mechanical departments were particularly outstanding because improvement was shown in both rates for each type of injury. On the other hand, departments that have particularly high fatality rates for 1929 and 1930 such as blast furnaces, general labor and coke plants showed no appreciable improvement in this type of injury.

Only seven departments in the steel industry with frequency rates higher than average, and of these, sheet and tin plate mills, open hearth, and seamless tube mills are most important because of their large exposure. These departments also have higher than average permanent partial disability rates, but, with the exception of the open hearth, low fatality rates. Fatalities, on the other hand, occur most frequently in open hearth, coke plants, blast furnaces, general labor, and general mechanical departments. In fact, these five departments account for over 50 per cent of all fatalities that occurred in the industry during 1929 and 1930, although their combined exposure is only slightly more than one-third of the total for all departments.

Permanent partial disabilities, however, are widely distributed. In proportion to man-hours worked, structural and rail mills, merchant mills, rod and wire mills, blooming and billet mills, transportation, open hearth, and seamless tube mills, have had the largest number of injuries of this type. Furthermore, those with the highest frequency rates for these injuries also have the highest severity rates.

You have noticed that the open hearth appears frequently in the high rate group, yet, some of our members have demonstrated quite conclusively that open hearth operations can be made as safe as any others in the industry. Sixteen of these departments, in 1930, had frequency rates below 10.0 and of these, all but four had severity rates below 1.0. In other words, the plants with the high frequency rates for this department are having the serious injuries.

You have no doubt noticed that a great deal of this report is given over to the steel industry, and in this connection, it may be in order to mention that the next year will no doubt see a system of departmental reports carried on into the machine industry, where I believe it will be a big help to all of us who are connected with that phase of the Metals Section. No doubt, most of us have a system of our own in our individual plant, but are not able to bring it out into a more detailed report.

It is a matter of general belief that accident experience in the Metals Section during 1931 will be even better than the past year. Operations, on the whole, have been low, but one of these days business will pick up, production schedules will be increased, then again will come the possibility of higher injury rates. Therefore, now is the time for plants and departments with records that are below par to look around, find their difficulties and correct them.

CHAIRMAN HENSEL: We are all very grateful to Mr. Schendel for reading this report and for giving us some sidelights on it. Have any of you noticed how the various departments of the steel plants have been split up in the annual report published by the Council? Have you any questions or any suggestions on the way the entire report has been handled?

G. G. GATEV: (The National Safety Council, Chicago): The National Safety Council wishes all members of the Council to send in their 1931 accident reports. The number has grown each year and the increase should be continued in spite of the depression and hard times. Information on accidents in many industries is becoming more reliable. This is partly due to the increase in the number of reports.

MR. SCHENDEL: What is being done about getting accident records in the machinery industry by departments?

MR. GRIEVE: We are working on that. The idea is to enable members to compare the records of their entire plant and also records in the individual departments. For example, those with forge departments can check their records by comparing with other forge shops. The idea as applied to the machinery division seems a good one.

The first year the method was used in the steel industry we received departmental reports from about ninety-five percent of those reporting, which was exceptionally good. Last year the idea was followed out in the electric railway industry; we had a large increase in the number of reports and approximately seventy-five per cent covered experience by departments.

CHAIRMAN HENSEL: During the past year I showed various department heads where they stood as compared with some fifteen or twenty similar departments of other companies. Some of those fellows were surprised to find that they stood near the top and others that they stood near the bottom.

D. E. SHANNON (Fort Pitt Malleable Iron Company, Pittsburgh, Pa.): I suggest the report be given in chart form to give us a chance to take notes.

CHAIRMAN HENSEL: I think that is a good suggestion. It will be taken up with the program committee of another year.

The next paper will be delivered by C. P. Waite, assistant supervising engineer, the Travelers Insurance Company, Chicago.

Analysis of Accident Causes in The Metals Industry

By C. P. WAITE

Assistant Supervising Engineer, The Travelers Insurance Company, Chicago

I have something to tell you and it very closely follows Mr. Schendel's remarks: "Determine your difficulties and then take steps to correct them." If I can sell you the importance of that particular statement and point out to you perhaps a manner of correcting them, I will feel pretty well satisfied.

When conditions exist due to unknown causes—and mind you it is *unknown causes*—and these conditions directly affect productivity and cause spoilage of tools, equipment and materials, cause delay and injure good will that might have been established, and also cause suffering, facts may be developed that accurately determine what the unknown causes are, why they exist, and how to eliminate them.

Please do not feel that any remarks I make are of a critical nature, but, reviewing the records of a number of plants, I feel that due to the present incomplete method of recording accidents, we of the metal industry have just that condition to contend with today. I don't believe that we yet know enough about true causes and because of that lack of knowledge our preventive efforts are often misdirected.

Now proper analysis will furnish true causes and true causes reversed will point to the remedy. What must an analysis of an accident consist of and what must it determine? It must determine this, gentlemen. In what manner was the workman doing his work when he was injured, and why was he doing it that way?

Just let me repeat that. In what manner was the workman doing his work when he was injured, and why was he doing it that way? Analysis should establish beyond safe practice what he was doing when he was injured and the reason why the workman resorted to that particular movement or action at that time. That comes pretty nearly determining the cause of the unsafe practice and the unsafe practice causes the accident. Now the reverse of either or both of these facts that you will determine cannot help but go a long way to explain a simple and effective remedy to avoid a repetition of just that kind of an accident.

The phone rang one day and the vice-president of a large plant called to tell me that a girl had just lost a finger on a punchpress. Too bad. I told him to please let conditions stay as they were until I reached the plant. I found everyone excited—a high productivity cost. How did it happen? The punch press repeated. Are you sure? Why, we are definitely sure. We tried to make the punch press repeat and we couldn't do it, so I said that I would have to see the girl.

The vice-president and I drove to the hospital and saw the young lady. She was crying. "What are you crying for?"

"I'm afraid I'll lose my job."

"Why?"

She said, "I did something that I should not have done. I placed my elbow on one of the trips of the two-handed tripping device and fed with the other hand."

Why did she resort to the unsafe practice? She said she was in a hurry. She said that she had spent so much time talking to a group of millwrights that, when it came half-past three, realizing that she was behind in her production, she had to "step on it." She never did it when the boss was looking. You can see how you are developing the remedy. Do you see, gentlemen, what would have resulted if our corrective efforts had been misdirected? They would have tested every punch press for repeating and spent a great deal of time doing it.

Let us go right up to the doctor with it and see what the doctor has that will help us. The first question that he will ask is, "What are the symptoms?" You have that and could answer by saying, "We have some slips, some falls and some bumping into this and that."

He will nod his head and say, "I am making progress." And then you will also

have the record of the burns, eye cases, cuts and machine accidents and you go through your record and show where these occur in the different occupations. The next question he is going to ask you, gentlemen, is the sticker. "What has brought about such a condition?"

The majority of clients don't know because they haven't jotted down the unsafe practices. He is going to say, "I cannot help you until I know what has been done that has caused slips and falls." Then you are going to realize that you are in a bad position. Then he is going to say in his professional way—and this, by the way, isn't a bad definition of an accident: "There are some situations arising every day within your organization that are not receiving intelligent treatment. That which causes your accidents could not have happened if the situation had received intelligent treatment. Go back to your plant and tell me what I need to know in order to tell you what to do."

All right! You come back all enthused and say, "Now we are going to find those unsafe practices and the reason why the employee resorted to the unsafe practice, and we are going to find our own remedy without going to the physician." You know, workmen are cagy individuals and you are going to find that the temptation to take things for granted presents itself very often. You are going to find that men have tendencies to protect fellow workmen out of friendship and out of sympathy, and your job, gentlemen, is difficult, but so very interesting. The truth is going to be hard to get and unless you get the truth, your paths of correction are going to be misleading and you are going to adopt the wrong corrective method.

I have had an opportunity to investigate a number of injuries but, by proper questioning, by observation and with the backing of the plant management I have, I feel, obtained fairly accurate information determining the true cause in quite a number of accidents.

A man's arm was broken while operating an engine lathe. He fell asleep on the tail stock and his sleeve wrapped around the revolving work. Now, the unsafe practice seems simple and, gentlemen, they found it very easy. "Resting armpits on the tail stock of a lathe in motion." Simple, and all of us that have worked in a machine shop have done it, but in this particular case it caused the man's arm to be broken. What do you report as the unsafe practice? That is the next question to ask yourselves and determine. This particular man was thought to be physically fit, but questioning developed that he was tired because he had been out until three o'clock in the morning attending a dance—valuable information relative to this particular accident.

Here is an accident that didn't cause injury to a workman but caused injury to a valuable punch and die. The operator tripped the press, from which he was removing a mould with a piece of half-inch drill rod, and the press came down and destroyed a very valuable tool. The unsafe practice is simple—placing foreign metal objects on top of the lower die with the flywheel of the press in motion. Why did he do it? Well, he had done it before and the rod worked better than a stick and he just took one more chance—a case of not following instructions. He had been given the stick.

The ends of two fingers amputated on a power press—another example. A wristlet type of guard set on the top of the die instead of on top of the work. If any of you gentlemen do not know what a wristlet type of guard is, it is a guard that is attached to the wrist and arm so that when the plunger descends the arm is pulled back out of the danger zone. It is a very effective way of guarding a punch press but it was not set right in this particular instance. Why did he resort to that unsafe practice? Instructions that all set-ups must be checked by the assistant foreman were not carried out because they had been given so long ago (and not repeated) that workmen and set-up men got into the habit of not having set-ups checked.

Here is an example in which 30 per cent of a lot of 5,000 brass bushings were drilled too large for clean broaching. A three-lip drill was ground with one lip long. The unsafe practice was, "Crowding the drill with one lip too long," or, "Grinding

lips of uneven length." That is a very valuable piece of information to any plant that wants to lower their productivity costs. The cause of the unsafe practice is that, even though told by his supervisor to have the drill ground by machine, the operator decided to grind it by hand because he could do it more conveniently and he was in a hurry. The case is a supervisory condition for correction.

The next accident is a serious one in which a punch operator was killed by a flying flake of the hardened punch. That man assumed that the punch lined up with the lower guides. He squatted down to see and tripped the press with the power on. It didn't line up and a flake of the punch came off and pierced his jugular vein and he died in fifteen minutes. It was an unsafe practice. "Using machine instead of hand power to line up dies." Why did the man resort to the unsafe practice? Well, he didn't know any better. It was his first day in the plant and he hadn't been told how to set that punch by the supervisor.

The female operator of an automatic folding machine fainted and fell against the moving side of a machine. It took time to get the facts but it helped the management when the facts were obtained. The unsafe practice that I have assigned to this is, "Continuing to work when not physically fit." Why did she continue to work when she wasn't physically fit? Because of financial difficulties. A little girl nineteen years of age, with one child, and deserted by her husband, and her wages garnished. You can't tell me that that information isn't worth digging up.

A man's forearm was mangled while cleaning the roll of a metal slitter. He was cleaning the roll with a piece of emery cloth while the roll was in motion. If any of you can recognize a metal slitter you will know that the rolls in back are spaced at different widths. This particular one was spaced about an inch and a quarter between the two rolls, and when a man's arm went through there, it was an unsafe practice. It is simple, "Cleaning rolls of a metal slitter while they are in motion." Why did the man resort to that unsafe practice? He couldn't read English. He couldn't read a sign posted on the machine instructing him to stop the machine when he cleaned the rolls.

Now, suppose all of these accidents happened in one plant. We do know definitely and accurately what the unsafe practices that caused the accidents are and, we know above everything else what needs correcting and what needs our attention. Here is what the analysis showed and I think it should be made a matter of record. These items should receive immediate attention and be constantly checked up. Workmen operating lathes are inclined to recline on tail stocks. Press operators use metal rods instead of wood to remove fouled pieces. Die setters do not set wrist-let type of guards from the shear point. Men grind three lip drills by hand causing them to become uneven in length. Employees are working in the plant physically and mentally unfit due to outside worries. Workmen clean rolls of slitters while the rolls are in motion. Workmen line up punch and dies with the power on.

And now we have the doctor's prescription—the medicine: "That your plant should take, if all these conditions exist, (and these are conditions that I feel should be controlled by the supervisor) immediate steps to present to the employee preventive measures for each of them." The management has learned something. There is insufficient control over specific conditions such as getting instructions carried out, such as giving instructions and giving them in such a way that they can be interpreted and carried out willingly, and, third, that they must check and correct the physical condition of some of their employees at once. That, gentlemen, I think will apply to pretty nearly any plant operating today. There isn't any doubt in my mind but what any one of these items has a direct bearing on your high productivity costs. These conditions have caused men to be injured. The conditions are known. The corrective remedies are known and it is a simple matter to sit down and judge and determine how they should be applied. These are facts of importance for any business conduct and when they are known, they usually receive preferred attention but these facts cannot be determined except by proper analysis of the accidents that have occurred in your plants.

ADJOURNMENT

Wednesday Morning Session October 14, 1931

H. G. HENSEL, Chairman

The Youngstown Sheet and Tube Company, Chicago, Ill.

The second session of the Metals Section convened with General Chairman Hensel presiding.

CHAIRMAN HENSEL: The first thing on the program this morning is the report of the Nominating Committee and the election of officers. We will call on the Chairman of the Nominating Committee, Mr. John Eib for the report of that committee.

Report of the Nominating Committee

By JOHN P. EIB

Supervisor of Safety, Illinois Steel Company, Joliet, Ill.

Your nominating committee has experienced numerous difficulties and disappointments this year.

Our efforts were first directed toward the usual promotion of the men whose services and counsel have been helpful to our section, and whose individual cooperation and that of their companies, was very highly valued and appreciated. We regret exceedingly to report that due to business conditions, we will lose some of our co-workers and friends from the Committees. However, we most sincerely hope that this loss will be only temporary and that another year will find them all back with us again.

In endeavoring to obtain new men to fill these vacancies, we have been very successful and have obtained some very splendid men. It has also been the thought of your Nominating Committee that the Executive Committee should be enlarged in order to provide for representation of as many of the various classifications which make up the membership of our section as was possible. There was also the additional thought to endeavor to distribute this representation geographically, whenever it could be done.

With these thoughts in mind, an even greater effort has been put forth this year to increase and distribute the Executive Committee membership.

It has been the rule of the Executive Committee of the National Safety Council that all officers and committee chairmen of the various sections, as well as the members of these committees, not only be selected before the Congress each year, but that the agreement of those selected be received.

Accordingly, I have the following names and nominations to present to the members:

General Chairman—F. A. LAUFERMAN, Safety Supervisor, Republic Steel Corporation, South Chicago, Illinois.
Vice-Chairman—ROBERT L. SCHMITT, Secretary, Louisville Car Wheel and Railway Supply Co., Louisville, Kentucky.
Secretary and News-Letter Editor—H. W. DARR, Supervisor of Safety, Bethlehem Steel Company, Johnstown, Pennsylvania.
Chairman Program Committee—S. W. DORAN, Personnel Superintendent, Pratt & Litchworth Company, Buffalo, New York.
Chairman Membership Committee—J. K. STAFFORD, Mississippi Valley Structural Steel Co., Decatur, Illinois.
Chairman Poster Committee—H. M. CROCHAN, Safety Director, Inland Steel Company, Indiana Harbor, Indiana.

Chairman Publicity Committee—A. BERQUIST, Safety Supervisor, The Youngstown Sheet and Tube Co., Indiana Harbor, Indiana.
Chairman Statistics Committee—T. A. SCHENDEL, Safety Engineer, Caterpillar Tractor Company, Peoria, Illinois.
Chairman Engineering Committee—J. E. CULLINEY, Manager of Safety, Bethlehem Steel Company, Bethlehem, Pennsylvania.
Chairman Committee on Slides and Safety Kinks—J. A. OARTEL, Chief of Safety Bureau, Carnegie Steel Company, Pittsburgh, Pa.
Chairman Health Committee—Dr. R. C. ENGEL, Director of Service Department, The Corrigan, McKinney Steel Company, Cleveland, Ohio.
Chairman Foundry Committee—F. G. BENNETT, Director of Safety, The Buckeye Steel Castings Company, Columbus, Ohio.

Chairman Car-Builders Committee—P. J. BRAND, Supervisor of Safety, Pullman Car & Manufacturing Corporation, Pullman, Chicago, Illinois.

Members at Large—

HARVEY G. HENSEL, The Youngstown Sheet & Tube Co., Chicago, Ill.
 JOHN P. EIB, Illinois Steel Company, Joliet, Illinois.
 E. G. QUESNEL, St. Louis, Missouri.
 T. H. MCKENNEY, Illinois Steel Company, South Chicago, Illinois.
 E. F. BLANK, Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
 J. A. VOSS, Republic Steel Corporation, Youngstown, Ohio.
 G. A. DAVIS, Illinois Steel Company, Chicago, Illinois.
 J. M. WOLTZ, Youngstown Sheet and Tube Co., Youngstown, Ohio.
 JOHN P. MUND, The Midvale Company, Nicetown, Philadelphia, Pa.
 W. F. MCGRAW, H. H. Robertson Company, Ambridge, Pennsylvania.
 A. C. GIBSON, Spang, Chalfant & Company, Inc., Pittsburgh, Pa.
 J. A. COLTRIN, National Radiator Corporation, Johnstown, Pa.
 R. R. BURNS, American Radiator Company, New York City, N. Y.
 A. M. LYTLE, Newton Steel Company, Youngstown, Ohio.
 A. E. BARR, Algoma Steel Corporation, Sault Ste. Marie, Canada.
 R. A. CHAFFIN, Continental Steel Corporation, Kokomo, Indiana.
 L. S. ADAM, Continental Roll & Steel Fdy. Co., East Chicago, Indiana.

This list of recommendations brings into active work in our section a number of new personalities, and it is the hope of your committee that they will develop into some fine Sectional Officers.

Mr. Chairman, I move that these nominees be selected for this Section.

SEYMOUR W. DORAN (Pratt & Litchworth Co., Buffalo, New York): Mr. Chairman, I second that motion.

CHAIRMAN HENSEL: The motion has been made and seconded. Are there any other nominations. If there are none we will vote on this motion—that the list as read of the officers and of the Executive Committee be accepted and that they be elected. All those in favor please rise.

(The motion was unanimously carried.)

CHAIRMAN HENSEL: The first subject on this morning's program is a talk by W. J. Peacock, Head of Personnel, Northern Paper Mills, Green Bay, Wisconsin.

Salvaging Human Power

By W. J. PEACOCK

Head of Personnel, Northern Paper Mills, Green Bay, Wis.

This topic divides itself into three phases and the first is the salvaging of men who have been injured in their work—in other words, the rehabilitation of men already maimed or out of the running in life because of past injuries. It is worth our while

to pause and consider accident prevention contests (and I note your high standing in contests). It is worth while, even when we have reason to be happy over some of the remarkable records that have been achieved in your section during the past year, to consider the man who may have had the misfortune to be hurt in a program of that sort. Imagine the feelings of one man who gets hurt when five thousand men are doing their work without accidents. Imagine his feeling of being out of standing with the rest of his fellows. Gentlemen, it is splendid to be able to achieve a no-accident record but, after all, in safety, one's task is the care of a man and especially when he is hurt. One should think of the state of mind of the man who may, in a no-accident contest, have too much pride to present himself for first aid. In many contests I have known cases of men who were afraid to report and who nursed an injury, worked all day, went to their own doctor at night, and came back to work when they ought to have been at home.

In this modern idea of entirely preventing accidents let us keep in mind the rehabilitation of men who have been injured in former years in our plants.

I recall Jim Hadden who had the misfortune to lose an eye. I was present one day when Jim came in with the hole in his eye, a horrible three-cornered hole, with the normal eye fluid coming out over his cheek. I will never forget the sensation I had—the awfulness of it—the realization at once that that man's eye was black for the rest of his life. That was five or six years ago. Jim is still working with us. He is not able to do the same sort of work, and it is my endeavor, it is my duty, to see that Jim goes on growing because, back of that one blinded eye, there are still the aims and desires of Jim to be realized. The man is still there.

Take the case of John Jasper—a man who had the misfortune to be underneath when a plate under the expansion joint of the header on the boilers fell and struck him on the skull, paralyzing him for life. Looking over his record when he came back, I found that John previously had worked as a telegraph operator on the railroad and had a fair education. It wasn't difficult to salvage John and put him back into service, for the man is still there though John is paralyzed.

There is a growing movement in forty-four states for the rehabilitation of men, women and children who have been injured. We have an obligation as citizens and members of industry to see that this movement progresses.

The second division of the subject is one that occurs to any experienced safety man. If we are going to salvage men, let us salvage them whole by preventing accidents, which is the basis of the safety movement. Stop accidents before they happen—this axiom makes our work a science, requires forethought, and challenges us to become thoroughly efficient. It involves, first of all, the guarding of our plants and the elimination, so far as possible, of physical hazards. It involves the training of our men in safe practices—in habits of correct thinking, and correct ways of performing their work. Our goal is "no accidents."

I know, gentlemen, that you clearly realize that many men have been blinded who never should have lost their sight. You need only recall the circumstances involved in many accidents to realize their absurdity. Jim Hadden should not have lost that eye and John Jasper should never have been struck by that expansion plate and paralyzed.

A man was killed in our neighborhood recently who ought to be alive and walking the streets today. Such cases give a safety man's work an element of sacredness—they urge him to anticipate the possibilities of accidents and to eliminate the desperately absurd factors which blind and maim men and put some of them under the sod.

I am tremendously interested today in the third aspect of this topic. The man who has been in the safety game for ten years or more is not asking only for new styles of posters, new methods of conducting contests and new ideas of safe practice, but he is asking for the philosophy of the safety movement.

I remember when the Council wrote my chief, Judson G. Rosebush, general manager

of the Northern Paper Mills, and asked him to address a very important meeting on the topic "The Philosophy of Safety." That is an important subject.

Any man tremendously in earnest with himself and in his job and any safety man who expects to grow will be asking himself the question, "What is the philosophy of the safety movement?" I think the answer can be given in a word.

I was standing at the window about a week ago—it was just getting dark—and looking over about a quarter of a mile of prairie just outside of Green Bay, when I heard the whistle of the Chicago Express. I saw the old train as it pulled into view. First of all was the glorious locomotive and then the beautifully lighted, modern train, baggage cars, day coaches, Pullman cars—a splendid thing. There was a flash from the firebox illuminating the right-of-way and the heavens above and then I saw the fireman, darting back and forth with his shovel, tossing in his coal with unerring aim, alert, eager—I could feel the very sweat on that man's brow. He was the one man on the train actually laboring, face grimy, hands hard, perspiring but determined, very much in earnest and very much alert and very mightily and intelligently going about his job. At first I thought it was "that one poor slave" making it possible for all the rest to ride in comfort. The second thought was better and more worthy of a personable man and was expressed by running to the door and yelling, in my enthusiasm, "Go to it, Old Man!" I could just feel his enthusiasm for his job.

I know some of the men who choose the employees for the North Western System and who trained them, their views, and some of the secrets of the North Western's safety work. Some of you remember that last year the National Banner for safety on the railroads went to the North Western System. I know that the men in the ranks have caught the spirit of the men in charge. I have seen engineers and conductors studying how to bring business to the railroad. What does that mean? It simply means that this great railroad system is a cooperative undertaking. They have the hands, the strong backs, the minds, the wills and understanding of their employees. All have the determination that the North Western will make good.

I call that salvaging men whole. In other words, they have the whole man at work. How much of the man on the job in your mills and shops stays at home? How much of him comes to work? It is a nice question.

During a disastrous street car strike in Detroit, when the men and the company were in a deadlock and the public was in desperation, Richman Henderson, former chaplain and professor of sociology at the University of Chicago, was chairman of a committee to settle the differences so that the cars might run again. I had the good fortune to have Dr. Henderson as my teacher. He taught human nature in a scientific natural way. One day he raised the question, "What do you mean by a whole man?"

All men have common interests. A real man lives in his mind and in his heart. He is not driven, like an animal, by instinct but by interests, and these become great ambitions to him.

There are seven of these interests in the well-rounded man. The first one is the human interest—the health interest. We share with all the human world in the interest and in the welfare of this human body. The next is the economic interest—our material wealth. A man comes to work not simply for his wages but because he has an interest in getting ahead—in acquiring a little property and possibly owning a car. He likes to have some standing in the community because a little prestige goes with the attainment of property.

We all have a third interest called the social interest. We meet in groups for discussions. The Almighty has seen fit to make us man and woman in this world and to put us into families as an indication of his realization of our social interest—our interest in people. Then we all have a knowledge interest that starts with curiosity in the child and develops to scientific investigation in our technical men. You may not believe that we all have a beauty interest. You see a fellow who carries a greasy oil can every day and wonder what sense of beauty may be in his mind. But, if you will call at his home you might find that, though he hasn't a great deal of money to

spend on decorating, he has whitewashed the basement wall! Every one of us has some notion of beauty—it may be in the tie the man wears or it may be in his choice of a wife.

And then we have the moral interest. Every man takes some pride in his integrity and his reputation. And, lastly, everyone of us has a religious interest. Your men may feel that more keenly than you and I. We, in our worldly wisdom, may have outgrown it, but the man in the ranks still has his religious interest and carries it with him daily.

Gentlemen, I think it is about time that American industry ceased being afraid of men. Every now and then you find a manager at the head of an industry who actually is afraid that his men will become too ambitious and strong. It is my honest conviction that this depression has placed both industry and capitalism on trial. I firmly believe that the depression is going to continue until we have learned how to cooperate with every group in society and with every individual.

To safety men this means that we must take the vow, "Before God I am going to help each man to be a physical success. I am going to work myself to the limit to see that he does get an increase in pay and that he does have a chance to buy an automobile if he wants it. I am going to make it my business to see that his friendships, his group life, and his other interests are on a happy basis. I am going to work myself to the limit to see that his curiosity to know is answered by giving him the program of the company so that he thrills in response to the spur of his own initiative. I am going to do my utmost to see that the pride of the man is satisfied in being a little better dressed and in having a better home and that his cultural and esthetic desires are satisfied. I am going to do my very best to see that he does have a name that he can hand on to his son with pride. I am going to see that he has a chance to make good in the realization of the full possibilities of his life."

CHAIRMAN HENSEL: The Metals Section owes a vote of thanks to Mr. Peacock for giving us this wonderful talk.

The next subject will be covered by J. A. VOSS, safety director of the Republic Steel Corporation, Youngstown, Ohio.

Hand Labor and Trucking

By J. A. VOSS

Safety Director, Republic Steel Corporation, Youngstown, O.

Handling of material by hand accidents are more numerous and cause more accidents than all machinery, therefore, this source of accidents is generally the safety man's greatest problem.

Handling material accidents can be classified as follows—

- Piling and unpling
- Loading and unloading
- Carrying
- Lifting
- Transporting by hand and power.

Many companies have found it of advantage to study the work of handling material by hand as thoroughly as time studies are taken on any kind of job. After observation it is often possible to formulate the safe way of performing a job. A slight change from the usual method of grasping a piece, carrying it, and setting it down, will often make for greater safety as well as greater efficiency.

There are many operations in industries which can be done only by human hands and human intelligence—plenty of such operations go around. The more we can relieve labor from handling heavy material by hand, the more we reduce the hazard of strain, flat feet and casualties resulting from over-tired physical condition. Re-

duction in numbers of material handling laborers, of course, reduces hazards in proportion to numbers.

Generally speaking, a job can be made safer where materials are handled by some mechanical device rather than by hand. We have found that wherever it is possible to substitute a conveyor, traveling crane, or hoist in place of manual labor or hand trucks for moving material, it results not only in a noticeable decrease in the number of accidents, but it also shows considerable saving in operating costs. The mere installation of these devices will not prevent accidents, for the operating conditions must be studied and safe practices and rules developed for the most advantageous use of this equipment.

So many elements enter into the causes of handling material accidents that this makes it almost impossible to attempt to cover the subject in a fifteen minute talk. I believe it would do all of us good to again carefully review Safe Practice Pamphlets No. 54 and No. 55 as issued by the National Safety Council. These pamphlets cover the subject in a very thorough manner and the information contained therein can well be applied in our campaign for the elimination of handling material accidents.

When a man handles material in a wrong or unsafe way, it is not enough to say that he is careless. Generally the fact is that he has gotten into a habit, and the remedy is to teach him the good and safe habit. Handling material is a process in which the organized safety training and supervision of workmen are particularly necessary.

Practically everyone is more or less careless in the manner of handling material. It is an almost universal trait of the so-called human race, therefore we have two premises: first, that unless trained otherwise by persistent and insistent follow up on the subject, men will be careless in handling material; and second, that unless carefully handled and properly piled, material will fall, roll, slide, bounce, and perform other antics peculiar to their perverse nature. Consequently a definite campaign for the safe handling of material is as important as any subject to which a well-ordered safety department can devote its efforts.

The use of lift trucks is becoming more and more general in plants where the moving of heavy material is necessary, both as a matter of efficiency and safety. The use of such trucks for heavy lifting has done much to eliminate strains and hernias. Much unnecessary piling and repiling is eliminated through the use of portable platforms which are transported by low slung trucks operated by man power or electrically driven. Material piled on these portable stock platforms is easily transported from place to place by the trucks, and therefore but one handling of the material is necessary. Elevating trucks find their place in many industries. They are in use not only in manufacturing departments but in warehouses and shipping departments where their value is demonstrated in piling heavy boxes, bales and other material which otherwise would be handled by hand.

Too often, accidents due to handling material are classified as accidents "incidental to the work." Responsibility—"Injured's." Recommendation to prevent recurrence—"Be more careful." The above is typical of many reports covering accidents caused by improper handling of material. Such accidents should be more carefully analyzed to determine the direct and indirect causes, and proper remedy to prevent recurrence should be recommended. Many handling material accidents are preventable by providing protective devices such as safety shoes, leggings, wristlets, aprons, gloves, etc., and wherever such devices are practical these should be provided.

Frequently the desired amount of storage space in warehouses and stock room is not available and the safety department must make sure that the piles are stable at all times and must frequently assist the operating department in determining safe methods of placing the material in piles and removing it from piles. This is very often an easy matter with bulk material, for the pile can be controlled by means of bins, with provision to remove the material from the bottom of the bin. With boxed, baled and barreled material, it is a different problem, and very often the hazards

differ with the location and material. The principal factors to be considered are weight, size and construction of the individual package.

Good housekeeping has been a big factor in reducing handling material accidents. In those plants where especial effort is laid on keeping all aisles unobstructed, there has been a noteworthy decrease in accidents of this nature. All too frequently accidents occur because of inadequate equipment, inefficient methods and improper handling of material and lack of education of the workmen. Analyze these causes.

A definite campaign to eliminate accidents resulting from the necessary handling of material will result, if intelligently carried out, in an improvement in working conditions, speeding up of work, and a marked reduction in such accidents, even if they are not entirely eliminated.

CHAIRMAN HENSEL: The next paper will be given by Dr. H. P. Davidson, Pullman Car and Manufacturing Corporation, Chicago.

Good Eye Sight Essential in Industry

By HERMAN P. DAVIDSON, M. D.

Pullman Car and Manufacturing Company, Chicago

All of you, at some time, have seen a balloon being pumped full of air. It lies flat on the ground first, and as more air is pumped in, it gradually assumes its rounded form. When still more air is pumped in, it keeps its round form against resistance. But should a pin be stuck through it, there would be a gradual collapse, so that the balloon would be nearly flat by the next day. Should the filled balloon be cut with a knife, there would be a quick collapse, and unless the hole be repaired air tight, the balloon could not again resume its rounded shape.

Suppose we reduce the balloon to golf ball size, cut a hole in the front and place a watch crystal over this hole so that it is air tight. Then replace the air by liquids, muscles, nerves, lens and blood supply. Then place two of these golf ball sized spheres on each side of the nose between the lids, and we have human eyes. These eyes are looked up by a set of pulleys so they can be guided just the same as our forefathers guided horses by means of reins.

The watch crystal of the eye is protected by two movable membranes called lids. These membranes have a twofold purpose: one to protect the crystal from light, injury and foreign particles, and the other to lubricate and moisten the watch crystal.

Like the balloon, a slow leak or a cutting wound would allow the eye to collapse with the loss of liquids, and any scratch of the glassy part of the eye would be the same as scratching the watch crystal on one's watch. Only the human crystal gets cloudy around the scratch, whereas the glass crystal does not. It is very evident that any injury, however trivial, may result in damage or even loss of an eye.

Next, we want to know the function of these eyes. We all answer "to see." How do we see? Light enters the eye through the watch crystal and is bent (refracted) by means of curved lenses, and is brought to a point on the sensitive plate of the eye. This sensitive plate telegraphs the image to the brain, and then we see.

It is the same principle that we have in the kodak. We all know that the kodak has a diaphragm to regulate light, a lens to refract the rays of light let in, and a sensitive plate to take the picture. Suppose we take a picture when the kodak is out of focus, we have a blurred picture after it is developed. The same may be the case with the eye. In both the kodak and the eye, the focus is out of adjustment. That is, the distance from the lenses to the sensitive plate is wrong. In the kodak we can adjust this distance by moving the bellows backward or forward, as the case may be. In the eye we can not do this, so we resort to other means. This is

accomplished by putting glasses in front of the eye to change the focus. These glasses are so ground that they can bring the light to a focus nearer to or further away. This, then, brings the light to the point desired, and gives us clear vision. History gives us an illustration of the use of a focal glass (lens) when John Smith saved his life by using a sun glass to set fire to sticks before the Indians. The second time, however, he had to rely on a woman.

So if the golf ball sized eye is too short, we use glasses to bring the light to a focus nearer so that it will hit on the sensitive plate clearly. If it is too long (that is, larger than a golf ball), another kind of lens is used to lengthen the focus so that the sensitive plate again is in focus. Thus, by combinations of the above, we can fit a warped eye (one that is not perfectly round).

Now owing to childhood diseases, congenital diseases, eye strain, defective light, improper diet, injuries and cross eyes of childhood, there are many of us who do not have normal eyes. Yet to see clearly we should have two eyes of proper size and shape. So it is essential to make them as nearly normal as we can with glasses.

After forty years of age the muscles weaken or become less elastic so that we have to have two glasses, one for distance and another for near vision. In other words, the kodak adjustment of the eye can no longer set the bellows backward or forward, and when this happens we require two glasses, or a two in one glass (bifocal). This is not due to disease, but to inelasticity of tissues, like the elastic band that loses its stretching qualities as it gets older.

During eight years approximately 11,000 pairs of eyes were examined at the Pullman Car Works, with 23,843 separate visits. Of these, 42 per cent were given normal vision (some had normal vision while others required glasses to make them normal). Fair vision was obtained in 37 per cent with or without glasses. This makes 79 per cent with good or fair vision in both eyes. This leaves 21 per cent with poor or bad vision in one eye or both that glasses could not help. Of this 21 per cent, 6/10 per cent were one-eyed men. This summary, on its face, looks as if the company has nearly one man out of every four with at least one bad eye, but that is not the case. Some of these men came in for pre-employment vision test, and were rejected. Others were employees of interlocking companies whose sight had failed and were sent in for opinions and reports. So there is no definite way to find out what percentage working have defective sight. Then there are the employees who have been pensioned off and are entitled to treatment. So actually it is not 21 per cent, but less.

Now that we know what good eye sight is, why is it essential in industry? Because it increases the man's efficiency, relieves him of eye strain, makes him less liable to have accidents or cause accidents. It reduces the employers' compensation pay roll, and it reduces the salvage bill. This over-shadows the cost of medical care and the cost of protective goggles in dollars and cents, not to speak of the humanitarian phase of the question. Some companies sell their goggles to the employee, but the Pullman Car & Manufacturing Corporation gives them prescriptive goggles gratis.

An employee who sees well is less liable to ruin his work and thereby save from salvage. He has a fraction of a second more to get out of danger, and he is less of a hazard to his fellow-worker. Furnishing a pair of goggles, or a dozen pairs, won't make a lazy man change his ways, but it can help the conscientious man who has poor vision.

The oculist can take men off dangerous occupations. For instance, a band sawyer with bad vision and trifacial neuralgia is transferred away from the saw. There is no way of telling whether this man would have been a compensation case, but in his new job he can't tempt Providence. In our plant certain occupations require a set standard of vision before these men are allowed on their jobs. For instance, crane operators, hook-ous, transfer table operators, train crews, punch press, shear

and band sawyers. In the wood working—shapers, sawyers, joiners, and stickers. These men pass annual examinations.

The compensation bill is reduced because of prompt attention and skilled care soon after the accident. It has eliminated the "picker" from the plant and other false first aid measures. The oculist also has a definite record of vision on entrance, and if the eye is bad at that time, can definitely refute a false injury claim made later. This happens far more frequently than you would imagine. An employee with previous good vision is injured while on his own time, in a broken wind-shield injury. He is off some time, then returns. He is sent to the oculist before being re-hired to "get a new pair of goggles." He does, and his injury and vision are noted. Later he claims injury in the plant. As a result of rechecking each time hired, he cannot put over his injury claim. Another foreman lost his only son. He drank continuously for a month. Upon return he had no vision to speak of. It was optic atrophy, due to boot-leg liquor. There are many such cases where the record is a real asset to the company. Often there has been a trivial injury for the man to lay his claim on, but he just as often says it is one eye that was injured, when in reality, it was the other. Of course, the legitimate injury case is paid his just compensation.

There is no way to check up as to accurate results from our better vision and goggle policy, for before accurate records were kept the men did not come in for trivial injuries, but let the "picker" remove the foreign substance. From 1916 to 1921, 30.8 per cent of all injuries that came to the dispensary were eye injuries (severe and mild). From 1923 to 1930, it is 24.5 per cent of all injuries that came to the dispensary, with all trivial injuries counted in. In 1923, the first year the oculist was on duty, 843 eye injuries were reported out of 21,327,130 hours worked. This includes the severe and the very mild scratches. In 1930 there were 145 injuries out of 7,725,833 hours worked. Quite a considerable reduction when you compare the number of hours worked. Most of these injuries are trivial ones. Still, they are all counted.

It is interesting to note the gradual change of attitude of the men about goggles. They consider it an affront at first, but they now request them. If an injury does occur, there is generally an apology such as "I was just wiping my goggles when something hit my eye." Formerly they expected to have eye injuries.

In conclusion I want to thank the management for their broad sightedness in making better vision possible in the Pullman Car & Manufacturing Corporation, and to the Safety Department for their cooperation. Also the Chief Surgeon who has given every aid.

CHAIRMAN HENSEL: Thank you Dr. Davidson for a very good talk.

The next subject will be presented by Arthur Berquist, safety inspector, The Youngstown Sheet and Tube Co., East Chicago, Indiana.

Good Housekeeping

By A. V. BERQUIST

Safety Inspector, Youngstown Sheet and Tube Company, East Chicago, Indiana

The matter of good housekeeping may not be as serious a task in some plants as it is in others, dependent upon the product, process of manufacture, and the handling of materials.

An illustration of this is our Indiana Harbor Works which consists of three units: coke plant, steel plant and tin plate mills, completely enclosed by themselves and separated by trunk line railroads. The task of housekeeping in the coke plant and tin mills is a less serious problem due to methods of handling materials, continuity of production process and light weights of materials handled and individual responsi-

ilities for plant orderliness as against a combination of departments, each handling material in a different state and degree; therefore, I will confine my discussion to the problem in a steel plant incorporating such peculiarities as exist in the other two plants.

An analysis of housekeeping, good or bad, can be determined by the following causes:

- Stocking of raw materials.
- Processing of materials.
- Transportation.
- Maintenance.
- Miscellaneous and non essential material.

Materials such as coal, ore, stone, sand, lime, and other bulk materials should be stocked in bins with retaining walls of sufficient strength to withstand pressure weight.

Other materials such as billets, slabs, bars, rounds, pipe, etc., attention should be given to the foundation skids. Pipe or rail should not be used, as pipe caves under weight and rail is apt to warp and bend, particularly with semi-heated stock, so that in unhooking lifts man may have his feet under skid when lift is lowered and cause serious injury. Six-by-six steel bars, a slab, or twelve-by-twelve timbers are most satisfactory for skids for above purposes.

Spacing of lifts is dependent upon weight of materials. On lightweight stock we use 1 inch x 4 inch, 2 inch x 4 inch and 4 inch x 4 inch lumber blocking and short lengths of two inch pipe, where materials are banded. Where round materials are stocked in piles, it is advisable to have cleats at end of skids. Where space is a factor, steel uprights embedded in concrete can be used for storage of long bars, rounds, pipe, etc.

Billets, skip or other banded stock and wide flat lifts should be cross piled and space of at least the width of bundle or stock left on edges of top row, so that crane chains or hooks striking on catching lifts would not pull material as readily as it piled close to the edge.

Where materials are stocked in yards temporarily, or for repair or relining jobs, avoid piling over oil lines, gas mains or tunnels, sewers and manholes as there are dangers of breaks in lines or mains due to weight with subsequent settling, possibility of tipping piles and other hazards.

Brick, sacked cement and other materials should be cross piled and tied in, and in removing materials, it should be done one tier at a time, leaving enough on each corresponding tier as a step in case piles are high. In the unloading of materials from cars, lumber used for sealing or bracing should have nails bent over or removed as fast as unloading takes place. Straw packing or paper lining if not to be used for any other purpose should be taken to some isolated spot and burned. In removing materials from cars, it should be done so that weight is equalized on sides as otherwise there is danger of car tipping. The same principle applies to the loading of cars.

In all cases of piling materials, attention should be given to proper track clearances, and that no part of pile projects out to the extent that anyone walking by would bump into such projection.

In the processing of materials, there are opportunities of spillages that can only be avoided by proper construction and practice.

At blast furnaces or other departments where skips are operated, plate across bottom side of skip will catch stone scrap cinders, grease and other materials and return to skip pit, eliminating the danger of material falling on anyone walking underneath and also the necessity of cleaning up spillages.

Scrap chutes for dumping runner scrap will eliminate scrap falling between cast house and cars. These also can be used to dispose of miscellaneous refuse from open hearth floors dumping to boxes. Bessemer vessel scrap chutes should be banked sufficiently at curves to prevent scrap flying from chute when charging. In addition,

a hinged plate hanger can be provided in chute to retard speed of heavy materials such as bloom butts.

Having sufficient cinder ladles on hand to take care of cinder on flush or cast and filling ladle to certain maximum will eliminate spillages of cinder on tracks. Locking ladles with padlock arrangement eliminates the danger of tipping ladle while enroute to dump. At some plants cinder pits with flume arrangement eliminates or decreases the handling and use of cinder ladles almost entirely.

All departments handling hot metal should have a thorough system of inspection of ingot moulds for slag rims or butts, also of hot metal ladles and cinder pots for dampness, presence of ice or water, which would result in explosion if used, with subsequent burns, damage to equipment, hazards of equipment shortage and necessity of cleaning up, which constitutes a hazard in itself. If pigging a cast when mould strand has been idle, strand should be operated a complete revolution to drain off water or ice in cold weather. A salamander or fire under strand, kept burning in cold or wet weather, will assist in keeping moulds dry. Two angles placed underneath the strand at discharge end of machine, allowing sufficient clearance for stickers to drop and slide along bars to a point where they can drop in an enclosed area, eliminates possibility of pig falling on anyone who may cross under strand, and segregates stickers in one place instead of being scattered.

Spittings from Bessemer vessels accumulate on side walls and overhead structure work, which should be knocked down at frequent intervals to avoid the danger of it falling on men below. Incidentally the wearing of hard boiled hats painted white is a protective measure for pitmen against this ever present hazard.

Highlines should be provided with three foot sideboard extending at an angle of forty-five degrees, preferably of steel to catch any materials that may fall from cars, particularly where passageways cross under highline.

An oxygen manifold system where any great amount of oxygen is used, will eliminate the danger of cylinders being scattered around, particularly where there is a danger of coming in contact with heat, hot metal or grease.

Aluminate lubrication, roller bearings on equipment, oil pressure feed system on roller lines, spindle bearings, etc., have reduced oil and grease conditions to practically zero. However, in the old type mill we still have the hand system of oiling to contend with. Oiling on overhead cranes, crane should be spotted so that it is not directly over passageways, stairs or landings. Proper attention to the application of oil or grease by oilers with proper type tools for each job will reduce overflows and spillages. More attention to the renewal of worn bearings will probably more than save the cost of change, in lubrication and decrease the slipping hazard. We all know that a sieve will not hold water. The use of oil-proof guards will also reduce the oil and grease hazard and lengthen the life of equipment.

Drip pans filled with sand, if oil is not to be filtered, will keep oil from running out on floors.

Tanks for fuel oil, tar, benzol or other flammable liquids should be dyked or set in concrete base with retaining walls to dam or control the spread of such liquids to a confined area in case of leaks. Wherever possible, piping for such tanks should be overhead instead of in tunnels so that in case of leak in line, it can be detected readily, whereas in a leak in a tunnel line, a sufficient quantity could accumulate to cause a serious fire before being detected.

In loading scrap, bloom butts, billets, crushed tin, plate, crushed pipe or cut off lengths, runner scrap and other materials for shipment to scrap yard or drop, attention should be given to trimming cars, so that no materials would project over side of cars to the extent they would strike buildings, columns or anyone passing, or fall off in transit, which creates a hazard to switchmen as locomotive footboards are often bent in due to scrap along tracks as well as breaking of cylinder cocks on locomotives. Also some of the material handled in this manner is of such weight that it is necessary to use a locomotive crane in removing it from along tracks after having fallen from car due to poor loading.

Open hearth hobs should be allowed to stand long enough to cool before transporting to dump as there is less likelihood of their breaking in transit and pieces falling along tracks.

Wire removed from bundled stock, the use of an 18 inch or 20 inch pipe about three or four feet long fastened to stand upright, will serve as a press for bundling wire, with the use of a tamp, and will eliminate pieces of wire lying around, creating a tripping or foot puncture hazard and will facilitate handling in returning for scrap.

Wherever possible and where scrap is of a size and nature to fit open hearth scrap pans and sufficient pans are available, it is advisable to use this method to handle scrap as it avoids rehandling and the minimizing of handling of materials tends to better housekeeping.

Provision should be made for storing polishing poles, pusher rods, tapping bars, guides, wedges, mould clamps, gagers, rolls and all other spares so that when they are not in actual use they will not be scattered at random, creating tripping hazard, and unnecessary handling and haste in locating them when necessary for use.

In the handling of heavy spares, mill housing, rolls, etc., and in placing on floor with crane, the weight of the material and square corners will in time cause damage to floors if made of brick or concrete, which makes for bad footing in walking through mills or in an emergency in getting away from cobbles. This can be remedied by inverting used rail set in floor with bottom or flat side up flush with floor surface and spacing a foot apart to carry the weight of such material.

Transporting of materials by railway car, automobile truck, tractors or other conveyances requires well-ballasted tracks to eliminate derailments, particularly on hot metal or ingot runs as derailment may mean disastrous spillages.

In switching or handling of cars, road crossings should not be blocked by cars; discipline should be effected for failure to clear cars on sidings creating hazard of "side swipes" and for pushing cars into building doors before being opened. Suitable track bumpers should be provided on stub tracks to eliminate pushing of cars off end of tracks, particularly on trestles. Where single steel bumpers are used in yards or in buildings, it is a good plan to paint them white so they are discernible at night.

Roadways and aisles should be kept in good condition, free from holes as they are often used as a passageway from one department to another by men as well as travelled by vehicles with loads. Dangerous corners should be well marked. An important reason for clear aisles, roads and passageways would be in the event of emergency such as fire. It might also be mentioned in this connection that all materials should be kept away from in front of fire equipment, hospital stretchers and electrical equipment.

With maintenance men, electrical or mechanical, a rule to remember with respect to housekeeping and orderliness is that a job is never complete until all guards have been replaced, and old and excess materials, tools and equipment removed.

To my mind, the minor part of housekeeping and cleanliness is that of keeping the plant free of papers, old overalls, gloves, old tobacco cans, cigaret packages and other incidentals. Containers at various locations with a definite understanding that such articles must be placed in containers will practically eliminate such articles being strewn about. In the case of cigaret packages, a beneficial campaign can be carried on to deposit all empty packages in a container at the gate with the idea of stripping lead to donate to charitable organizations.

In connection with non-essential materials a survey of any plant will reveal articles on roofs, overhead iron work, crane runways, platforms and stairs that have absolutely no need of their being there and while not in anyone's path, may at some time be caused to fall and strike someone, causing serious injury so that housekeeping alone is not confined to ground conditions but to overhead conditions as well.

The discussion I have presented may appear to be one of materials handling more than housekeeping, yet in diagnosing housekeeping, one cannot gainsay the fact that housekeeping is almost entirely the outgrowth of materials handling, and the lessen-

ing or minimizing the number of movements necessary to the handling of materials is the essence of good housekeeping.

CHAIRMAN HENSEL: Discussion is open on the different subjects. I am sure the speakers will be glad to have you fire your questions at them and so let's go.

T. H. MCKENNEY (Illinois Steel Co., So. Chicago, Ill.): Do Dr. Davidson's figures pertain only to the Pullman Company?

DR. H. P. DAVIDSON: No, they cover eleven thousand people in interlocking companies. Some of these people are retired men—men seventy-five to eighty-five years old.

MR. MCKENNEY: When you say there is one in every twenty men industrially blind and one in every fifty men is industrially blind because of injury, would that mean that the one in twenty would be industrially blind because of injury?

DR. DAVIDSON: No. One in fifty had some previous injury. It may not have occurred in our plant, but on the road, playing football or while hunting in the fall.

MR. MCKENNEY: I am somewhat amazed at the large number of men with one eye and those industrially blind.

T. A. SCHENDEL (Caterpillar Tractor Co., Peoria, Ill.): I would like to know whether your goggle program covers every man in the plant? How does a man have to qualify for a pair of prescription glasses?

DR. DAVIDSON: We specify that every man in the plant shall wear goggles. Any man caught without them is disciplined, and if he is caught too many times, he is discharged. His common alibi in the past has been that the glasses are no good—they don't fit him and they steam up. If these men wear outside glasses, we get them and compare them with his goggles—the doctor will give him the proper kind.

MR. SCHENDEL: Why spend money for prescription glasses when the man already has a pair of glasses? Why not put a coverall goggle right over those glasses? What do you think of that from a standpoint of vision?

DR. DAVIDSON: Much depends on the strength of the man's glasses. Coverall goggles can be used in some cases but in most cases they can not, as in the case of the spot-welder and jobs where a pair of goggles is burned out every week or in even less time. Most people are not comfortable in a coverall goggle because of the intervening space between the goggles and the glass which has a refraction area. This bends the rays of light and gives a prismatic effect. When one glass is over the top of the other, it is very necessary to have the goggles rightly fitted and properly in front of the eyes to avoid headaches and pulling because of prismatic effects which depends on the thickness of the glasses. Goggles must be properly adjusted in front of the face; adjustments are one of our greatest troubles. Teach your men how to set and adjust their goggles and you will avoid a lot of kicks.

We have given up our flat goggle in our Pullman Car and Manufacturing plant. We still use them in the shops around Buffalo and Calumet but not in Chicago. In the Pullman plant we have found that the toric lens or the curved lens gives the eye the right angle and it has eliminated a lot of trouble and complaint from the men. The men no longer tell us that, when they sight down the end of a car, it is lopsided at the other end.

C. W. HANKO (Pittsburgh Steel Company, Monessen, Pa.): Does sweating cause particles to get past the goggles and into the man's eye?

DR. DAVIDSON: We have found that the regular sweat band takes care of that. Try to get your men to clean their goggles two or three times a day. This is difficult because men refuse to clean them. They should clean their goggles every morning with soap.

To keep goggles from blurring while going from a hot place to a cold one is quite a task. We had quite a lot of trouble with an operator whose work involved passing over alternating hot and cold places. We got around it by requiring men on that job to have two-twentieths vision. If the men on the job can't pass the examination

they are taken off the job and placed elsewhere. We have the welfare of our employees very much at heart and these men are taken care of.

P. J. BRAND (Pullman Car and Mfg. Co.): Dr. Davidson has given you a list of the occupations and the vision required for each. When a man grows old in his position, for his own safety and for his own good he is changed to a job where he will be more comfortable and where there is less likelihood that he will be injured. We endeavor to get him a job like the one he had and paying as much money.

W. GRAHAM COLE (Metropolitan Life Insurance Company, New York City): I know of the excellent work the Pullman Company is doing. I believe that we should use the so-called standard requirements for particular occupations with considerable caution. It is surprising how many trained men do work with very little vision. They have so associated their movements that they practically do it automatically and do not require a high degree of vision. On the other hand, we must remember that the man with a subnormal vision but with properly supplied illumination may have just as good vision as the man with normal vision but with poor illumination. I wonder if the Doctor has made any studies along those lines.

DR. DAVIDSON: I think that is a mighty good point. I have made no direct study of the illumination but expect to do so.

Mr. Cole's statement, about a man with poor vision doing a good job is perfectly true. In 1923 we had a young blond lad with very poor vision. We examined him and found that he was an albino. Being very interested, I sent him back to his work and saw his foreman, who said that he was one of the best cabinet workers in the plant.

That, however, was an exceptional case and I think that most men of bad vision are a menace not only to themselves but also to the men around them.

Very often I am asked the question, "Will ordinary clear protective type goggles affect the vision?" I don't think they do. Many men complain about the plain goggle and say that it hurts their eyes. We have tested a number of cases by taking out the glass and putting it in a different goggle; the men were perfectly happy and contented. They have been told that the plain goggle is a cheap goggle and hence their opposition.

As men get older, they develop some error of refraction, whether they wear a plain goggle or a prescriptive lens. They say that they cannot see as well as they could last year. Most of these men are about the age of forty, beginning to get near-sighted or far-sighted, or with some pathological error in the eye, and they need a prescriptive goggle. If you don't give it to them you are going to have trouble.

You must remember that our goggles are wide—four to six kilometers in diameter—much wider than the average man's pair of glasses and consequently, it is necessary to drill out the center in order for him to see clearly. If this is not done, that prismatic effect develops and causes pulling and headaches.

E. F. BLANK (Jones and Laughlin Steel Corporation, Pittsburgh, Pa.): What is meant by the term "Industrially Blind?" Do you mean 2-100 or 2-200 and how do you get these figures?

DR. DAVIDSON: The rate is set by the State of Illinois at 2-200.

MR. BLANK: Do you mean that one man out of every twenty is industrially blind in one eye or in both eyes?

DR. DAVIDSON: In one eye. It may be either eye. We always take the worst eye.

MR. BLANK: In talking about prescription lenses versus coverall lenses, do you feel satisfied that the goggle ground in a high degree of plus or minus hasn't lost strength and become hazardous for the wearer?

DR. DAVIDSON: We use a "drop ball" test on all of our lenses which must come up to a certain standard. Mr. Brand, our safety man, can explain that to you.

MR. BRAND: We take a sample of each supply of goggles and put them through the "drop ball" test; our standards are rather severe—far exceeding the test of the

Federal Government and the United States Bureau of Standards. We test them for strength and for refraction. Some years ago lenses were none too good in this regard, but they are much better now, although we still have rejections. I think the type of prescription lenses we use is stronger than the plain lenses.

MR. BLANK: Do you test every prescription lens?

MR. BRAND: We test one in "five" or "ten" or "fifteen" to see that we are getting the product we are paying for.

MR. BLANK: After the prescription is ground in?

MR. BRAND: After the job is completed and sent to us.

MR. SCHENDEL: We have had four cases in which prescription glasses have stood up under impact with only the usual shattering which occurs in any shatter-proof lens. Those glasses were pretty well ground.

REPRESENTATIVE (Richmond Coke and Iron Company): Are your men given a pair of goggles when they are hired and do you let the men keep them? Have you any formula for sterilizing goggles?

MR. BRAND: When a man is coming back in a week or several months, we lay his goggles aside. But when a man comes back after about two years he must be examined because his vision is probably different. When we have a permanent lay-off, lenses of prescription goggles are taken out of the frames and marked by Dr. Davidson. We have many calls for plus-50 and plus-75 goggles and if those lenses are in good shape, they are sterilized and used again.

We usually sterilize our goggles with live steam but now use certain solutions which we find very effective.

DR. DAVIDSON: While lenses can be sterilized and used again, one must be sure that the eye-distance is correct in the new frame.

MR. BRAND: Dr. Davidson examined each pair of prescription lenses that we received and then saw that all men had a good fitting goggle. He also refitted some of the old goggles in the proper frames and saw that they were properly adjusted to the man's face.

T. H. MCKENNEY (Illinois Steel Company, So. Chicago, Illinois): Arthur Berquist stated that the men in the pits wore hard-boiled hats painted white. I wondered why they were painted white.

ARTHUR BERQUIST (The Youngstown Sheet and Tube Co., East Chicago, Indiana): The first purpose of the hat is to protect the worker from falling metal and when the hat is painted white, the man on the top can see it moving around down below.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

Foundry Session

F. G. BENNETT, Chairman
The Buckeye Steel Castings Company, Columbus, O.

The third session, the Foundry Session, of the Metals Section convened with F. G. Bennett, safety director, The Buckeye Steel Castings Company, Columbus, Ohio, presiding chairman.

CHAIRMAN BENNETT: This is the fourth meeting of the Foundry Division of the Metals Section. The division originated in New York during the congress of four years ago when Dr. Chaney, of the United States Department of Labor, stated that foundry accident experience was far from being good in comparison with the other sections of the metal industry. The outcome of his remarks was the establishment of a division of the Metals Section known as the Foundry Research Committee. (I have suggested a change to the Foundry Committee.) Its purpose is to study intensively the accident problems in this industry.

This morning we listened to excellent papers on good housekeeping and also on the handling of materials which are both applicable to foundries. In the paper Mr. Voss, the speaker, pointed out that the various mechanical installations in foundries have reduced the hazards of handling materials and particularly foot accidents.

Foundry Industry in Need of Improvement

The foundry industry, I am sorry to say, has not shown the improvement we anticipated. I do know, however, of one foundry organization in Ohio that has begun an intensive campaign to reduce accidents. They are emphasizing, particularly, frequency reduction and cooperating with our industrial commission.

During the past year the American Standards Association completed the Foundry Code—a revision of the old foundry code developed by that organization. Various engineering groups sponsored it. Mr. Sanford and myself were representatives of the National Safety Council on the code committee. Some changes were made from the previous year. The code has not been printed yet because there will be some further changes, particularly in the materials used in the code.

I can't see why the foundry industry should continue to have a high frequency rate compared with the other divisions of the Metals Section. High frequency rates do not exist, however, in every foundry. We have certificate and first-ward winners whose employees worked 773,000 man-hours without a lost-time accident. One is a brass foundry. We have another foundry which worked 1,285,000 man-hours and only had 11 lost-time accidents. We have some radiator companies and several steel foundries with exposures of 110,000, 73,000, and 54,000 man-hours without a lost-time accident. These records show what can be done with intensive study and intensive safety work in the foundry. One large steel plant, The Corrigan, McKinney Steel Company, Cleveland, Ohio, with 2,589,000 man-hours of exposure had four lost-time accidents—a frequency rate of 1.54. If they can do it, any foundry can do it.

Our first subject this afternoon will be handled by Dr. Leonard Greenburg, United States Public Health Service, Yale Medical School, New Haven, Conn.

Cleaning in the Metal Industry

By DR. LEONARD GREENBURG
U. S. Public Health Service, Yale Medical School, New Haven, Conn.

My talk is not going to be a complete discussion of the subject, "Cleaning in the Metal Industry" but rather a talk concerning itself only with sand blasting methods in the metal industry.

I don't know whether you are familiar with the fact that some time ago, namely in 1928, the Executive Committee of the National Safety Council authorized the appointment of a committee to inquire into the problem of sand blasting in the metal industry. This committee was empowered to inquire into the importance of the problem of sand blasting hazards in the United States and the desirability of the National Safety Council conducting a study of this problem. In complying with this resolution and under the joint sponsorship of the Engineering and Health Sections, a Sand Blast Committee was formed. There were eight or ten members on that committee.

The first question we tried to answer was, "Does a health hazard exist in general sand blasting operations?" And, second, "If such a hazard exists, what is the general extent of the hazard and, if possible, what is a rough approximation of the persons exposed to such a hazard?" And the final question "Does this committee consider the problem of such importance that the National Safety Council should engage in a study of the problem as a whole?"

This committee after several meetings arrived at an answer to these questions and I should like to briefly read the opinion of this committee to you.

"It is the committee's opinion that wherever sand blasting is conducted a potential silicosis hazard exists and that in most cases workers are exposed to the inhalation of silica dust to a greater or lesser degree depending on the duration of their exposure and the type of process which might, under certain conditions, be injurious to health."

For the second question, a study of silicosis, the committee felt that the National Safety Council was not justified in making a study of the problem of silicosis as such. In South Africa, in Australia and in this country by the United States Bureau of Mines at Joplin, Missouri, and by the United States Public Health Service at other places, considerable data has been accumulated on the production of silicosis and fibrosis from silica dust and it was the feeling of that committee that the National Safety Council would not be justified in studying this problem of silicosis again. But the committee did feel that the problem of sand blasting was of very great importance and that it was justified in recommending to the National Safety Council that a study of sand blasting as a hazard in the United States be made.

Then, as a result of that recommendation, a rather large committee was formed for the study of sand blasting as a hazard in the United States but I won't bore you with a list of its members but I would like to point out the agencies represented. There were three men from universities, several industrial physicians, several safety men, two representatives of insurance interests, three representatives of government agencies, two representatives of the state departments of labor and of health, three representatives of health and medical organizations, two representatives of industry, representatives from each of four large organizations making sand blasting equipment, one representative of fan and blower companies, representatives from three trade organizations and three additional representatives from the National Safety Council coming from the Metals Section, the Foundry Section, and the Steam Railroad Section.

Now, it was thought that this large committee might do justice to all of those persons interested in sand blasting and every effort was made to get their views on the subject and get a contribution from them in the way of information which might help the committee in its work.

The committee got its funds from the National Safety Council (I forget just how

much was set aside but I think it was either five or six thousand dollars, I am not clear on that at the moment).

There was no one available to conduct the research at that time so the United States Public Health Service generously donated the services of Mr. Bloomfield, one of the sanitary engineers who has had many years of experience in the actual work in the field. Thus the United States Public Health Service and the National Safety Council were able to cooperate in the making of the study. The object of the study, I briefly stated, was to make a survey of the sand blasting operations in this country and I will show you just how we attempted to identify the various kinds of equipment with the makers and locate equipment around the country in an effort to get a reliable sample or cross-section of the industry as a whole.

The purpose was to make a study of the sand blasting equipment, comparing the amount of dust in the air with the proper known standards affording health protection. We have these standards from the South African experience, the Australian experience, the Bureau of Mines at Joplin, Missouri, and from the experiences of the United States Public Health Service. There was no necessity of having any further investigation to get knowledge as to how much dust should be permitted in the atmosphere of a workroom. The important thing to determine was just what any given industry disclosed in the way of atmospheric pollution.

We first studied equipment such as rooms, barrels, cabinets and certain special types. We studied sand as an abrasive and also other materials such as a shot and steel grit. A rather uniform plan of study was followed, making a sanitary survey of every plant visited. For example, if this were the room in which there were two pieces of sand blasting equipment, we would make sketches of the room and all the equipment. We studied the ventilation provided in the room and the construction of the ventilation equipment and then we gathered data on the equipment itself—going so far as to get the size and the number and the maker's name and the age of the installation and its up-keep and all of that. Finally, we made dust counts of the amount of dust in the atmosphere either inside equipment or in the general workroom outside.

For instance, if we were dealing with an ordinary sand blast room, we would make tests of the amount of dust in the room and then we would make tests of the amount of dust in the room in which the particular piece of equipment was housed to get an idea as to the possible effect of this equipment on the health of the workers in the room.

To evaluate the harmfulness of some of these dusts, we took samples and made petrographical analyses of the dust which we obtained in the work room. We also made occupational analyses of the workers with a history of the exposure and a complete history of their occupations. And, lastly, we obtained as many X-ray pictures as we thought might be pertinent to the particular piece of equipment under study.

We were primarily interested in studying silicosis but you can see that some of these X-ray pictures might lead to something of great importance. For example, we found a man who was working around blasting equipment in an atmosphere contaminated to a lesser extent than some of the acceptable standards and that man had been working there for a large number of years and his chest was entirely negative to silicosis. This might be considered as partial proof at least that he was not suffering because of his occupation and that would serve as a check on the standards to which we had compared his occupation. Of course, such an X-ray picture would be of comparatively little value if a man were working in a very dusty atmosphere and had a bad chest because we know that such atmospheres do produce these chests in practically all cases.

Another very important portion of the study was protective devices. We made a survey of the literature on this subject and there is practically nothing available that is of any value. Our first study along this line was made at a well known plant in Bridgeport about six or seven years ago. At that time all the available literature

had failed to reveal anything at all in the way of actual studies on protective value of helmets, respirators and masks.

At the beginning of this study we again went over all the literature that we had and failed to find anything of note and so we included, with our other work, a rather detailed study of some of this equipment, and, finally, we have had the literature of this whole subject under scrutiny for some time and will be prepared to discuss the findings with the other investigators in this country and abroad.

I should like to repeat that there are four general types of equipment, including rooms, barrels, tables and cabinets. In the case of tables, cabinets and barrels the worker usually is outside of the piece of equipment. He may shovel a lot of small castings into a barrel and close the door of the barrel and then be in the general room atmosphere but outside of the equipment. In the case of the sand blasting room, of course, the worker actually is inside of the room where the blasting is being done and in this latter case it is absolutely essential that he be provided with some kind of protective device.

The very first thing we did at the beginning of this study was to find out what kind of safety blasting equipment was in use. We wrote practically all the manufacturers and they kindly sent us lists of all of the equipment they made. From this we computed that approximately 28 per cent of the equipment was in the form of sand blasting rooms, about 44 per cent was in the form of barrels and about 21 per cent in cabinets and about 9 per cent in tables. There is some variation, of course, those figures are rather rough but, in general, those figures express the types of equipment that are being used in the sand blasting industry.

Another important question that came up was "In what kind of industries is this type of equipment to be found?" We found that 65 per cent was in foundries of various kinds including 22 per cent in forges and heat treating shops and about 13 per cent spread over many miscellaneous kinds of jobs. After we had found this we decided to canvass these manufacturers as to what they considered their best equipment, in order to study certain pieces of the best equipment available.

We tried to get approximately 28 per cent of rooms to study and 44 per cent of barrels and about 20 per cent of cabinets, and so on. We tried to see that the work was spread out among the foundries, as a rule, to the extent of about 60 or 70 per cent and to forge and heat-treating shops to the extent of 10 per cent—in other words, we wanted to get a real sample of industry as a whole. Then we made it our business to study several of the best pieces of equipment of each manufacturer.

Now, the objection may be raised that by doing this we avoided the study of the old equipment, but that isn't so at all, for we studied all equipment that came along by a selection which I will explain afterwards but we made it our business to get the whole of this equipment.

One of our committee members raised the question that in certain states the operation might be on a higher and better plane than in others because of labor laws and for that reason we spread our study over some eight states including the state of Wisconsin, which is supposed to be on a very high plane from the point of view of labor supervision, and other leaders.

Now, I am going to pass around a survey form which we used and by means of which we attempted to get all information that might be of any importance in each one of the plants, without overlooking any of them. We planned to make these sanitary surveys, get all the information and all the data pertaining to the equipment and its operation and, finally, close by getting our dust-count and computing it (and this was done in some laboratory, either at the one at the plant or at some nearby plant—the City Health Department or some place of that type) and then, afterwards, to compile our results.

To go back to the study of the question of silicosis, I want to point out that there are really four factors which enter into the production of this pulmonary disease. One of these is the composition of dust and it is now fairly clearly established that

dusts which are high in quartz content are more injurious than those which are low in quartz content. The second is the number of particles of dust and we determine the number of particles of dust by the use of a suitable sampling apparatus which has been developed by the Bureau of Mines and the Public Health Service. We used this standard type of procedure in all of our analyses. It is the same as that used by the Public Health Service and Bureau of Mines. In addition to that we studied the particle size. You see, usually, the large particles of dust do not gain entrance to the lungs and for that reason the determinings of the particle size of these dusts are exceedingly important. We did that by a special technique and we had photomicrographs of that made to present with our final report.

Lastly, we have the factor of duration of exposure. If a man works five years he will inhale twice as much dust, relatively speaking, as a man who has worked two and one-half years will inhale.

As I say, the type of equipment was approximately the same as that we found from the study of the records presented to us by the equipment manufacturers.

Our abrasive studies resulted approximately as follows: In 15 per cent of the equipment, sand was used as the abrasive; in 45 per cent, steel of some kind or other was used as the abrasive (as shot or in broken fragments of some kind); and in approximately 4 per cent, steel and sand mixed were used.

So far as personal protection is concerned, in forty-one per cent of the cases, positive-pressure helmets of some kind were provided. In twenty-six per cent of the cases, respirators were provided and in approximately thirty-three per cent of the cases no protective equipment was provided.

So far as the dust was concerned, we found the picture to be about as follows: When steel grit or steel shot is used we found the silica content in the dust of the air very low—usually less than 5 per cent. When a mixture of sand and steel is used, the silica content may vary from 25 to 50 or 60 per cent. And, finally, when sand alone is used, the silica content is usually around 80 or 95 or 100 per cent. It becomes obvious from this that the use of steel shot or steel grit is certainly to be advocated over the use of sand—all other things being equal.

Relative to size of dust particles, our studies showed that practically all of the dust in the air as caught by our sampling apparatus was of a dangerous size. Practically 100 per cent of it was less than five microns in size and that is a size that can easily get into the lung tissue. The most frequent size of all the dust particles was around one and one-half microns. In general, it can be said that sand blasting, is accompanied by the production of certain amounts of dusts which may be high in free silica (whether sand or steel grit or steel shot is used) and is hazardous to a greater or lesser degree.

I have a few slides which will summarize some of the results which we have obtained.

(Slide No. 1) This slide shows the result of our dust determinations (in all we have two hundred fifty-five counts on the various types of equipment). These are selected samples, the others having been taken out because they represent certain special conditions and in the final report they will, of course, all be presented. We have twenty samples here in which the man was protected by positive-pressure helmets and respirators taken in rooms, in some cases the minimum amount of dust was one-tenth of a million particles per cubic foot of air. It is well to have in mind the figure of ten million particles which is approximately the standard which might be used in this industry (on this point the committee has not voiced its final opinion and I only say that with reservations). At any rate, in certain cases the worker is protected in that he is only subjected to the inhalation of one-tenth of a million particles but in other cases he gets approximately five million and in some cases he gets twenty-five million particles but only approximately five million where positive pressure helmets and respirators are used. Curiously enough, the worker under those conditions is only getting five million particles but in the types of equipment which

ordinarily have been considered as safe, namely, barrels and tables, the worker is exposed to a greater amount of dust, for example the worker gets almost twice as much dust as in the case of barrels and six times as much in the case of sand blast tables. We are convinced, as a result of this study that in many cases the use of sand blast barrels and tables is far more injurious than the use of sand blast rooms where the worker is provided with a positive-pressure helmet of a satisfactory type.

Now cabinets are widely used in this industry but they form a smaller part of the equipment and, as a general rule, are used more intermittently than the other types but in certain cases, even with cabinets, there is an exposure of nearly eleven million particles of dust per cubic foot of air.

(Slide No. 2) This picture shows the technique which we employed in studying the value of some of the masks and respirators. Our apparatus is so arranged that we can do three things at one time. We have a control device for sampling the dust and this other one is the device which samples the dust of the blasting room itself and with the device (c) here we take a sample of the air from under the helmet and sample it in the apparatus marked "A". While the worker is sand blasting materials, therefore, we have been able to measure the dust concentration in the sand blasting room and at the same time test the air under the helmet with which he is provided, and, finally, by the use of this apparatus marked "B" we have been able to measure the actual amount of air which he breathes—the outdoor air with which the helmet is supplied. I would like to show you the results of this special study which we made on the provision of fresh air to helmets and its effect on the dust concentration under the helmet.

(Slide No. 3) This shows one such study made in the sand blasting room. The blasting caused five hundred million particles per cubic foot. The worker was provided with a helmet to which the air was supplied. This air contained three-tenths of a million particles per cubic foot, that is, about three hundred thousand particles per cubic foot were going to the helmet itself. Now then, under those conditions, by varying the amount of air going to the helmet, we tried to find the relationship between the amount of air going to the helmet, (which, as I said, varied from two to six cubic feet,) and the amount of dust under the helmet. Our results were extremely erratic. We wondered why that was until we realized and took into account the fact that this helmet was provided with a metal screen in front of the eyes of the worker. This screen was open and, of course, at six cubic feet, a good deal of air would be blown out through that double screen in the front part of the helmet. However, at other times the worker might direct the stream of sand in such a way that it might hit one of the castings and bounce back and strike the double screen in front of his helmet and actually some of the dust would enter the front part of the helmet. We tested this theory out and found that that was the case and I am going to show you the results of the second series of observations made when the double screen eye-shield was replaced by a suitable piece of glass.

(Slide No. 4) Here we have the double screen replaced by a glass eye-shield in the helmet with approximately six hundred sixty-five million particles of dust per cubic foot of air and where the air pumped into the helmet contained three hundred thousand particles of dust. Under these conditions a very orderly arrangement resulted between the amount of dust under the helmet and the amount of dust in the air supply (you will notice that the air supply was six cubic feet of air). It would seem from such observations that it would be reasonable to conclude that the amount of air that should be supplied to one of those positive-pressure helmets is approximately six cubic feet. Now that particular helmet was an ordinary heavy canvas-type without any fancy fittings of any kind and I think the explanation is simple enough—that when you supply approximately that much air, it can only come out through the bottom of the helmet—around the base where it fits to the man's neck and shoulders and there is very little opportunity for any dust to infiltrate in this manner.

(Slide No. 5) Our next endeavor was to see whether the amount of air in the sand blast room would have any influence on the amount of dust under the helmet. We maintained the air supply to the helmet constantly at six cubic feet and the air coming into the helmet contained three hundred thousand particles again and this time, by interfering with the ventilation in the sand blast room, we managed to increase the number of particles to nearly four billion particles of dust per cubic foot and under the helmet at that time we got about three million particles, in fact about 2,970,000—well below any reasonable standard—so it is certainly safe to say that with a helmet of this type, even with the amount of dust in the sand blast room far above anything that ordinarily would be found, the air under the helmet would be very low in actual dust count.

(Slide No. 6) This curve (on the chart) shows graphically the results of our experiments and shows that with the same small amount of air supplied to the helmet you get a normally high count—between forty and sixty million—and when you have six cubic feet of air supplied to the helmet the dust count is practically as low as you can reasonably hope to get it.

Finally, one more word about maintenance. As a result of our study we certainly have arrived at the opinion that most sand blasting equipment is rather poorly maintained for general practice. Most of the protective devices are very poorly maintained and certainly the adequacy of any of these protective devices and the adequacy of any of the equipment, particularly barrels and tables, which are important factors in the prevention of general atmospheric pollution should be given more attention than our view discloses has been given up to this time.

A word in closing. We have not had a meeting of the committee on sand blasting hazards for some time. We have not had a meeting since we have collected all this material and the next step in our plan is simply to draft a tentative report to the committee and to have all their changes noted and made and finally to get a report out with which everybody will be satisfied and contented and then, perhaps, present it to the Council for approval.

CHAIRMAN BENNETT: Dr. Greenburg, we thank you very much for this excellent, definite and clean-cut paper on this important subject relating to our industry.

We have a little time now for discussion.

MR. SHANNON (Fort Pitt Malleable Iron Co., Pittsburgh, Pa.): I would like to know the opinion of Dr. Greenburg on how long a man could work at sand blasting with an air-equipped helmet—how long could you safely keep a man on that class of work?

DR. GREENBURG: It is clear enough that if a man has a good piece of protective equipment which you know to be in good condition and he is supplied with sufficient amount of air, I think he could work indefinitely. The best thing to do would be to look him over every six months with X-ray pictures. With some means like that you can actually see whether he is in good health. With a good supply of air, he should be able to work indefinitely in my opinion. That is what the result of our study would indicate.

C. W. WAGNER (U. S. F. & G. Insurance Company): Dr. Greenburg, what do you think of the possibility of silicosis to the operators on sand blasting operations on buildings? They don't have any helmets.

DR. GREENBURG: I think they should be given helmets. I think they have a real exposure.

MR. WAGNER: But they would laugh at anyone who suggested that they wear a helmet.

DR. GREENBURG: I won't say exactly but I don't think there is any argument there.

CHAIRMAN BENNETT: Of course you understand that Dr. Greenburg is relating scientific facts from scientific findings and it is up to us to use them as diplomatically as we can to bring about the use of protective devices.

I should like to bring to your attention one of the important statements made by Dr. Greenburg at the close of his remarks on the up-keep of protective devices. It is similar to the up-keep of your first-aid devices. Perhaps your plant is completely equipped but in six months time you are not—or perhaps even in six days.

SEYMOUR W. DORAN (Pratt & Litchworth Co., Buffalo, New York): Dr. Greenburg, in taking those tests showing the relative values of the room against the barrel and the table type of sand blast, are those results of tests taken over a period of time or at one particular time? For instance, in the barrel type, were they taken while the barrel was being dumped, and isn't it a fact that most of the dust would be accumulated at that particular time?

DR. GREENBURG: Those tests were taken for all the time that the piece of equipment was in operation. I didn't explain the slide that goes to show this sampling apparatus and I judge that you got your ideas from the one picture. In general, we fasten the apparatus around the worker's neck and let him wear it while he filled the barrel and while he dumped it and during the entire time while the barrel was turning. In other words, we tried to approximate as closely as possible the actual exposure.

MR. DORAN: I don't believe it is customary for the barrel operator to wear any protection except a respirator.

DR. GREENBURG: It isn't customary to wear any protective equipment. That is what made the study so interesting from a preventive point of view. It shows that we have been thinking that these people have been well taken care of while, in many cases, they have not. I think the answer is simple enough. It means that the manufacturer of this equipment should look at these barrels in a more critical way and make them so dust tight that no dust can get out of them.

MR. DORAN: That is the point I wanted to bring out. Could we use air-tight equipment in barrel operations?

DR. GREENBURG: I think it can be developed.

DR. A. S. GRAY (State Dept. of Health, Conn.): I would like to say in connection with the study of maintenance that I have seen this study made in Connecticut and many splendid pieces of equipment were lending hazards to situations because they were not properly maintained. And these, too, had been used for heaven knew how long! Good helmets, because they were not in good repair, were subjecting individuals to definite hazards and so far as sand blasting was concerned, most of the barrel hazards that we found were due to the fact that the barrels were not properly maintained. Most of the ventilation lines were in bad condition and good equipment, just because it had not been kept in good condition, was adding hazards in many instances.

DR. J. P. LEAKE (United States Public Health Service): I should like to ask Dr. Greenburg if there is any hope of getting away from using silica for this purpose?

DR. GREENBURG: I think not completely. At least, not at the present time.

I was very much interested and gratified to meet one of the executives of a plant where I was temporarily engaged and he explained to me how they had been using steel grit instead of sand and I think that in the future probably a great deal more of the steel will be used and, from the point of view of safety, it is a very satisfactory solution of the problem.

MR. DORAN: Dr. Greenburg, in connection with that last question, I would like to say that, so far, we have not discovered anything that will make a mould like sand and I guess we can't get away from that entirely.

DR. GREENBURG: That is an interesting point. When we began this study we intended to go into the different castings like clean castings and dirty castings but, unfortunately, some of the other factors so far overshadowed the amount of sand on the castings that we didn't have any clear results along those lines. Now, in spite of that, I think that a dirty casting, that is a casting with a good deal of sand adhering to the casting, does pollute the atmosphere to some extent but I think the use of

steel shot or steel grit instead of sand is really a big step in the solution of the problem.

A. C. SCHULTZ (Bucyrus Erie Company, So. Milwaukee, Wis.): I would like to give you an outline of what we are doing to protect our sand blast men at our plant. We have about fifteen or twenty sand blast men and they are on the job and off the job for about two weeks. At the end of each two weeks, X-ray pictures are taken of them and before they go on the job they are examined and after they come off the job they are examined again.

CHAIRMAN BENNETT: Do you mean that your men are examined at the end of every two weeks?

Mr. SCHULTZ: Yes, every time they go off the sand blasting job.

I have also been wondering if there is any real good way of checking up on sand blasting?

Dr. GREENBURG: Well, certainly X-ray pictures are an excellent way of checking up on the conditions under which the men work. There is no question about the study of the amount of dust in the atmosphere and the use of good equipment being a good protective check. That is probably the best thing to do and also to use the best equipment you can get.

Mr. SCHULTZ: We do use the best equipment we can get.

Dr. GREENBURG: If you do that and then check up the workers by means of the pictures every four or six months you are playing pretty safe.

CHAIRMAN BENNETT: Dr. Winslow, would you care to make some comment on this paper?

Dr. C.-E. A. WINSLOW (Yale Medical School, New Haven, Conn.): I am enormously pleased to hear this paper. I have been, for some years now, the Vice President for Health of the Council and have had to bear some of the reactions from earlier studies and it is a particular pleasure to meet with this one. It is a pleasure to me to see that these investigations of sand blasting operations are not only sound and scientific but seem to yield results which will be highly satisfactory. It seems to point the way to controlling one of the most serious problems in industry. I think the Section and the Council and the other Sections concerned can be very proud of this investigation.

CHAIRMAN BENNETT: It has been the custom in the Metals Section to show pictures of some recent changes in mechanical equipment and safe practices in our industry. Mr. Oartel, who has always looked after this feature, has kindly consented to show us a film relating to the foundry industry.

Developments of Safety In Foundries

By JOHN A. OARTEL

Chief of Safety Bureau, Carnegie Steel Company, Pittsburgh, Pa.

(The following list of slides showing safety devices was produced by Mr. Oartel, with, in some cases, a brief description.—Ed.)

American Steel Foundries, Chicago, Illinois

1. Results of poorly designed and defective trunnions on early type of steel flasks. This shows an accident due to defective trunnions.
2. Poorly constructed and unsafe flask trunnions. This shows defects in the construction of the trunnions.
3. Carrying large grab bucket with improper kind of chain which did not have a hook.

The entire weight of load is dependent on the small gagger iron, which broke causing bucket to fall on workman. Proper chains were available but chainmen neglected to make change.

4. Unsafe practice of riding crane loads. Workmen should not in any case be permitted to ride crane loads.

5. Unguarded rail ends on cleaning floor. Photo shows a casting which had slipped or fallen off the skids due to the rail ends not being guarded.

6. Early type bucket—bail latch closed.

7. Result of bail latch failing to close. (Photos of 6 and 7 show an early type bucket with provision for locking bail, which did not always work, as is shown in photo No. 7.)

8. Sand mill with wooden guard over crown gear, the motor and belt unguarded. This guard was good as far as it went, although wooden guards should never be used except temporarily; in addition, the motor and belt should have been guarded.

9. Early attempts guard rail ends on cleaning floor. This guard is designed to prevent castings from being pushed from the end or falling.

10. Up to date sand mill with guards over crown gear. This shows a completely guarded modern sand mill in which all gears are covered.

11. Untidy and unsafe conditions in Machining Department. Untidy conditions anywhere will ultimately result in accidents.

12. Early conception of what constituted a properly guarded machine. This guard is not sufficiently high to properly protect men who may be working near the machine.

13. Congestion in cleaning department, unsafe trap door covering air valve and hose connection. In addition to the congestion which is bad for safety, the photo shows a hose pit cover in the foreground, which does not fit properly and might form a tripping hazard. In addition, it could easily be misplaced.

14. Untidy conditions in cleaning department showing unsafe method of handling a casting which resulted in an injury. A sling should have been used in moving the casting.

15. View of foundry in the days when the foremen generally excused such conditions by saying a clean foundry was a foundry without work. This has been proved to be untrue, as there are numerous foundries today where good order is maintained, the shop well lighted and production is not retarded in any way.

16. Castings loaded on cars in unsafe manner. A car loaded in this manner is very hazardous. Had the castings been piled regularly, it would not only have been less hazardous, but would have consumed less time in unloading. Stakes or side boards placed on the car would also tend to keep the castings from falling off. We remember an incident where casting was improperly placed on a narrow gauge car for transportation to the place where it was to be used. This occurred during the night, and in transportation the piece rolled off without the knowledge of the train crew. It fell close to the track, resulting in a severe accident to a member of another crew, whose trip came along shortly afterwards.

17. Yard drop and skull cracker conditions especially bad underfoot. Conditions such as these will undoubtedly result in many accidents not only to the men employed at the drop, but also to train crews whose work necessitates them going to the drop.

18. Dirty and dangerous conditions in foundry. The conditions pictured not only look bad, but form some very serious tripping hazards.

19. Unsafe conditions resulting from failure to maintain proper clearance between track and material pile. All material, no matter what it is, should be piled a safe distance from a railroad track to prevent accidents to train crews.

20. Sand box with drop bottom. (Note method of locking latch.) Had two latches been placed on box, one at each end, it would undoubtedly have prevented the sagging which is shown at one end.

21. A sand blast unit of long ago, which did not keep the dust in, so why keep it in repair? A sand blast unit should not only be well guarded, but should have an exhaust system for drawing out the dust.

22. Modern shot blast with workmen all outside. This unit is well protected in every way. It should not only eliminate accidents to workmen, but should also prevent dust from escaping into atmosphere.
23. Pouring platform in modern foundry, which shows an orderly, well arranged pouring platform where the work can be done efficiently and safely.
24. Close-up of pouring on safe platform. This shows workmen supplied with necessary safety devices and protective clothing.
25. Views of present day cleaning department (5 photos). These tidy, well kept cleaning departments should make the work safe and pleasant for the workmen.
26. Molding by a new method. This shows a modern device, which eliminates the sand pile and the shovelling necessary in the oldtime method.
27. Bulk material bins. With the use of bins with partitions more material can be stored and handled safely.
28. View of modern foundry floor. This shows a foundry floor with good order in piling and shop well lighted.
29. Modern shipping department. This shows the material stacked or piled in an orderly way with aisle space for workmen.

Carnegie Steel Company, Edgar Thomson Works Foundry Department

1. Early type goggle. While this goggle seems crude, consisting only of a wire mesh screen with no glass lens, it undoubtedly protected the workmen's eyes; however, it cut down the vision considerably. The present day goggle not only protects the workmen's eyes from molten metal and chips, but also gives adequate range to the vision.
2. Handling hot metal without goggles or leggings. Handling molten metal is dangerous at all times and the men should be fully protected with goggles and leggings.
3. Metal handled by narrow gauge car and crane. Men wearing goggles and leggings. This method eliminates handling by hand and the photo shows the men fully protected with goggles and leggings.
4. Old fashioned, difficult and dangerous method of transferring 700-lb. crucible of molten brass from one shop to another. This method required five men.
5. New method of transferring molten brass from one shop to another by Shephard hoist on jib crane which one man can balance. This is very much safer and more efficient than the old method of handling by hand.
6. Old fashioned method of transferring flasks from yard to shop. This was slow and laborious, and requires four men to do the job.
7. Baker crane for transferring flasks. This is quicker and safer in every way and eliminates handling by hand.
8. Bronze cooler for blast furnace which is difficult to roll on account of taper. Many accidents occurred while rolling it by hand.
9. Baker crane—coolers can be handled more easily, in less time and with no accidents.
10. Pouring babbit without any protection. Babbitt should never be poured without the use of goggles and in large jobs a mask should be worn.
11. Pouring babbit, equipped with helmet and leggings.
12. Casting shop—no goggles or leggings, which resulted in many burns to eyes, body and feet.
13. Up to date casting shop with goggles, leggings and all safety appliances.
14. Old chipping shop showing lack of clearance and working space. The small clearance between pusher and wall and pusher and molds made it extremely hazardous.
15. New chipping shop showing ample clearance and working space. Windows are equipped with steel shutters which makes the shop cool in summer and warm in winter.
16. Old chipping shop showing lack of clearance between car and wall. This

- was an extremely hazardous condition, should anyone try to walk between car and wall when train was in motion.
17. New chipping shop showing ample clearance between car and wall and car and molds.
 18. Chipping shop showing lack of clearance for pusher for removing core barrels from ingot molds.
 19. New chipping shop with ample clearance for pusher.
 20. Chain and hook for lifting molds. This hook was very heavy, which resulted in a lost time accident caused by man's hand being caught between heavy hook and mold.
 21. Spreader for lifting ingot molds which can be placed by crane man so that very little effort is needed to hook up.
 22. Old way of hooking up flasks which resulted in many injuries to hands and fingers.
 23. Up to date method of hooking up flasks. Crane man places spreader so that clevis can be fastened with very little effort.
 24. Unpaved and muddy roadway through foundry.
 25. Nicely paved road through foundry.
 26. Unpaved road through foundry.
 27. Nicely paved road through foundry.
 28. Subway entrance to Convenience Building. Man can change clothing and report in shop without crossing tracks or going outside the building.
 29. Old time method of cleaning up at end of turn. This consisted of a wooden or galvanized bucket, which was seldom or never cleaned and the only water available was cold at all times and especially so in cold weather.
 30. Up to date Convenience Building.
 31. Old time water boy.
 32. Modern drinking fountain, electrically refrigerated. This maintains the water at the proper temperature and tends to lessen heat cases.
 33. Warning sign at cupola building for hot slag blowing from cupola and for dropping bottom. The dropping of the cupola bottom is extremely hazardous and not only should warning signs be placed but signals should be given by word of mouth or whistles blown when the bottom is dropped.
 34. Bulletin board for displaying safety record. Green light shows no accidents, red light shows accidents. This method and similar ones keep every workman in touch with the progress of safety. It can be used either at the main entrance of the plant or in departments.
- CHAIRMAN BENNETT: It is not a law in Pennsylvania.
Mr. Oartel, we certainly appreciate the effort that you have made to get this film in shape for us each year.
Our next feature is the presentation of a film strip of the General Electric Company, describing a conveyORIZED foundry system, by Mr. G. E. Sanford.

ConveyORIZED Foundry System of the General Electric Company—(Motion Picture)

By G. E. SANFORD
General Electric Company, Schenectady, N. Y.
Cupola Charging

Raw materials such as pig iron, scrap, coke, etc., are stored in bins with slanting bottom which are about six feet above the ground. Charging bucket is placed on scale car which is operated by the charger who loads into it the proper amount of each material as determined by the foundry chemist. The filled bucket is then

spotted in line with a monorail crane which lifts the bucket and runs it into the cupola, at which point the bottom of the bucket is dropped. The crane control, instead of being in the crane as is customary, is on the ground, so that the entire charging is done by the same man who operates the scale car, although the picture which was taken a few years ago shows this as a 3-man operation.

Sand Mixing

The sand is mixed in a mixing room and is carried by belt conveyor to hoppers at the molding stations, a man on the foot-walk by this belt conveyor fills each hopper as required by use of moveable plow. Any surplus sand carried to the end of this belt returns by bucket conveyor to the main storage bin.

Molding Conveyor

The conveyor which handles the molds is of the endless type. Starting in with the molding stations, the empty flasks come from the shake out past the molders who remove them, make their molds on molding machines, taking such sand as they require from the overhead hoppers. Any spilled sand which falls past the mold goes through a grating onto a belt conveyor below returning to the mixing room. There is no shoveling of sand in this operation.

The molds are then placed on the conveyor and after leaving the molding zone, a man places weights on the molds, the conveyor then passing to the pouring room.

Pouring

Hand ladles are supported by an endless single rail, the pourers get their metal from the cupola, then step on a moving platform which is geared to the conveyor at the same rate of speed, so that while they are actually pouring they have the same relative effect as if they were standing still.

As a precaution against an accident in this location, if a man rides this floor section too far or within about three feet of the end, his foot strikes an electric contact lever which stops the entire conveyor. When running at full capacity, three men pour 600 molds per hour.

Cooling

The conveyor then passes through the outer wall of the building and through a sheet metal covered cooling zone. At one point in the cooling zone, a mechanical device removes the weights from the molds, putting them onto a gravity conveyor from which place they go to the man who places the weights on molds.

The molds continue to the shakeout where the flasks are dumped onto a power vibrating grating, sand falls down to a belt conveyor which returns it to the mixing room; a workman with a hook pulls the castings out onto a short conveyor which dumps them into boxes which are taken by lift trucks to the tumbling barrels. The empty flasks are placed bottom-side up on the conveyor and go again to the molding section.

This conveyor system has an adjustable speed, the speed of the conveyor depending on the thickness of the metal in the castings, which also determines the amount of time in which the molds must be in the cooling zone. This is an excellent arrangement for mass production of similar castings.

A number of places are shown in the film where it would appear that guards would be required, but as an explanation of this, would say that certain guards were intentionally removed for photographic purposes, in fact, in one place a portion of the building wall had to be removed. In actual practice the entire outfit is adequately guarded.

With reference to the accident situation at that plant, the frequency and severity for 1930 were both considerably lower than the average rates for gray iron foundries,

as issued last July by the Council; and I believe that this is partly due to the fact that the men are on specialized work where a molder does nothing but mold, the pourer does nothing but pour, etc., which is a decided contrast to the old method where a molder not only makes his molds but also pours and in most cases shakes out his castings.

The safety record also, I believe, is partly due to energetic safety work on the part of the plant personnel.

The motion picture which I have described here is available on safety stock, either 35mm or 16 mm, and can be loaned to Council members if any of them would like to show it in their plants. Requests should be addressed to me, personally.

ADJOURNMENT

**Thursday Afternoon Session
October 15, 1931**

**H. G. HENSEL, Chairman
The Youngstown Sheet and Tube Company, Chicago, Ill.**

The fourth session of the Metals Section convened with General Chairman Hensel presiding.

CHAIRMAN HENSEL: The very first thing on our program today is the awarding of the certificates to those who completed the six-months contest. We had 190 units entered in the Metals Section Contest in 1931. This is an increase over the previous year when we had 152 units entered, and over 1928 when we had 34 units entered. These gains show the growing popularity of contests. In 1931 our contest covered 186,171 employees who worked a total of 217,329,000 hours, or an average of 1.167 hours per person. In 1930, reports covered 173,000 employees who worked a total of 218,000,000 hours, or an average of 1,257 hours per person.

The following is the list of winners of Trophies and Certificates, those ranking No. 1 in each case being awarded Trophies, the others Certificates.

Steel Mills Group-A

1. Corrigan McKinney Steel Co., Cleveland, O. (2,589,672 man-hours worked—1 lost time accidents—frequency rate 1.545.)
2. The Youngstown Sheet & Tube Co., South Chicago Works, South Chicago, Ill. (600,699 man-hours worked—1 lost time accident—frequency rate 1.655.)
3. Continental Steel Corp., Kokomo Division, Kokomo, Ind. (1,672,191 man-hours worked—3 lost time accidents—frequency rate 1.794.)

Steel Mills Group-B

1. Driver Harris Co., Harrison, N. J. (464,300 man-hours worked—no lost time accidents.)
2. Standard Steel Works Co., Burnham, Penn. (36,783 man-hours worked—no lost time accidents.)
3. Laclede Steel Co., Alton Works, Alton, Ill. (541,368 man-hours worked—3 lost time accidents—frequency rate 5.542.)

Rolling, Finishing and Fabricating Group-A

1. Central Tube Co., Ambridge, Penna. (599,380 man-hours worked—1 lost time accident—frequency rate 1.668.)
2. Pittsburgh Steel Co., Pittsburgh Steel Products Co., Allenport, Pa. (829,284 man-hours worked—1 lost time accidents—frequency rate 4.823.)
3. Bethlehem Steel Co., Lebanon Plant, Lebanon, Pa. (1,633,756 man-hours worked—9 lost time accidents—frequency rate 5.509.)

Rolling, Finishing and Fabricating Group-B

1. Republic Steel Corp., Union Drawn Steel Co., Beaver Falls Plant No. 1, Beaver Falls, Pa. (351,218 man-hours worked—no lost time accidents.)
2. Pittsburgh Steel Co., Pittsburgh Steel Products Co., Monessen, Pa. (345,283 man-hours worked—no lost time accidents.)
3. Republic Steel Corp., Union Drawn Steel Co., Massillon, O. (178,580 man-hours worked—no lost time accidents.)
4. Republic Steel Corp., Steel & Tubes, Inc., Brooklyn, N. Y. (170,086 man-hours worked—no lost time accidents.)
5. Pittsburgh Steel Co., National Steel Fabric Co., Monessen, Pa. (168,321 man-hours worked—no lost time accidents.)

6. Republic Steel Corp., Union Drawn Steel Co., Gary, Ind. (119,821 man-hours worked—no lost time accidents.)
7. Republic Steel Corp., Union Drawn Steel Co., Hartford, Conn. (91,778 man-hours worked—no lost time accidents.)
8. Pullman Car & Manufacturing Co., Bessemer, Ala. (68,591 man-hours worked—no lost time accidents.)
9. Continental Steel Corp., Chapman-Price Steel Co., Indianapolis, Ind. (51,727 man-hours worked—no lost time accidents.)
10. Camel Co., Hammond, Ind. (35,413 man-hours worked—no lost time accidents.)

Iron Foundries Group-A

1. The Ohio Brass Co., Mansfield, O. (773,545 man-hours worked—no lost time accidents.)
2. Wilson Foundry & Machine Co., Pontiac, Mich. (1,285,676 man-hours worked—11 lost time accidents—frequency rate 8.556.)
3. American Radiator Co., Elmwood Avenue Group, Buffalo, N. Y. (619,325 man-hours worked—7 lost time accidents—frequency rate 11.303.)

Iron Foundries Group-B

1. National Radiator Corp., Johnstown Union Plant, Johnstown, Pa. (110,294 man-hours worked—no lost time accidents.)
2. Universal Foundry Co., Oshkosh, Wis. (73,873 man-hours worked—no lost time accidents.)
3. Continental Roll & Steel Foundry Co., Warwood Plant, Wheeling, W. Va. (54,866 man-hours worked—no lost time accidents.)
4. Chattanooga Implement & Manufacturing Co., Chattanooga, Tenn. (36,688 man-hours worked—no lost time accidents.)
5. Louisville Car Wheel & Railway Supply Co., Louisville, Ky. (26,880 man-hours worked—no lost time accidents.)

Steel Foundries Group-A & B

1. Kensington Steel Co., Chicago, Ill. (88,462 man-hours worked—no lost time accidents.)
2. The Industrial Steel Casting Co., Toledo, O. (71,003 man-hours worked—no lost time accidents.)
3. The American Rolling Mill Co., Central Works, Middletown, O. (113,382 man-hours worked—1 lost time accident—frequency rate 8.820.)

Heavy Machine Shops Group-A

1. General Electric Co., Philadelphia Works, Philadelphia, Penn. (3,077,666 man-hours worked—6 lost time accidents—frequency rate 1.950.)
2. Michle Printing Press & Manufacturing Co., Chicago, Ill. (687,425 man-hours worked—2 lost time accidents—frequency rate 2.909.)
3. General Electric Co., Erie Works, Erie, Pa. (5,044,500 man-hours worked—24 lost time accidents—frequency rate 4.758.)

Heavy Machine Shops Group-B

1. Whiting Corp., Harvey, Ill. (435,835 man-hours worked—no lost time accidents.)
2. Allis Chalmers Manufacturing Co., Thresher Works, LaPorte, Ind. (159,095 man-hours worked—no lost time accidents.)
3. Pauly Jail Building Co., St. Louis, Mo. (157,135 man-hours worked—no lost time accidents.)

4. Euclid Crane & Hoist Co., Euclid, O. (93,295 man-hours worked—no lost time accidents.)

CHAIRMAN HENSEL: The next subject on the program is "Your Hour." It was started some six or eight years ago and was so well liked that we had many requests to put it on again this year. I want to introduce our friend, Tom McKenney, of the Illinois Steel Company, So. Chicago, Illinois, who will have charge of this feature.

"Your Hour"

CHAIRMAN MCKENNEY: I have several questions which have been suggested by various members, and I will start right in with the first.

"What is the difference between the cause of an accident and the reason for an accident, and how would you ascertain the reason?"

J. A. VOSS (Republic Steel Corporation, Youngstown, Ohio): The reasons for an accident are the many far-reaching ramifications that lead up to the cause and the cause is the completion of the reasons. Stop the reasons and you won't have the cause.

CHAIRMAN MCKENNEY: Could you give us an illustration?

Mr. VOSS: A man was seriously injured as the result of a violation of a rule requiring the use of a safety lock when working on a piece of equipment. The reasons for that accident probably started years ago when that man was first hired and his foreman failed to properly instruct him.

H. W. DANK (Bethlehem Steel Corporation, Johnstown, Pa.): The reasons go beyond the mechanical conditions into the mental attitude of the workman or the man in charge.

JOHN P. LEE (Illinois Steel Co., Joliet, Ill.): This subject has been brought to our attention over and over again. What can be done to eliminate the reasons underlying the causes of an injury? In our case we have found that worry over sickness in the home can be greatly relieved by the employment by the plant of a visiting nurse.

Mr. DANK: We had a man who had been working in a boiler house for possibly fifteen or twenty years. One day he walked out of the boiler house onto the unloading track directly in front of a moving train of cars and was killed. He had a reputation of being very careful and considerate around his work. The committee simply passed it up as "unavoidable" until we investigated his domestic relations. They found that his wife was sick in bed, that a daughter had been in bed for about two years with tuberculosis, and a son about nineteen years old had broken into a trunk and stolen three hundred dollars—all the money they had in the world. Those three things were preying on this man's mind; he was in a half-dazed condition and walked to his death.

We feel that the foreman is the only one who can detect mental strain because he can watch the movements of his men when they come on the job. If there is anything unnatural or peculiar, the foreman is instructed to talk to that man immediately and find out if there is anything on his mind that would cause him to wander away from the straight and narrow path of safety.

G. H. McCLAIN (Jones and Laughlin Steel Corporation, Aliquippa, Pa.): I have come to the conclusion that a man doesn't have to worry to be thinking of something else. He can be just day-dreaming. We had a man in our blooming mill who stepped in front of a delivery truck and lost one leg. We tried a week or more to find out what he was thinking about. He didn't have a wife or family to worry him. He may have been thinking about the good time he was going to have tonight or the good time he had last night or the work he was going to do.

E. F. BLANK (Jones and Laughlin Steel Corporation, Pittsburgh, Pa.): In each of our plants we have a social service worker whose duty is to visit the homes

where there is trouble, domestic, financial or otherwise, and get it straightened out. It is up to the foreman, or any employee, to report such situations to the safety and welfare department of the plant. We can eliminate a good many of the reasons for the causes of our accidents by getting into these homes and straightening out matters to reduce worry among our workers.

CHAIRMAN MCKENNEY: Here's another good question.

"What is the best method of getting injured men back to work during this period of depression when they are inclined to malingering during a short-time operation?"

T. A. SCHENDEL (Caterpillar Tractor Co., Peoria, Ill.): But there is a way.

Metals Section - Dec 1931

QUESTIONS ANSWERED

Three questions emanating from the 20th Annual Safety Congress, viz., No. 1 - "Methods of Returning the Slightly Injured Man to Work"; 2nd, "The Advisability of Lighting Locomotive Foot-boards", and 3rd, "Detecting Mental and Physical Fatigue of the Workman," have brought in a number of responses.

Mr. C. M. Allen, Staff Supervisor, Safety and Training for the American Rolling Co., Middletown, Ohio, submits the following valuable information:

We use all oil-electric locomotives and both the front and rear foot-boards are lighted. This has proved very satisfactory, and we feel that they are justified both from the standpoint of safety and efficiency.

Question #3 -

Constant supervision and doing something about it at once is the only suggestion we can make on this subject."

side of constant supervision of the foreman?"

G. H. McCLAIN (Jones and Laughlin Steel Company, Aliquippa, Pa.): The foreman is expected to be acquainted with the characteristics and condition of health of his men. Every now and then we have a foreman say, "I have a good man up here who seems to be a little under the weather. He doesn't seem to be clicking just right. I would like to send him down and have the doctor check up on him. Let's see if there is something wrong or if he is just loafing."

This may lead to something very important. Very often we find some reason for fatigue and in most cases the foreman is able to detect it, either by observation or conversation with the man.

CHAIRMAN MCKENNEY: "Is the high frequency of industrial accidents due mostly to the everlasting demand for speed?"

4. Euclid Crane & Hoist Co., Euclid, O. (93,295 man-hours worked—no lost time accidents.)

CHAIRMAN MCKENNEY: The next subject on the program is "Your Hoop." It was requested by the committee that the subject be taken up by the representatives of the industry. The next subject on the program is "Your Hoop." It was requested by the committee that the subject be taken up by the representatives of the industry.

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-3-

"Under 'Seeking Knowledge' - Question #1

The Safety Director and company physician should work close together on every case whether a depression is on or not. Now some physicians are prone to forget just how long a man is off due to an injury and unless the safety director is on his toes it might take as long to get a man back to work with a cracked finger as one with a broken back.

I for one believe in keeping a close tab on the fellow who is off on account of injury, the same as the company physician.

Question #2 -

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CHAIRMAN MCKENNEY: Here's another good question.

"What is the best method of getting injured men back to work during this
period of depression when they are inclined to malingering during a short-time opera-
tion?"

T. A. SCHENDEL (Caterpillar Tractor Co., Peoria, Ill.): Put them in a car and
take them to the plant and show them the line in front of the employment office.

CHAIRMAN MCKENNEY: Does anyone else wish to say anything on that?

H. M. CROGHAN (Inland Steel Company): We had a case where a fellow re-
fused to go back to work after the doctor said that he was able. He was getting
more compensation than he would wages on the job. Our Chief Surgeon said that he
was able to go to work, and when the man still refused we filed application before the
Industrial Board. The man got a notice and he was glad to come back.

CHAIRMAN MCKENNEY: We will pass on to the next question.

"What experience has anyone had with placing electric lights to reflect on loco-
motive foot boards?"

MR. CROGHAN: We have all our locomotives equipped with electric lights to re-
flect on the foot boards. They are very successful and I would recommend the
practice.

CHAIRMAN MCKENNEY: Where do you place the light?

MR. CROGHAN: About three feet above the foot board.

CHAIRMAN MCKENNEY: How do you protect it?

MR. CROGHAN: By an iron casting reflector about the light.

CHAIRMAN MCKENNEY: We can pass on.

"What can we substitute for an air hose in cleaning castings without materially
affecting production? Seventy-five per cent of our accidents are caused by the use
of the air hose."

A MEMBER: If you are not using a sand blast in your cleaning, the use of stars
in your tumblers should eliminate the dirt that comes from castings. A "star" is
just a little cast iron washer put into the tumbler with your casting and takes the
dirt out of the crevices and the corners and eliminates the sand blast.

MR. SCHENDEL: Perhaps the man that asked that question was thinking of the cast-
ing after it reached the machine shop. A great many of our eye cases come from
blowing out drill holes with an air hose after reaming. We get away from the
hazard by putting a small disk just back of the nozzle of the air hose. Another
thing that helps is an extension of the tube to allow the hose to get down in the
casting and make the blow-out, with the worker standing some feet back. If that
doesn't work, protect the man with goggles.

CHAIRMAN MCKENNEY: Our next question has a psychological aspect.

"What means can be used to detect a worker's mental and physical fatigue out-
side of constant supervision of the foreman?"

G. H. McCLAIN (Jones and Laughlin Steel Corporation, Aliquippa, Pa.): The
foreman is expected to be acquainted with the characteristics and condition of
health of his men. Every now and then we have a foreman say, "I have a good
man up here who seems to be a little under the weather. He doesn't seem to be
clicking just right. I would like to send him down and have the doctor check up
on him. Let's see if there is something wrong or if he is just loafing."

This may lead to something very important. Very often we find some reason for
fatigue and in most cases the foreman is able to detect it, either by observation or
conversation with the man.

CHAIRMAN MCKENNEY: "Is the high frequency of industrial accidents due most-
ly to the everlasting demand for speed?"

J. F. HATTYMAN (Standard Steel Spring Co.): My charts show that we have a higher frequency rate when we are in full operation than when we are not.

C. C. RICHMENT (Western Electric Company, Cicero, Illinois): I don't think that the increase in industrial frequency is due to the increase in speed. It is the machines that do the work. Once a machine is set up it depends on the operator. It is his carelessness which determines whether he is going to get his fingers pinched and not the work of the machine.

E. F. BLANK (Jones and Laughlin Steel Corporation, Pittsburgh, Pa.): I don't agree with what has been said about the machines doing all the work. A good deal of the work is done by hand labor.

However, I think that most of us have this experience in regard to the speed of operation—at a certain per cent of capacity the accidents don't bother us very much but when we get almost to full capacity, then our accidents do increase. A plant's accident rate is probably normal at about 80 per cent of capacity; the rate increases with higher capacity and decreases with a lower rate of operations.

I have heard it said that some people have had more accidents during this depression and I think that some of this might be attributed to lack of nourishment and an increase in worry. We have had a few isolated cases of that kind. As a whole, our accidents have decreased very much since our production has been curtailed.

A. ANRAM (Hamlin & Company, New York City): Doesn't it seem reasonable to have higher frequency during periods when operating schedules are abnormal?

MR. MCCLAIN: Some of our best records were made in months when we made our top production records.

A. V. BERQUIST (Youngstown Sheet and Tube Company, E. Chicago, Indiana): I would like to ask Mr. Blank if he did not notice a marked increase in the frequency of accidents a few months after the peak production.

MR. BLANK: No, I can't say that that has been true. I do think, however, that cases mentioned by Mr. McClain are exceptions and not the rule. Generally, the frequency rate will follow the general rate of operation of the plant. The National Safety Council's figures will show that in 1,562 industrial plants recorded during that year there was only a slight decrease in the severity rate over 1928. The frequency rate was also just a little lower than it was in 1928, but it wasn't much lower as compared with the preceding year. But both rates were sharply lower in 1930 when operating schedules were much lower than in 1929 or 1928.

H. W. DARR (Bethlehem Steel Corp.): When the operations are low, the income is very much curtailed and efficiency men get busy. We had a locomotive crane with a little truck attached on which were being hauled some heavy castings; this has always been a three-man job—the operator and two men on the ground. The efficiency man decided that two men could do the job. The work involved swinging a 600-lb casting into a door eight feet from the floor. One man fastened the chain to the casting and then went inside the door. The crane operator swung the casting into the door where it kept swinging back and forth. The fellow on the inside had to pull it in. The crane man thought he was safe and dropped the casting but the fellow on the inside wasn't looking and received a smashed foot—he had safety shoes on at the time too.

The direct cause of that accident was an insufficient number of men to do a certain job. I invite you to investigate all the accidents you have when production is low. It is my opinion that the frequency rate is higher at such times because of a lack of sufficient men to do the job.

CHAIRMAN MCKENNEY: This next question is for open hearth men.

"What method is recognized as safest in open hearth practice for breaking test bars with reference to injuries—the use of goggles, temporarily, the use of test breakers, or what?"

MR. BERQUIST: The most general practice is to break them with a sledge. When

breaking with a sledge, we always have the men wear approved goggles with the hardened lens. We never use a test breaker.

E. F. HARRIS (Mesta Machine Company): They should use a box covered breaker with a hole in the top and a plunger through it to break these pieces. That will keep them from flying all over the floor.

H. J. PREBLE (LaCledde Steel Company): We use the same method and of course we use goggles and a sledge. The bars have a groove so that they break easily.

CHAIRMAN MCKENNEY: "What type of goggles have been found best for pouring molten metal?"

MR. BERQUIST: We use a cup goggle with a standard hardened lens.

W. F. GREEN (American Steel Foundries): We have the ordinary safety goggle and a special lens of olive green. It is very easy on the eyes.

CHAIRMAN MCKENNEY: That is the hardened lens?

MR. GREEN: I wouldn't say it was a hardened lens.

C. W. HANKO (Pittsburgh Steel Company, Monessen, Pa.): We have used the bifocal goggle to a better advantage than just the plain green glass or the olive green glass. We have been very successful with it.

D. E. SHANNON (Fort Pitt Malleable Iron Co., McKees Rocks, Pa.): I would like to know if anyone in the malleable iron game has used the full-vision goggle for pouring? That is the type of goggle aviators use.

T. A. SCHENDEL (Caterpillar Tractor Company, Peoria, Illinois): We tried out the so-called full-vision goggle in the gray iron division. We had several boys come in from other plants who wanted the aviator type of goggle but saw no advantage, and though we gave them the goggle, we have gone back to the cup type. We use a fiber frame rather than the metal because the metal draws the heat. With the metal frame men complain that the frames are burning their foreheads and ears.

MR. MEYERS (Ohio Brass Company): After trying out several types of goggles in the malleable division, we decided on the coverall type for pouring.

CHAIRMAN MCKENNEY: And now we have time for one more question.

"Why not have the National Safety Council provide speakers at meetings of the Iron and Steel Institute in order to reach all the executives in the steel industry?"

MR. HARRIS: I make a motion that this body refer it to the Executive Committee of the National Safety Council for consideration.

(The motion was seconded and voted that this question was to be submitted to the National Safety Council.)

MR. HANKO (Pittsburgh Steel Company, Monessen, Pa.): The idea of the motion is to let the captains of industry know our problems and understand what we are trying to do. We have some good ideas and thoughts which our superiors should know but don't know. If they can't come here, let us go to them.

(Mr. T. H. McKenney retired as chairman and General Chairman Hensel resumed the chair.)

CHAIRMAN HENSEL: The next subject on our program will be announced and explained to you by our new general chairman. We are all indebted to Mr. M. D. Conroy, now with the Granite City Steel Company of Granite City, Illinois, for the last three playlets that this section has put on. This year's play is called "Penny Wise". We owe Mr. Conroy a vote of thanks for what he has done for this section.

T. H. MCKENNEY (Illinois Steel Company, So. Chicago, Illinois): I move you that we give a rising vote of thanks to Mr. Conroy for the valuable contributions he has made in providing us with these plays.

(The motion was seconded and a rising vote of thanks was given to Mr. Conroy.)

E. G. QUENAL (General Steel Castings Corporation, Granite City, Illinois): Gentlemen, before our present chairman retires, we should show our appreciation for his efforts during the past year and also give him a rising vote of thanks.

(A rising vote of thanks was given to retiring chairman, H. G. Hensel.)

CHAIRMAN HENSEL: I want to thank everyone here for the very wonderful spirit

of cooperation that has been shown during the past year and for the privilege I have had of working with you. It certainly has been an inspiration and I don't think that anyone knows what cooperation means until he has filled the job as chairman of a section. There was not a member of the section or of the Executive Committee that I called upon who did not come across with his share and more too.

Your new General Chairman, Frank A. Lauerman, will now act as chairman during presentation of the playlet.

F. A. LAUERMAN (Safety Supervisor, Chicago District, Republic Steel Corp.): I assure you that it is a privilege and a pleasure to act as general chairman of this section during the coming year. I hope that each and every one of you will feel, as I do, the responsibility that we have in supporting the work of the section.

(The playlet entitled "PENNY WISE," written by M. D. Conroy, St. Louis, Missouri, for the Metals Section, was then produced with an excellent cast of characters. The playlet, which is in one act, has been mimeographed for distribution, and copies may be secured by writing the headquarters offices of the National Safety Council, Civic Opera Building, 20 North Wacker Drive, Chicago.)

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Mining Section

Officers 1930-31

General Chairman—R. N. HOSLER, Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.
Vice-Chairman in Charge of Membership (Metal Mining)—W. H. COMINS, National Lead Co., St. Francois, Mo.
Vice-Chairman in Charge of Membership (Coal Mining)—THOMAS E. LIGHTFOOT, Koppers Coal Co., Pittsburgh, Pa.
Vice-Chairman—A. H. MENDELSON, Copper Range Co., Painesdale, Mich.
Vice-Chairman—FRANK DUNBAR, Pickands, Mather & Co., Mather, Pa.
Secretary and News-Letter Editor—DANIEL HARRINGTON, U. S. Bureau of Mines, Washington, D. C.
Chairman Program Committee—H. T. BANNISTER, Madison Coal Corp., Glen Carbon, Ill.
Chairman Statistics Committee—W. W. ADAMS, U. S. Bureau of Mines, Washington, D. C.
Chairman Engineering Committee—JOHN L. BOARDMAN, Anaconda Copper Mining Co., Butte, Mont.
Chairman Entertainment—J. T. RYAN, Mine Safety Appliances Co., Pittsburgh, Pa.
Publicity Committee—
 A. W. ALLEN, "Engineering and Mining Journal," New York City.
 M. R. BUDD, "Explosives Engineer," Wilmington, Del.
 R. DAWSON HALL, "Coal Age," New York City.
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Executive Committee—THE OFFICERS AND
 H. C. HENRIZ, Phelps Dodge Corporation, Bisbee, Ariz.
 FRED H. NESBITT, Tri-State Zinc and Lead Ore Producers Assn., Miami, Okla.
 CLYDE A. McDOWELL, Pittsburgh Coal Co., Pittsburgh, Pa.

Tuesday Morning Session October 13, 1931

RUSH N. HOSLER, Chairman
 Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.

The first session of the Mining Section convened with General Chairman Rush N. Hosler, Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, presiding.

CHAIRMAN HOSLER: It is a pleasant duty to call the Mining sessions of the Twentieth Annual Safety Congress of the National Safety Council to order. The depression may have curtailed our attendance, but should not dampen our ardor toward accident prevention work. During times of serious depression, it is more necessary than ever to lower the cost of your product. In Richmond, Virginia, I presented a paper before the Mine Inspectors' Institute of America, outlining my idea of the direct and indirect cost of accidents in mining bituminous coal in Pennsylvania, and those studies revealed the startling fact that it is between one-eighth and one-seventh of your labor cost. Isn't that saving worth while?

It was also my privilege to present a paper before the Coal Mining Division of the American Institute of Mining and Metallurgical Engineers in Bluefield last Friday on the subject, "Are accidents more frequent in low volatile than in high volatile coals?"

My conclusion was that the volatile matter of coal has no relation to accident frequency in mining except that the fatality rate for catastrophes in high volatile coals is greater than in low volatile coals. The high volatile coals are more susceptible to dust explosions, which have been a factor in catastrophes for the past fifteen years.

In looking for explanations for accident severity rates and different causes of accidents, I am convinced that geological conditions, pitches of seams, height of seams, etc., have no influence. They are an operating problem and must be solved from that standpoint.

The first item of business on our program is "Reports of Committees." I am going to ask Mr. Harrington, our secretary, to read Mr. Adams' report of the Statistics Committee.

Report of the Statistics Committee

DANIEL HARRINGTON (Chief Engineer, Safety Division, U. S. Bureau of Mines, Washington, D. C.): I will first read Mr. Adams' letter to our general chairman, in which he expresses regret at his inability to be present.

Dear Mr. Hosler:

The work of the statistics committee of the mining section during the past year consisted entirely in the collection of reports of accidents at coal mines, metal mines, and nonmetallic mines, the compilation of the reports, and furnishing the statistics to the headquarters of the National Safety Council in Chicago. The figures were published by the Council in its publication entitled "Industrial Accident Statistics: 1931 edition," and may be found on pages 21, 22, and 27 of that report. Since then, more comprehensive figures have been prepared, covering a large number of mines, and these data are included in the paper entitled, "The National Safety Competition of 1930."

There are still some mining companies, members of the mining section, whose accident experience is not included in the figures compiled by your committee on statistics. Will you kindly extend a cordial invitation to such companies to participate in this work, if they can make it convenient to do so?

It has not been possible for me to go to Chicago for the meetings this year, but, I extend my sincere wishes for a most successful week.—(Signed W. W. Adams.)

Mr. Adams also sent with his letter a copy of U. S. Bureau of Mines Report of Investigations No. 3126, of which he is the author, and of which the following is a brief summary:

Each year the U. S. Bureau of Mines conducts a contest known as the National Safety Competition in which 337 coal and metal mines and quarries enrolled in 1930. The records of these organizations furnish the most reliable statistics on accident experience in the mining industry.

The average frequency rate for all types of mines during 1930 was 61.85 which

is an improvement over the rates of contests conducted during the five preceding years. The severity rate, 8.80, on the other hand, was lower than in the preceding three years but higher than for 1925 and 1926. The severity rate covers only normal injuries, omitting catastrophes. The improvement in the 1930 frequency rate was due to lower rates made in metal mines, quarries, and open-pit mines.

Quarries and open pit mines, with a frequency rate of 22.07 and a severity rate of 3.76 during 1930, have fewer hazards than any other division in the mining industry. Accidents are most numerous and severe in coal mining; the anthracite group had the high frequency rate of 109.34 and the bituminous group had the highest severity rate, 13.70.

Many mining operations established 1930 records which would be a credit to less hazardous industries. There were 84 out of 337 reporting mines and quarries that did not have a lost time injury during the year. An anthracite mine, which worked 817,000 man-hours, had a frequency rate of 40.39 and a severity rate of only 1.00. In the bituminous group, an organization working 256,000 man-hours achieved the exceptionally low rates of 3.90 for frequency and .14 for severity. The record of a metal mine working 318,000 man-hours without a lost time injury shows what can be accomplished in this branch of mining. While these records were among the best reported, many other companies made records which were almost equally good.

The contests conducted by the Bureau of Mines have aided many companies to improve their records during the last six years and the Bureau urges members to participate in them.

CHAIRMAN HOSLER: I am sure it will be worth your while to accept Mr. Adams' invitation to participate in his safety competitions. They stimulate your safety programs.

SECRETARY HARRINGTON: I appeal to the coal mining people, particularly, to fill out and return to Mr. Adams the blanks which he sends them each year for reporting non-fatal accidents. The Bureau of Mines is trying to assemble, for the first time, the non-fatal accident statistics in coal mines. The amount of effort entailed in filling out of these blanks will be repaid several fold to the mining companies. Send them in promptly! The metal mining people have done this very cheerfully for years.

CHAIRMAN HOSLER: Mr. Boardman is chairman of the Engineering Committee. To my knowledge he has submitted no written report.

SECRETARY HARRINGTON: Mr. Boardman has assembled some information on the use of storage battery locomotives in coal and metal mines and has submitted it to the National Safety Council to use in the formulation of a safe practices pamphlet.

CHAIRMAN HOSLER: The next committee is the Publicity Committee. Mr. Dawson Hall is requested to make a short report.

R. DAWSON HALL (Coal Age, New York City): Most of the papers have given some publicity to this meeting, which I hope is adequate. Owing to the space limitations, it is impossible for them, especially monthlies, to give the publicity they would like. Publishers are certainly in sympathy with everything that can be done to advance the cause of safety in the coal industry.

CHAIRMAN HOSLER: Mr. Forbes, the chairman of the Posters and Slides Committee, will make a report at this time.

Report of The Poster and Slides Committee

By J. J. FORBES
Chairman

There is very little for your chairman to add to his report for this year, other than what was contained in his report on the poster situation for last year.

During the present year, your chairman conferred with Stanley Kershaw, Director, Poster Division, on two occasions. One of these conferences was held in my office, Bureau of Mines, Pittsburgh, Pa., and the other in Mr. Kershaw's office, National

Safety Council, Chicago. At both of these conferences a careful analysis was made of the available pictures for making up into posters.

I want to report again that there is a distinct shortage of good metal mining pictures for poster use, but there is a number of good coal mining pictures still available.

I do not believe that the membership of the Mining Section has taken sufficient interest in assisting your chairman by sending in good pictures that could be used for making up into posters, and I want to again ask your cooperation in securing for me good pictures depicting metal and coal mine safety work for possible use in preparing posters. You can send these pictures either to Mr. Stanley Kershaw, National Safety Council, Civic Opera Building, Chicago, Illinois, or to me in care of the U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa.

During a recent conference with Mr. Kershaw, he showed me the circulation of the various posters that have been prepared for coal and metal mines, and I was amazed to find out that some of these posters which I considered conveyed a very distinct lesson in safety had a very poor circulation. I refer particularly to poster No. 2899, which emphasizes the importance of testing for gas in "gobbed" areas. This poster, in addition to emphasizing that examinations should be made high up on the "gob," also gives the percentage of gas for the various heights of methane caps. You will be interested to know that the circulation of this poster was only 100.

This brings up the question as to what kind of posters coal and metal mines desire. There is a number of posters available at this meeting for inspection, and I would like to have the candid reaction of the Mining Section as to posters which are most desirable for bulletin board use.

CHAIRMAN HOSLER: Mr. Lightfoot, our vice-chairman in charge of membership, coal mining, will make his report.

THOMAS E. LIGHTFOOT (Koppers Coal Co., Pittsburgh): It is a sad duty to report that there are more "outs" than "ins" in the membership figures for the past year in coal mining. We had only three new members and fifteen withdrew.

If a man can't come to this meeting and get some inspiration and new ideas and go back determined to make a better accident record, it is not the fault of the meeting but the man. What we need in these meetings is more operating men. We don't need so many safety men. Last year at Pittsburgh we had a large attendance of operating men from presidents down to mine foremen, assistant mine foremen, and the Pittsburgh meeting was unusually fine.

Would it not be possible to have some individual memberships to enable mining company officials and foremen to attend these meetings? I believe membership of that kind for five or ten dollars would go a long way toward stimulating interest and advancing the work of the Mining Section.

SECRETARY HARRINGTON: I would like to let that matter stand in abeyance for the time being, and let everybody think it over. It is a vital question.

CHAIRMAN HOSLER: The next committee report is the Nominating Committee. Mr. Henrie, our immediate past chairman, is chairman of the Nominating Committee and he submits the following report:

Report of the Nominating Committee

Your Nominating Committee, consisting of H. C. Henrie, chairman, J. T. Ryan and Theodore Marvin, begs to submit herewith its final recommendations on the nomination of sectional officers and committeemen to serve on the Mining Section National Safety Council, during the coming year:

General Chairman—W. H. Comins, National Lead Co., St. Francois, Mo.
Vice-Chairman in Charge of Membership (Coal Mining)—Thomas E. Lightfoot, Koppers Coal Co., Pittsburgh, Pa.

Vice-Chairman—P. M. Arthur, American Zinc Co., Mascott, Tenn.
Vice-Chairman—J. W. Alt, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.

Vice-Chairman in Charge of Membership (Metal Mining)—Frank B. Dunbar, Pickands, Mather & Co., Mather, Pa.

Secretary and News Letter Editor—Daniel Harrington, U. S. Bureau of Mines, Washington, D. C.

Statistics Committee Chairman—W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

Entertainment Committee Chairman—J. T. Ryan, Mine Safety Appliance Co., Pittsburgh, Pa.

Publicity Committee—M. R. Budd, Explosives Engineer, Wilmington, Del.; R. Dawson Hall, Coal Age, New York City.

Poster and Slide Committee Chairman—J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa.

Engineering Committee Chairman—W. T. Metzger, Hudson Coal Co., Scranton, Pa.

Executive Committee Officers and—H. C. Henrie, Phelps-Dodge Corp., Bisbee, Ariz.; R. N. Hosler, Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.; George Martinson, Pickands, Mather & Co., Hibbing, Minn.; C. A. McDowell, Pittsburgh Coal Co., Pittsburgh, Pa.; D. D. Moffatt, Utah Copper Co., Salt Lake City, Utah; B. F. Tilsen, Construction Engineer, North Caldwell, N. J.; Howard I. Young, American Zinc, Lead and Smelting Co., East St. Louis, Ill.

Respectfully submitted,

H. C. HENRIE,

Chairman, Nominating Committee.

SECRETARY HARRINGTON: I move the acceptance of the report.
(The motion was seconded and carried.)

CHAIRMAN HOSLER: The next report is that of our Secretary, Mr. Harrington.

Report of The Secretary

By D. HARRINGTON

U. S. Bureau of Mines, Washington, D. C.

The secretary's report must necessarily be but a skeleton in a two-fold description of the activities of the Mining Section for the year and in the giving of a brief resumé of safety conditions in the mining industry.

As usual there was much correspondence by the secretary in connection with mine safety in general, in connection with the mid-winter meeting of the Executive Committee of the Mining Section held in Chicago, in helping to arrange the details of the program of the mining section for the annual congress and in the various features which arose from time to time in getting out the 12 monthly news-letters. Several hundred letters have been written; and at least half a dozen visits made by the secretary to National Safety Council headquarters at Chicago.

The mining section meetings in Pittsburgh on September 30, and October 1 and 2, 1930, were unquestionably the best in the history of the section in so far as concerns attendance, and one of the most encouraging features was the large number as well as the considerable percentage of operating officials who were present and who participated actively. There was a total registration of 303 which compares very favorably with the 106 registered in 1929; among the 303 were 27 presidents, vice presidents or general managers of mining companies, 16 general superintendents, 25 mine superintendents, and 36 mine foremen. There were also in attendance 13 state mine inspectors; and 24 states as well as Alaska, District of Columbia, Canada, and Mexico contributed to the attendance.

The papers were of an unusually high order and nearly all of the authors were present; at least five of the papers were later on reproduced in the mining technical journals.

The 12 monthly news-letters totaled 71 mimeographed pages for the year, or an average of about six mimeographed pages per letter. An attempt was made to issue articles of interest to coal mining, as well as to metal mining, and to a certain extent quarrying, petroleum, and the cement industry as all of these are readily included in a broad interpretation of the term "mining." A hasty resumé of the 12 letters issued during the year indicates that out of about 135 items or articles in the 12 letters, 35 were wholly on coal mining, 27 wholly on metal mining, 36 were on data of interest to both coal and metal mine safety as well as a few items on safety in the cement, quarry and petroleum industries and 37 items conveyed data in connection with the publications or other business of the National Safety Council. While very few expressions of opinion, written or verbal, as to the good or poor quality of the letters are received, many of the items have been taken into plant publications and into the printed press, even (in a few instances) in foreign countries, and in many cases the origin of the item is not given. Some of the items have caused criticism and there is no question that some of them have caused action to be taken looking toward greater safety. If the present editor is continued in his position for the forthcoming year, suggestions are more than welcome even if they are of a critical nature provided they are constructive in the giving of hints looking to the improvement of the letters. In this it may be well to call attention to the fact that when members of our membership committee approach "prospects," they state that they are frequently met with the remark that the National Safety Council gives mining practically nothing so why throw away good money on membership; some of us think the statement unfair, even untrue, but the fact remains that this type of statement is made and if any suggestions occur as to remedying our deficiencies they will be decidedly welcome, as the Mining Section certainly should be built.

The year which has elapsed since the last meeting of the Mining Section in Pittsburgh on September 30, and October 1 and 2, 1930, is unquestionably the most fruitful in mine safety performance in the history of mining in the United States. The exact figures are not yet available in metal mining for the country as a whole in 1931, but in so far as fatalities are concerned coal mining in the first 8 months of 1931 has broken all safety records as there were but 960 fatalities as against 1322 in the first 8 months of 1930; if the fatality rate for the first 8 months continues through the remainder of the year there will be but 1440 fatalities for the year 1931 as against 2014 for 1930, and there were fewer coal mine fatalities in 1930 than in any other year in the present century except 1921 and 1922, when the coal mine fatalities were 1995 and 1984, respectively. The coal mine fatalities show a decrease of 27.4 per cent in the first 8 months of 1931 as against the similar period of 1930, the tonnage decrease being about 16.3 per cent. There is good reason to believe that there will be at least 400 (possibly 500) fewer fatalities in the coal mines of the United States in 1931 than in any other calendar year of the present century. For the first 8 months of 1931, 3 states, Michigan, North Dakota and Texas, as well as Alaska, have been able to avoid fatal accidents in their coal mines, and every other coal producing state except Indiana has reduced the number of coal mine fatalities as compared with the first 8 months of the previous year. Alabama, Kentucky, bituminous Pennsylvania, Utah, Virginia, and Washington, have had notable safety records this year in the avoidance of fatalities in coal mining.

One of the most encouraging features in coal mine safety is the long period of avoidance of major explosion disasters in bituminous and lignitic mines; there hasn't been a major explosion (one in which 5 or more are killed) from January 28, 1931, to the date of writing, October 7, 1931, or nearly 8½ months, this being by all odds the longest period of immunity from major explosions in the bituminous coal mines of the United States in over 30 years. Pennsylvania's bituminous mines, with over 130,000 employed and production nearly 150,000,000 tons per year, haven't had a major disaster since March 21, 1929, or more than 2½ years, a remarkably fine

record and one which should cause the coal mining men of most of the other coal producing states to do some intense thinking.

The latest nation-wide figures on metal mining accidents are those issued by the Bureau of Mines for the year 1930, in a press release of September 30, 1931. It is shown that from a point of view of fatality rate the year, 1930, was the best—with the exception of 1928—in the history of metal mining in the United States in so far as reliable statistics are available; the fatality rate per thousand 300 day workers in 1930 was 2.92, while that of 1928 was 2.50. The non-fatal injury rate in 1930 was 167.86 per thousand 300 day workers or decidedly the best non-fatal injury rate in the past 20 years which undoubtedly means in the history of metal mining in the United States. Of the metal mining states with large production and number employed the best fatality rate in 1930 was held by Arizona with rate 2.06—then Minnesota with 2.41—Utah next with 2.87, while among the large producing states California has the dubious honor of having the heaviest fatality rate of 5.84, then Idaho with 4.93, and Montana with 3.80. In non-fatal accident rate among the larger producing states Minnesota has the best rate or 60.59, then Alabama 65.37, then Michigan 139.39.

There has been made available during the past year such a wealth of remarkable safety records of nearly all kinds by individual mines, mining companies, counties or states in both coal and metal mining that it is now definitely demonstrated that all kinds of mining can be done with at least as much safety as almost any other major industry. Several companies, some in coal, some in metal mining, as well as in the cement, petroleum and quarry industries, are finding that by the application of intensive well-directed effort for a period of a few years, accidents can be reduced 75 to 90 or more per cent; and almost invariably in these cases it is found that production costs are lowered and general operating efficiency and output per man or per unit of operation are increased. The trend toward ascertaining the cost of accidents per unit of production has gone forward by leaps and bounds during the past year and the resultant showing, that in many if not most cases accidents have been causing 10 or more per cent of the cost of the mined product, has given an impetus to accident prevention which will unquestionably have a far-reaching and long-standing effect in the reduction of accidents in mining.

Among the numerous influences or causes which are aiding in the promotion of safety in mining at this time a few will be mentioned.

1. The business depression with resultant large numbers of men available for work has caused those who are employed to be willing to follow instructions much more readily and more closely than in boom times; in other words discipline is more effective.
2. Mining operators are beginning to realize that safety pays; and in finding that 10 or more per cent of cost of production is due to accidents, the cutting of 25, 50 or more per cent of accident cost may change a red balance to one with a dark hue.
3. The publication of the very excellent safety records of such organizations as The Phelps Dodge Corporation, the Miami Copper Company, The Cleveland Cliffs Iron Company, the Pickands Mather Company, The M. A. Hanna Iron Mining Co., The Montreal Mining Company, The American Zinc Company, The Utah Copper Company, The Tennessee Copper Company, and others in metal mining, and the Mather Collieries Company in Pennsylvania, The Consolidation Coal Company in West Virginia, Kentucky, and Maryland, the Youngstown Sheet and Tube Company in Pennsylvania and West Virginia, The Norfolk & Western Company's Fuel Department in West Virginia, The American Rolling Mill Company in West Virginia, The DeBardeleben Coal Corporation in Alabama, The Ford Collieries Company in Pennsylvania, and numerous other coal mining organizations, has shown that mining can be done safely and the only inference that now can be made is that there is something radically wrong with any mining organization which has a poor safety record.

4. One of the very best safety accomplishments which the year has brought forth is that of the Cleveland Cliffs Iron Company which came to hand just as this report was being written. This company within the past 27 months has had seven mines which have succeeded in operating a year or more without the occurrence of a single lost-time accident. In its October Bulletin the Company announces that all of its operating mines and plants worked the entire month of September without a lost-time accident, total man days of labor being approximately 38,000. As of October 1, the underground mines of this company had continuous days without a lost-time accident as follows: Gardner Mackinaw 499 (this mine had a previous no lost-time record of 545 days); Spies Virgil 247; Morris Lloyd 246; Cliffs B. Shaft 127; Negaunee 99; Cliff A. Shaft 84; Athens 58; Maas 37. Its Open Pit Mines had the following number of continuous days without a lost-time accident: Tilden 655; Holman Cliffs 630; Hill Trumbull 393; Canisteo Cliffs 196.

Certainly this company is showing that mining accidents can be held to a very few and mines with considerable numbers of workers can be operated for long periods without occurrence not only of fatalities but of practically any kind of accidents.

5. The J. A. Holmes Safety Association by giving its approximately 40 awards annually to the mining and allied industries for meritorious safety records, methods, etc., and giving publicity to the details of these performances is calling attention to the good work of those who receive the awards, and this causes others to try to emulate the praiseworthy efforts and results of their neighbors. In numerous instances this has brought about much improvement in accident occurrence not only in single mines but in several mines of a company.

6. The publication of articles on safety in mining and giving facts with the calling of a spade a spade by outstanding men of the industry which has been done to a remarkable extent during the past year has had a decidedly helpful effect. The excellent articles on mine safety which have appeared with authorship by such men as C. W. Conner of the American Rolling Mill Company of West Virginia; Milton H. Fies of The DeBardeleben Coal Corporation of Alabama; P. G. Beckett of The Phelps Dodge Corporation, Arizona; Frank Dunbar of Mather Collieries Company of Pennsylvania; W. D. Brennan of The Utah Fuel Company of Utah; Thomas G. Fear of The Consolidation Coal Company of West Virginia; W. V. DeCamp of The United Verde Copper Company of Arizona;—the published statements of these men whose operations are both safe and efficient, and similar efforts of many others prominent in both coal and metal mining all have forced safety to the attention of the only too numerous school of old timers who are still inclined to look upon mining as inherently unsafe and to regard safety as a fad or as something impossible of realization in mine work though possibly applicable to railroading, construction, or other industrial activities.

7. Numerous organizations of mining men are now doing good work in accident prevention and getting results; among the most effective are the Mining Section of the National Safety Council of the Lake Superior Region, the Iron ore mines of which are probably leading the metal mines of the United States in safety achievement; the Alabama Mining Institute which through its cooperative efforts with the Alabama coal operators, the Holmes Safety Chapters, the state inspection service and the U. S. Bureau of Mines is rapidly bringing Alabama's coal mines to the very front of the coal mining states of the union in safety results; the Tri-State Zinc and Lead Ore Producers Association has performed wonders in forwarding the health and safety of the workers of the Tri-State region; The Southern Appalachian Coal Operators Association has been doing yeoman work in safety and its efforts are now being rewarded by the relative freedom of accidents in the mines; the Rocky Mountain Coal Mining Institute has for years paid much attention to safety and while its efforts have been largely frustrated probably in part at least because of the unusual hazards in that region, on the other hand Colorado has been able almost to

eliminate major explosions which some years ago were very prevalent, and New Mexico in recently released nation-wide figures ranks sixth in the states of the Union in non-fatal accident rate in its coal mines; The Colorado Metal Mining Association in Colorado and the California Metal Producers Association and other bodies in California have undertaken a safety campaign in Colorado and in California metal mines and the results should in time reduce the excessive accident rates in both fatal and non-fatal accidents which now obtain in the metal mines of those two states and are causing compensation payments to pinch the operators very severely.

8. One of the important developments of the year in the furthering of safety in bituminous coal mining was the entrance of the National Coal Association through its Safety Committee into a campaign against accident occurrence in the bituminous mines of the United States. With the appointment of Milton H. Fies of Alabama as the chairman of the Safety Committee of the Association, the committee began to function actively and its plan of campaign is modelled somewhat after that of the Portland Cement Association which has produced what might be termed superlative results in the reduction of accidents in that industry. As a partial result of the year's efforts of the safety program of the National Coal Association there have been established four actively functioning safety institutes in Virginia, West Virginia, and Kentucky, and several others are in process of formation in those states as well as in Ohio and Pennsylvania. In addition largely as a result of this movement, numerous coal mining organizations already in existence entered upon safety work with considerable vigor. This movement of the National Coal Association has in it possibilities of much importance to the forwarding of safety in coal mining.

9. The U. S. Bureau of Mines has unquestionably aided considerably in the forwarding of safety in the mining and allied industries. In the fiscal year ending June 30, 1931, 110,000 employees of the mining and allied industries were given a full course of first-aid to the injured, the total so trained during the past five years aggregating nearly 400,000; there is no question now that first-aid training of the Bureau of Mines is good accident prevention work as well as aiding in the direct saving of at least 200 lives annually; the Bureau of Mines' new accident prevention course in bituminous coal mining for mine officials was launched during the year and between 1,000 and 2,000 mine officials took the full course which requires several weeks for a presentation; there were circulated approximately 400,000 copies of the 100 or more different safety publications issued during the year and in most instances these publications were sent direct to those likely to read and use them; considerable numbers of chapters of the Holmes Safety Association were organized and kept in working order during the year and in connection with them the mimeographed Holmes Notes giving about 20 pages of safety data were issued monthly; in addition the Bureau's safety personnel cooperated in many ways with numerous organizations such as the National Safety Council, National Coal Association, Lake Superior Section of the National Safety Council, Coal Mining Institute of America, Mine Inspectors Institute, and dozens of other organizations. The Bureau of Mines is also performing a number of excellent services to the mining industry in activities on accident statistics; nation-wide accident data are assembled and published on fatal and non-fatal accidents and the results as given to the public are correlated with the ironing out of most of the kinks due to local differences in the methods of keeping of records. Probably the outstanding statistical feature of the year is the taking of nation-wide data by the Bureau of Mines on non-fatal accidents in coal mining, this being the first year that this has been done; and the assembling of the nation-wide data on non-fatal coal mine accidents reveals many surprising features as indicated in a press release by the Bureau of Mines on July 18, 1931. In addition to its other activities the Bureau handles practically all of the work of the Sentinels of Safety Competition and of the Sand and Gravel Safety Competition; these competitions while including only a small percentage of the mining industry have a helpful effect in the forwarding of safety effort in mining.

10. The above are but a few of the helpful influences which have aided to bring about the rather bright outlook in safety in mining. And there is no question that the Mining Section of the National Safety Council as well as the Council as a whole has contributed materially to the bringing about of the present very gratifying upward trend of safety activity and of safety accomplishment in mining. It is now "up to us" in the Mining Section to do what we can to expand the activities of the section in every feasible manner to try to "do our bit" in continuing the good safety work now under way. If as many of us expect and all of us hope, we are soon to have more prosperous business conditions, there will then be much additional effort needed if we even hope to prevent the mining accident rate from again going up and probably going up fast; hence the burden of maintaining the present fine status or of trying to improve it, means work and much of it.

CHAIRMAN HOSLER: We are exceptionally fortunate to open our program this morning with a subject that can be so ably presented by Dr. Sayers, chief surgeon, U. S. Bureau of Mines.

Relation of Illness to Safety in Mining

By R. R. SAYERS

Chief Surgeon, or Chief, Health and Safety Branch, U. S. Bureau of Mines; Surgeon, U. S. Public Health Service, Washington, D. C.

It is estimated that approximately 99,000 people were killed by accidents in the United States during 1930. The increase—less than 800—over 1929 is not as large as in most other recent years and is less than anticipated from the increasing population. Records of nonfatal accidents are fragmentary and incomplete, but the National Safety Council (in "Accident Facts," 1931 edition) concludes from all available records that there are annually at least 10,000,000 nonfatal accidents severe enough to prevent the victim from going about his usual occupation for one or more days. Data on cost of accidents are also incomplete, but the cost is at least \$3,000,000,000 every year.

Published by permission of the Director, U. S. Bureau of Mines. (Not subject to copyright.) Of the 1930 accidents, 33,000 were due to motor vehicles, 30,000 occurred in the home, 20,000 were public accidents not due to motor vehicles, and 19,000 were so-called industrial accidents.

Although there were fewer deaths from accidents classified under the mining and under the construction industries than under some of the others, as manufacturing and agriculture, yet among those having high accident frequency and severity rates, mining and construction had rates nearly three times the general average. In a list of accident rates by industries, compiled by the National Safety Council ("Accident Facts," 1931 ed.) from reports of member establishments, mining was second on the list in frequency (49.34 per 1,000,000 man-hours worked) and was first on the list in severity rates (8.94 days lost per 1,000 man-hours worked). The industries showing figures most comparable to mining for 1930 are wood-working and lumbering with a frequency rate of 40.53 and a severity rate of 3.31, construction with a frequency rate of 51.57 and a severity rate of 5.49, and marine with a frequency rate of 36.61, and a severity rate of 3.50.

Causes of Accidents

H. W. Heinrich, in his book on "Industrial Accident Prevention," calls attention to the inaccurate reference to the cause of an injury as the cause of the accident. A person is injured by a fall, the fall is the accident, but what we need to know, in order to prevent falls, is what caused the fall. Perhaps instead of calling the fall the "cause" of the accident it would be better to call it the "occasion." The cause of an accident is what actually produces it or brings it about; the occasion is what, directly

or indirectly, provides an opportunity for the casual agencies to act or serves to set them in motion. When a person is injured falling down stairs, the fall is the direct cause of the injury but not of the accident itself, which may be due to the physiological condition of the victim who may have defective eyesight or may be subject to epilepsy, or may be suffering from some other disability that causes him to fall when the occasion presents itself.

In a tabulation of the four most important occasions of death in the United States in 1929 by months ("Accident Facts," 1931 ed.) automobiles came first in each of the 12 months, with falls second in each month except July, when drowning took second place and falls third. In an analysis of 11,000 (*National Safety News*, Jan., 1930, p. 50) fatal and nonfatal cases, it was found that more than twice as many accidents were due to non-mechanical agents as were chargeable to machinery in operation, the former total being more than 7,700 as against less than 3,200. These figures emphasize graphically the importance of the human factor in the situation. Far-sighted manufacturers have installed guards on moving belts and machinery, and have safeguarded other points of hazard, because accident prevention is good business practice from every standpoint; yet it is evident that employees continue to suffer injuries, many of which are fatal, because they do not exercise sufficient care in performing such ordinary actions as walking and carrying.

Due to the improvement in safeguarding and the use of safety devices, accidents have very largely been reduced where these protective measures have been employed. Accidents attributable to the human equation and caused by carelessness, indifference, and thoughtlessness are increasing and constitute the biggest problem in accident prevention today. (*Safety Engineering*, Oct., 1927, p. 113.)

It is not possible to say how many accidents are due to the individual and how many are due to conditions over which he has no control, but the fact that more than half the accidents in mines are due to operations in which personal responsibility has more opportunity to function and that investigations in industry in general show that about 90 per cent of the accidents are avoidable would indicate the part played by the individual in accident causation. According to statistics compiled by the Division of Safety and Hygiene of the Industrial Commission of Ohio, the five principal occasions of accidents, in which the human element is largely predominant, persistently maintain their relative standing year after year. (*Safety Engineering*, June, 1929, p. 257.)

Value of Health Supervision in Industry from the Standpoint of Accident Prevention

The consensus of opinion that seems to point toward the individual as the most important factor in accident causation leads to the conclusion that we must seek the type of information that can be found only through the critical examination of the human machine in order to reveal its deficiencies, either of structure or of function. This principle is applied to every complex device used in industry but is neglected with regard to the infinitely more complex device that guides the machinery. The operator who would not think of introducing untested machines into his mines or factories and who takes all reasonable precautions to see that his tools and appliances are properly constructed and adapted to the purpose for which they are to be used, will not hesitate to employ a large number of workers of whose physical capacity and health he has no conception, some of whom may be suffering with diseases that may endanger the safety and health of all the others and be a source of economic loss through lowered efficiency and increased compensation risk. For instance, a person suffering from epilepsy is not a proper one to carry a box full of dynamite, yet few employers inquire whether the men entrusted with such an important task are subject to this disease.

The two most important factors regarding the health of the individual in connection

tion with his industrial life are (1) his physical condition when he enters employment and (2) the conditions of his working environment that may affect him afterward.

Physical Condition of Employees as Revealed by Physical Examination

A study of the results now available of physical examination in industry indicates that perhaps many of the accidents, attributed to the carelessness, indifference, or mental deficiency of the employee, may be due to poor health or to undiscovered or unrealized physical defects.

The physical deficiencies of the men of the United States became glaringly apparent not only through the large number rejected entirely after examination for the draft during the war but through the fact that even those found eligible for service could not be used in battle until they had been physically trained. The rejection rate in the first draft in the United States for active military service of men between the ages 21 and 31 was 33 per cent. In Great Britain the rejection rate for ages 18 to 24 was 64 per cent; only 26 per cent was accepted in Grade 1 as eligible for full active military service. Pre-war reports on the examinations for the United States Navy (E. L. Fisk, "Health Building and Life Extension") while less representative of the general population are of interest in showing the types of physical deficiencies that are found among men having sufficient confidence in themselves to apply for enlistment:

Number of men examined	82,592
Number of men rejected for all causes	51,167
Causes of rejection	Per cent
Defective eyes	11.4
Underweight	6.5
Flat foot	6.08
Defective teeth	5.9
Deformities	4.3
Varicose or varicose veins	3.8
Heart affections	2.8
Height, under	2.6
Poor physique	2.0
Ear	1.7
Genito-urinary-venereal	1.6
Hernia or tendency to	1.6
Skin disease	1.3
Height and weight, under	1.1
Tuberculosis or suspects	1.1
Pyorrhea	1.08
Tonsillar conditions	.72
Genito-urinary-nonvenereal	.66
Nasal abnormalities	.57
Febrile conditions	.46
Mental disorders	.36
Goiter or tendency to	.35
Defective speech	.15
Miscellaneous causes	3.41
Total number rejected	62.00

A summary of the final report of the draft examination shows that among the total number examined, both accepted and rejected, there were found 468 men per 1,000 with defects worthy of record. However, physical examination of employees either for employment or periodically for improvement of health conditions made

prior to the war indicate that the draft records underestimate the true conditions. (E. L. Fisk, "Health Building and Life Extension.")

Connection between physical condition and accident occurrence.—What is the connection between poor health and physical defects and accidents? The Hood Rubber Co., (Dr. C. O. Sappington, *National Safety News*, Oct., 1928, p. 96) in a study of absenteeism, found that the accident rate for women rated as third class by physical examination was nine times greater than for those rated as first class. Among the men, those rated as third class showed nearly double the accident rate of those rated as second class. These findings were obtained in spite of the precautionary measure of special placement of third class persons in occupations involving low accident risk.

The relation of certain physical defects to accidents is apparent to any one, such as loss of an eye, an arm, a leg, or fingers. But physical and mental defects exist in every degree from the perfectly normal to a total loss of a member or of the function thereof. For instance, in the case of the eye, we may have a total loss of the eye, or of its function of vision, or of any degree between that and the normal, and the same is true with every other member of the body. Many employment men hesitate about hiring the man with one eye, but as they can not see the inside of the heart, they hire a crooked man who is a menace to himself and every man working under every hat he makes. They turn down the man with two or more fingers off and hire the man with active tuberculosis, and fail to take precautions to prevent the spread of the disease. They will hire the man with two good appearing eyes, who may not be able to see the largest letters on the test chart. According to Dr. C. F. N. Schram ("Industrial Manhood as a Purchasable Commodity") there are many more men applying for work in the average industry whose eyes appear all right and yet who are almost blind in one eye than there are whose eye defects are noticeable.

The most widespread physical defect, and therefore probably the one involved in the largest number of accidents, is defective vision. Studies in Pennsylvania have shown that more than half of the total accident claims arise from injuries to the eye. (W. H. Kinsy, *National Safety News*, July, 1929, p. 23). There is no method for determining the percentage of accidents happening to other parts of the body that might have been avoided had the employees' eyesight been raised to the point of highest efficiency. The fraction of a second necessary for the normal, healthy eye to comprehend the circumstances of danger may be all that is needed to avoid a blow. In such an emergency, however, seriously defective vision is almost entirely helpless.

The statement has been made (R. S. Simpson, *Safety Engineering*, June, 1923, p. 220) that about 70 per cent of our muscular activities are initiated in response to impulses induced by our sense of sight. This fact, coupled with the average defective-vision conditions, may in large measure explain many accidents which, for want of a definite understanding of their causes, are at present ascribed to carelessness or heedlessness.

Various statements are made as to the number of persons in industry who have defective vision. One writer states that 30 per cent of the persons who finish school and engage in business enterprises have defective vision, and that the lighting conditions in many of the establishments that they enter are even worse than those found in our schools. Therefore we should not be surprised to learn that investigation shows the percentage of workers having defective vision to be greater than the percentage of school children similarly handicapped. In some plants where thorough examinations were made it was found that 9 out of every 10 workers had defects of vision and that only a small number were correcting these defects with glasses. In other plants between 60 and 80 per cent of the total number employed had defective vision. It would appear on this basis that between 25,000,000 and 30,000,000 workers in this country have subnormal vision.

In 1924, according to the report (*Safety Engineering*, Jan., 1924, p. 44) of the Ford management to the Eyesight Conservation Council of America, 29,000 of 60,000 Ford employees examined had defective vision. The Ford report stated that although

this number was very high, the percentage of defective vision would have been still higher if more complete eye examinations had been made, which was not considered necessary except in special cases.

In some mines, in which the employees have been given a physical examination, the percentage of eye defects seems to be lower than in other industries. In an examination of the eyes of 800 employees of three mines of the St. Louis Smelting and Refining Works and the National Lead Co., only about 20 per cent of the men had defective vision. In an examination by the United States Bureau of Mines of 1,098 miners, 21.4 per cent were found to have defective vision in one or both eyes. Twenty of 81 applicants who presented themselves for examination for certificates as hoisting engineers in Utah had defective vision.

In addition to defective vision, the many other defects found among industrial employees are potential causes of accidents, not only to the individual suffering from them but to other employees as well.

There is not a great deal of material available showing the connection between the physical condition and accidents that the individual may experience. However, in a study of accidents among motormen and bus operators, (C. S. Slocum and W. V. Bingham, *The Personnel Journal*, Dec., 1927, 251-257) a canvass of the company's record showed that accidents did not distribute themselves impartially among the men who operated the cars. Half the accidents happened to less than a third of the operators. In one group of 300 men of ample experience and maturity in the service, half of the accidents happened to only one-fifth of the motormen. Also high accident men were found to have a poorer general service record than low accident men. More of them tended to offend and to offend more often. All men over 50 years of age are given an annual medical examination by this company. Among the items measured and recorded are blood pressure systolic and diastolic. The men over 50 years of age with abnormal blood pressure had on the average more than twice as many accidents as did men of comparable age and experience and with normal blood pressure. An interrelationship between these three factors—abnormality of blood pressure, number of delinquencies, and accidents—would suggest that in some measure the physiological condition probably accounts for both the number of delinquencies and the number of accidents.

Later the age for examination was reduced to 40 years and it was found that pathological conditions are one-third to one-half as common in the younger group as in the older.

Purpose and Extent of Health Supervision

With a realization of the impaired physical condition of such a large proportion of industrial workers, the importance and economic value of health supervision in industry becomes increasingly apparent.

The work of a plant physician should reach all departments and all activities of the organization. The physician who confines his activities to the plant dispensary is found to be of limited value to the industry with which he is associated. It is only as his influence reaches into the operating departments that the fullest measure of his service is realized. Co-existent with his curative and preventive activities should be a desire to see that men are placed at work for which they are physically qualified. The only method of attaining this end is through the physical examination of workers and applicants for employment, to determine not only their physical condition but their mental attitude as well. Such examination should disclose in each case whether the worker is fit for the job for which he applies or is occupying or whether he should be given a different type of work because of some physical defect or weakness, or rejected if no suitable work is then available. More and more the effort is being made to find work for all.

Physical examinations are frequently made of workers to be transferred to more

hazardous or exacting jobs. This often will prevent a future accident or breakdown in health. (National Industrial Conference Board, Special Report No. 22.) The following is a good example of death that might have been avoided had such a type of health supervision been in force. (David S. Beyer, *Safety Engineering*, Feb., 1924, p. 101.) A man 67 years old, apparently hale and hearty and who boasted that he had not seen a doctor in 40 years, was employed in carrying barrels and bags of leather material weighing up to 100 pounds each and placing them on shelves and storage piles from 3 to 6 feet high. He had been handling bags and barrels in this plant for several years when one day after placing a barrel on the sorting table he complained of sudden pain in his stomach. He died the next evening from an internal hemorrhage. The autopsy showed chronic ulcers of the stomach which had ruptured and was attributed to the strain from lifting a heavy barrel.

In many cases a worker with physical defects or suffering from some diseased condition, often unknown to himself, is a cause of accidents to others as well as to himself. Borsley reported a death and a serious accident in a steel mill from an overhead crane, both the result of defective vision in the operator of the crane. This man was given a thorough examination and his vision was found so defective that he had no idea of perspective. Another man with serious heart disease was allowed to operate a dummy engine in a mine. His heart failure and sudden death resulted in injury to several employees who were in the cage being hoisted by this engine.

As indicated by the above examples, physical examination is the keystone of industrial health work and serves as a background and stimulus for preventive medical work in industry.

The extent to which prospective employees should be subjected to physical examination depends in large part on the type of industry in which they are engaged. There are special types of occupation for which a more searching examination with respect to specific details is necessary, such as those in which particular importance is attached to eyesight, hearing, or possible previous beginnings of industrial disease, as among certain metal and chemical workers; also those in which the acme of physical perfection and endurance is required, such as engine drivers. However, all applicant examinations should be so carried out that the elements in the physical field covered would enable the examiner to detect: (National Industrial Conference Board, Special Report No. 22.)

1. Active pulmonary tuberculosis.
2. Cardiac disease with potential or established decompensation.
3. Active or chronic venereal disease.
4. Acute contagious disease.
5. Chronic progressive disabling disease, such as Bright's and diabetes.
6. Potential and active focal infection.
7. Defective vision and hearing of a degree incompatible with the requirements of a given industry.

The chief objects of physical examination are:

1. To place the worker in the occupation that suits him best.
2. To detect the presence of remediable physical defects in order to enable the worker to correct them.
3. To determine the presence or absence of serious organic disease, either of which may have an important bearing on employment selection.
4. To prevent occupational disease, by excluding susceptible workers from specific hazards.
5. To prevent the spread of communicable disease, by the exclusion of infected persons.

Value to the employer of physical examination of workers—The placing of all comers on jobs without any effort at a physical selection for their work is responsible for a great financial waste that can not be determined but has been estimated (H. E.

Mock, *Journal of Industrial Hygiene*) at more than \$500,000,000. Some of the sources of this waste are:

1. Labor turnover due to the employment of the unfit who later must be discharged because of inability to do the work or who are forced to stop work due to advancing disease. These latter have been a source of loss during the entire period of employment on account of the gradual decrease in their efficiency.
2. Increased industrial liability to accidents from those who, because of their physical condition, are subject to frequent accidents.
3. Absenteeism due to illness and lost-time accidents.
4. Liability to long disability compensation of those who suffer accidents that ordinarily would not be serious but, because of coincidental physical conditions, cause prolonged disability or death.
5. Loss of services of those who are healthy, through contraction of contagious diseases. The acute contagious diseases are more common, but tuberculosis and syphilis also cause great loss.

Based on incomplete data, the Department of Labor estimates the total annual number of disabling work accidents under normal industrial conditions as approximately 2,453,500. Of these, 21,230 result in death, 1,730 in permanent total disability, 105,620 in permanent partial disability, 540,350 in temporary disability of from two to four weeks, and 433,000 in temporary disability over four weeks. The injured workmen and their dependents are reimbursed in accident compensation approximately \$200,000,000 each year. This compensation is paid by the employer or replacement of these workers, which has been estimated to be \$35 for each individual. (E. L. Fisk, "Health Building and Life Extension.") There is still another possible cost to the employer for which no estimates are available and that is the breakage or spoilage of machines and material that may occur as a result of accidents in which workers are injured or killed, or through impaired health and efficiency of the workers.

The employer should not make physical examinations with the sole idea of weeding out the unfit. It should be kept in mind that men must work and it is the duty of the plant physician to place men to the best of their abilities. He should remember that if a man is, for physical reason, a danger to himself, to his fellow man, he should be adjudged unfit for the position. A sincere attempt should be made to place all persons.

Value of physical examination to the employee—From an economic standpoint the worker is the one who pays the greater part of the enormous cost of industrial injuries. According to the Secretary of Labor, the total annual cost of wage loss resulting from these industrial accidents amounts to at least \$1,000,000,000. The injured workmen and their dependents are reimbursed in accident compensation approximately \$200,000,000 per year. Thus it will be seen that in spite of the compensation laws the workers must still bear four-fifths of the economic burden resulting from industrial injuries.

If, as has been estimated, 90 per cent of the accidents are due to the individual workers and probably 90 per cent of these workers have physical impairment or defects ranging from moderate impairment—requiring some form of hygienic guidance or minor medical, dental, or surgical treatment—to serious physical impairment or defect—urgently demanding immediate attention—and that probably 75 per cent of these impairments or defects could be cured or benefited by treatment, it is of the greatest advantage to the individual that he find out his physical assets and liabilities. In addition to the economic loss in wages due to accidents, mentioned above, the worker must count the hours of physical suffering and the inconvenience to himself and his family, as well as the possibility of permanent, partial, or total disability with a loss in his earning power. Probably in many cases the years of mental distress outweigh the years of pain and suffering incident to the immediate accident. It is

impossible to evaluate the actual cost to an injured person of reduced earning power and inability to advance in position. But for the resulting handicap he might have been advanced far up the ladder of supervising responsibility had not accident and disability cut short his prospective career. The whole theory of physical examination from an industrial standpoint is to fit a man to his job, to put him to work at a job which he is physically able to do. Physical examination is the one sure way to determine, in the best interests of the workman himself and of his family, how his earning capacity can be maintained and the period of his useful life lengthened. (*Safety Engineering*, January, 1929, p. 26.)

In accordance with findings of physical examination prospective employees may be classed as follows:

1. Those physically fit for any work.
2. Those physically underdeveloped, or with some slight anatomical defect; otherwise fit for any work.
3. Those fit only for certain employment when approved and supervised by the medical department.
4. Those unfit for any employment.

The reports (A. L. Murray, Report of Investigations 2117, Bureau of Mines) of one large corporation employing thousands of men show that 7 per cent of those applying for work were physically unfit but that by simple operations and other corrective measures 75 per cent of those rejected on original examination were sufficiently restored to normal to warrant their employment, thus the total net rejections amounted to less than 2 per cent of all those applying.

Industrial Environment as a Factor in Accident Causation

Abnormal conditions of the air and bad illumination are two of the health hazards in the mining industry that may affect the worker in such a manner as to predispose to accidents.

Abnormal Air Conditions as Factors in Accident Causation

Abnormal conditions of the air may be due either to physical or chemical changes. The physical changes are abnormal temperature, humidity, and air movement, and the presence of dusts. Chemical changes may be due to variations in the normal constituents, as lowered oxygen or increased carbon dioxide; or to the addition of abnormal constituents, as carbon monoxide (white damp), hydrogen sulphide (stink damp), sulphur dioxide, methane (marsh gas, fire damp), hydrogen, and nitrogen.

Temperature, humidity, and air movement as causes of accidents—According to Hope, accidents in factories show a seasonal fluctuation similar to that shown in percentage of output, as they are more frequent in summer and under bad conditions of ventilation than in winter and under good conditions of ventilation. An exception occurs, however, in very cold weather if the temperature falls too low, more accidents occurring from slipping of tools, etc., if the hands become too cold. Hope mentioned that in a fuse factory the accidents were at a minimum at temperatures between 60 and 69 degrees F. Above these temperatures there was a slight and progressive increase with rise of temperature, but with lower temperatures there was a well-marked increase, so that, in the case of women, there were two and a half times as many accidents when the external temperature was at or below freezing than when it was 47 degrees F. or over, and the accidents among the men were twice as numerous. This result is largely due to the numbing effect of cold on the hands, especially when cold metal tools have to be held in them; but there is also a numbing effect on the brain.

From data collected in two munitions factories and a projectile factory on industrial accidents in relation to temperature, Vernon observed that in both men and women the minimum accident frequency was at 65 to 69 degrees. At lower temperatures it gradually increased to a similar extent in men and women, till at 50 to 54 degrees it was

35 per cent greater than at 65 to 69 degrees. At temperatures below 49 degrees the frequency fell off slightly. This decrease may have been due to the fact that the workers were too cold to keep up their usual rate of production. In such a case they would expose themselves to less risk of accident. At temperatures above 65 to 69 degrees the accident frequency showed only a slight rise for the women, but for the men it increased rapidly; and at temperatures above 75 degrees it was 39 per cent greater than at 65 to 69 degrees. Probably this difference was due to the fact that the work of the men was often of a heavier character than that of the women, and the greater the exertion required, the more trying must be the effect of exposure to high temperatures.

Further light is thrown on this subject by Vernon and Bedford, as to the relation of atmospheric conditions to accidents incurred in certain collieries. The results show that as the temperature of the seam rose (or the kata cooling powers fell), the accident frequencies of the colliers and trammers, who work at or near the coal face, tended to increase, while the accident frequencies of the haulage men and other employees, who work in the airways where the temperatures are lower, remained practically constant throughout.

These preliminary conclusions have recently been confirmed through another investigation by Vernon and Bedford relating to the causes of absenteeism in a group of collieries employing 23,000 miners. In this inquiry, it was again shown that accident frequency was closely associated with temperature, the men, when working at temperatures under 70 degrees incurring per 100,000 shifts, 5.2 accidents of minor severity, causing less than 10 days' disablement, 13.0 accidents of moderate severity, and 20.9 accidents severe enough to disable for 20 or more days. When working at temperatures of 70 to 79 degrees, however, the men incurred more than twice as many minor accidents as before, and when working at a temperature of 80 degrees or more they incurred four times as many. The frequency of the severe accidents apparently was not affected by temperature, due to the fact that the accidents incurred are put on record only if the men stay away from work for four days or more and then claim compensation. A man incurring a minor accident is more inclined to go back to work before the four days are up, and therefore gets no compensation, if he has been working under cool and comparatively pleasant conditions. If, however, he has been working in a hot and unpleasant pit he is more likely to be fatigued and to have less pleasant recollections of his work, consequently he is apt to stay away and to go on to compensation. If, however, he receives a severe accident he goes on compensation whether he was working under pleasant or under unpleasant conditions.

One of the most striking results of the installation of a cooling plant in the Morro Velho mine was the fall in the accident rate. In the 16 months (August, 1919, to November, 1920, inclusive) previous to the starting up of the plant there occurred 20 deaths through underground accidents and four cases of disablement, the total liability for compensation involved in connection with these accidents being 80,675 milreis. In the following 16 months (December, 1920, to March, 1922, inclusive) there were six fatal accidents underground and four cases of disablement, the amount of compensation involved being 35,820 milreis (one milreis is about 50 cents).

Sometimes accidental deaths may be the indirect result of the faintness caused by the effect of the heat on the circulation. As an example, Raymond mentions the case of a man who fell down an upcast shaft, probably because he was overcome by the heat while putting in timbers.

While the direct action on the body of increased temperatures and humidity may in itself predispose the individual to accidents, there are other points to be considered. One of these is the fact that a moderate increase of temperature—within physiological limits—will augment the action of gases. In a study of the effects of exposure to low concentrations of carbon monoxide, it was found that high temperature and humidity, with a given concentration of carbon monoxide, caused more rapid combination of the gas with hemoglobin than did normal conditions of temperature and

humidity. This is of importance under conditions in which carbon monoxide and other toxic gases may be encountered.

According to the annual report of the Secretary of Mines of South Africa, the mine on the Witwatersrand having the highest death rate from accidents during 1925 was the Village Deep, with an accident rate of 4.35 per 1,000. The report states that the high temperature in this mine is no doubt having an indirect effect in causing accidents. A special investigation was made owing to four cases of sudden death that occurred between September 29, 1925, and January 1, 1926, in this mine. Since August 20, 1926, managers have been required to report cases of heat apoplexy just as they do serious accidents.

Since some of the physiological effects of high temperatures and humidities are dizziness, physical weakness or exhaustion, and inability to think quickly or accurately, it is evident that a person suffering from the effects of exposure to such conditions might show an increased tendency to experience accidents. Probably the physiological effect of abnormally high temperatures most likely to predispose the subject to accidents is that on the circulatory system, shown especially by the increase in pulse rate. After bringing out a car 1,200 feet in the 1,800 level of the Julia mine of the Comstock lode, Nevada, in an air temperature of 108 to 110 degrees F., a carman had a pulse rate of 140 per minute, which fell to 64 after a rest at the station. In the case of a visitor, the pulse rose from 60, his normal rate, to 120 after walking through the drift. Though no arbitrary rate at which certain symptoms occur has been determined, the consensus of opinion indicates that very uncomfortable sensations are felt after the pulse rate exceeds 135 per minute, and that the atmospheric condition becomes almost unbearable when the rate exceeds 160 per minute.

Mine dusts as factors in accident causation—The physiological effect of dusts as a factor in accidents probably is mostly indirect, through a general lowering of the physical efficiency. During the World War, however, British miners were found to be so susceptible to carbon monoxide poisoning that an order was issued prohibiting them from working in any place where the presence of gas was suspected. A considerable percentage of the miners from Australia and South Africa, especially the older men who had worked in the gold mines, suffered from silicosis. This rendered them more susceptible to carbon monoxide and they suffered more severely from the effects and took longer to recover. This increased susceptibility would, of course, render a man more liable to accidents from gases encountered in gassy mines or in case of mine fires necessitating exposure to smoke.

Chemical changes in the normal constituents of the air as factors in accident causation—In studies made by the psychological laboratory of Mellon Institute of Industrial Research it was observed that ordinary fatigue and the conditions of narcosis from drugs and from oxygen depletion depend alike upon asphyxiation of the muscle cells. An attempt was made to determine what degree of delayed response and impaired efficiency, as indicated by the physiological and mental signs, may be taken as an objective index of fatigue. Throughout all tests the powers of concentration, steadiness, persistence, substitution, calculation, memory, and the ability to sustain continuous reaction ran such close parallels with increasing symptoms of asphyxiation that, according to Mr. Johnson, head of the laboratory, no distinction existed between so-called "nervous" fatigue and physical exhaustion. Almost the entire range of disturbances observed related to factors in the physical environment, that is to say, to oxygen supply, air conditions, and comfort. A man gets drunk on too low an oxygen intake, asphyxiated by the combustion products within his muscle cells. According to Mr. Johnson, three conditions counterfeit this picture of alcoholic poisoning: (1) A diminished oxygen supply due to great dilution of the air by means of other gases, or in rarefied air of high altitudes, or in inclosed spaces polluted by carbon monoxide; (2) a lowered rate of cell respiration caused by alcohol or other drug; and (3) induced fatigue, when cells burn faster than the toxic products of incomplete combustion can be washed away by the blood stream. The above physiological

reactions, especially delayed response and decreased powers of concentration, would predispose a person affected thereby toward accidents.

Bad illumination is a two-edged sword. It causes accidents directly by obscuring hazardous conditions and indirectly by affecting the vision of the workers. According to the First Report of the Departmental Committee on Lighting in Factories (Empire Mining and Metallurgical Congress, London, 1924) increased prevalence of accidents, damage to eyesight and health, and diminished output are the result of unsatisfactory lighting conditions. A large industrial insurance company (Dr. C. O. Sappington, *National Safety News*, October, 1928, p. 96) has estimated that 18 to 25 per cent of industrial accidents are due to inadequate or improper illumination. The causes of accidents traceable to poor lighting may be due to

1. Insufficient lighting in dark corners.
2. Improper lighting effects:
 - a. Glare or blinding sources.
 - b. Shadow production in dangerous places.
 - c. Too great contrast as light on working place compared with other places.

Another statement (R. E. Simpson, *Safety Engineering*, August, 1924, p. 77) is that faulty lighting and poor eyesight are the major factors in one out of every eight accidents.

Conditions of illumination, of course, are much poorer in the mines than on the surface. Jewell points out that, although the human eye is capable of receiving light impressions of extraordinary range, from the light of the midsummer sun, estimated at 40,000 foot-candles, to a flicker of a match on a dark night a hundred yards away, still it must be adapted to the light present, and the process of "dark adaptation" by which the miner "gets his eyesight" after descending into the mine, and of "light adaptation," the reverse change on his return to the surface, are of great importance in the consideration of underground lighting conditions. Rapid changes from light to darkness or from darkness to light are unpleasant. Physiological considerations point to the necessity for adequate and uniform illumination, avoidance of glare, and a gradual process of dark adaptation. Illumination in mines may be deficient due to the low candle power of the lamp used, the limited area illuminated by the lamp, and the lack of contrast. In England this poor illumination in the coal mines is generally considered as the cause of the eye disease called nystagmus. The eye strain resulting from poor light is not only harmful to the eyes but possibly also to the general health of workers, and thus indirectly may predispose the individual to accidents.

Summary

1. It is estimated that 99,000 persons were killed and 10,000,000 injured by accidents in the United States in 1930. Of this number about 23,000 were industrial accidents. Mining headed the list in severity of accidents.
2. It is estimated that the cost of all accidents in the United States is at least \$3,000,000,000 every year.
3. In total amount of time lost, severity of nonfatal injuries, and total cost, falls are the most serious industrial accidents.
4. Due to improvement in safeguarding and use of safety devices accidents have been very largely reduced where these safety measures have been employed, but accidents due to the human equation are increasing and constitute the biggest problem in accident prevention to-day.
5. The fact that more than half of the accidents in mines are due to operations in which personal responsibility has more opportunity to function and that investigations in industry in general show that about 90 per cent of the accidents are avoidable indicates the necessity of concentrating on the individual in accident-prevention work.
6. The first step in accident prevention, therefore, would seem to be a complete

physical examination of the worker to determine his ability to perform the work for which he is employed.

7. Physical examination of men for the army during the war and also examinations of workers in the industries indicate that from 75 to 90 per cent of the workers have some defect or impairment of health and that probably in 50 per cent these defects or impairments are of enough importance to reduce efficiency and increase liability to accidents.

8. One of the most important and widespread impairments found among industrial workers is defective vision. In some plants 9 out of every 10 employees were found to have defective vision; in other plants, 60 to 80 per cent were found to be similarly handicapped. In a study made by the Bureau of Mines of 1,098 miners, 21.4 per cent were found to have defective vision in one or both eyes.

9. Employees should be given a physical examination before employment and at intervals thereafter. The extent and thoroughness of the examination and the frequency of reexamination should depend upon the type of occupation and the degree of health hazard involved.

10. The value to the employer of physical examination is indicated by the fact that the financial waste due to placing all corners on jobs without any effort at physical selection for their work has been estimated at more than \$500,000,000.

11. From a monetary standpoint the value of physical examination to the employee is still greater than to the employer. According to the Secretary of Labor, the total annual wage loss resulting from industrial accidents amounts to at least \$1,000,000,000. The injured workmen and their dependents are reimbursed in accident compensation approximately \$200,000,000 each year. Thus it will be seen that in spite of the compensation laws the workers must still bear four-fifths of the economic burden resulting from industrial injuries.

12. It has been stated that 90 per cent of the defects and health impairments are either curable or can be greatly benefitted by medical treatment; therefore physical examination to determine what these are is the first step toward their correction. Physical examination from an industrial standpoint also is to fit a man to his job.

13. The reports of one large corporation employing thousands of men show that 7 per cent of those applying for work were rejected on examination, but that by simple operations and other corrective measures 75 per cent of those rejected were sufficiently restored to normal to warrant their employment. The total net rejections amounted to less than 2 per cent of those applying.

14. Abnormal conditions of the air and bad illumination are factors in the environment influencing accidents through their effect on the individual and his health and comfort.

15. Some of these conditions are physical changes in the air, such as abnormal temperatures, humidities, and air movement, and the presence of dusts; and chemical changes, such as lowered oxygen or increased carbon dioxide content of the air, or the addition of abnormal constituents such as carbon monoxide, hydrogen sulphide, sulphur dioxide, methane, hydrogen, and nitrogen. From data collected on industrial accidents in relation to temperature it was observed that in both men and women the minimum accident frequency was at 65 to 69 degrees F. At lower temperatures it gradually increased to a similar extent in men and women, till at 50 to 54 degrees it was 35 per cent greater than at 65 to 69 degrees. At temperatures above 65 to 69 degrees the accident frequency showed only a slight rise in the women, but in the men it increased rapidly, and at temperatures above 75 degrees it was 39 per cent greater than at 65 to 69 degrees. Probably this difference was due to the fact that the work of the men was often of a heavier character than that of the women, and the greater the exertion required the more trying must be the effect of exposure to high temperatures.

16. One of the most striking results of the installation of a cooling plant in the Morro Velho mine was the fall in the accident rate. In the 16 months (August,

1919, to November, 1920, inclusive) previous to starting up the plant 20 deaths occurred through underground accidents and 4 cases of disablement, the total liability for compensation involved in connection with these accidents being 80,675 milreis. In the following 16 months (December, 1920, to March, 1922, inclusive) there were six fatal accidents underground and four cases of disablement, the amount of compensation involved being 35,820 milreis.

17. The effect on accidents of air movement is shown by investigations in 10 collieries in England. While the accident frequency was practically constant at all velocities under 60 feet per minute, it showed a considerable increase at a mean velocity of 72 feet. The accident severity was high at very low velocities, but fell to a minimum at one of 30 to 50 feet per minute; then it rose rapidly, like the accident frequency. From the small amount of evidence adduced, the investigators concluded that probably accidents reach their minimum when the air currents have a comparatively low velocity, such as 30 to 60 feet per minute.

18. The physiological effect of dusts as a factor in accidents probably is mostly indirect, through a general lowering of the physical efficiency. However, it has been found that miners suffering from silicosis are more susceptible to deleterious gases, especially carbon monoxide, and would be more liable to accidents from gases encountered in mines.

19. The physiological effects of various gases, such as delayed response and decreased powers of concentration, would predispose an affected person toward accidents.

20. Poor illumination causes accidents directly by obscuring hazardous conditions and indirectly by affecting the eyes of the workers so as to result in defective vision, which in turn leads to accidents. A large industrial insurance company has estimated that 18 to 25 per cent of industrial accidents are due to inadequate or improper illumination.

J. A. GIBSON (Miss. Lime and Material Co., Alton Brick Co., Bluff City Lime and Stone Co., Alton, Ill.): I would like to know what per cent of this firm's representatives here have physical examinations.

SECRETARY HARRINGTON: There are present 44 representatives of mining companies. How many metal concerns represented here have physical examinations? (Eleven.) Eleven out of twenty-four, but there may not be twenty-four companies here. Now the coal? (Eight.) Eight out of twenty. I know there are not that many companies. I know one coal company that has seven representatives here, and another four.

W. T. METZGER (Hudson Coal Co., Scranton): Is there any objection on the part of the miners' organization to the physical examination?

C. W. GIBBS (Harwick Coal and Coke Co., Pittsburgh): We adopted physical examinations when we were operating union—United Mine Workers—there was no objection.

MR. METZGER: We operate in the anthracite field where there are serious objections to physical examination, and, therefore, can not adopt a system.

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Mich.): What are the Doctor's recommendations for underground men with defective vision?

DR. SAYERS: Correction of vision. Even if you have a man wearing goggles, the vision can be corrected.

SECRETARY HARRINGTON: If the metal mining people would get down to brass tacks and put in decent lights, they wouldn't have so much vision trouble.

MR. TRESTRAIL: Do you figure an electric cap lamp an improvement on an incandescent light?

SECRETARY HARRINGTON: It depends on where your incandescent lamp is placed. It makes a lot of difference if the light is 15 or 16 feet away.

Wm. CONIBEAR (The Cleveland-Cliffs Iron Co., Ishpeming, Michigan): Assuming

that the Doctor was a mine executive and found he had men in his employ who did not qualify physically, would he not give them work?

DR. SAYERS: If a man was definitely a hazard to himself and to his employers, I would lay him off.

MR. CONIBEAR: Suppose you had a man getting feeble, around sixty-four. Would you disqualify him?

DR. SAYERS: No, I would find work for him.

CHAIRMAN HOSLER: The author of the next paper has an enviable record in coal mine accidents during the past two years. It is a real pleasure to have one who can speak with such authority. Frank Dunbar, Mather Collieries Co.

Discipline in Relation to Accidents

By FRANK B. DUNBAR

General Manager, Mather Collieries Company, Mather, Pa.

Accident prevention and first aid were not considered to any extent by the mine management prior to the establishment of the United States Bureau of Mines. A few companies during 1910 became interested, however no real effort was made until after the passage of compensation laws. Officials were more concerned in production. For a number of years the compensation was low and instead of accidents decreasing, they became more frequent, operating officials working under the idea that the insurance carrier would pay the bill. In some cases, the superintendent was not interested enough to investigate an accident.

In recent years, the compensation has increased, the insurance carrier has increased the rate and the cost has more than doubled, therefore the cost of accidents on a tonnage basis, has a prominent place on the cost sheet and the management has become vitally interested.

Mr. Rush N. Hosler, Superintendent of Coal Mining Section, Pennsylvania Compensation Rating & Inspection Bureau of Harrisburg, Pa., presented a paper at the Coal Mine Institute of America, on December 10, 1930, on economic losses in the Pennsylvania bituminous mining industry, resulting from injuries. I wish to quote a few figures from his paper. In the five year period 1925 to 1929, the cost of work injuries in Pennsylvania bituminous mining for compensation and medical treatment alone exceeded twenty-five million dollars, or more than five million dollars per year, and the time lost on account of these injuries amounted to 21,384,423 lost days, equaling 85,538 years. We can hardly grasp the enormity of these figures. The loss of time of more than 17,000 man years per year, represents a wage loss of more than ten million dollars per year.

These appalling figures may mean more to us when expressed in cents per ton of coal mined. It was shown that the first item cost 3.6 cents per ton. This is trebled when the wage loss is added and becomes 10.8 cents per ton in counting the time lost in man years. While Mr. Hosler's data represents Pennsylvania only, I believe it will compare in general with other bituminous fields in the United States.

Discipline and its relation to accidents is a subject that has been before the mining industry for a number of years. What does the management mean when they say "We have discipline at our mines, but we do not seem able to reduce our accidents." A number of prominent mining men are inclined to separate safety and costs. While safety should be the first consideration, we cannot hope to operate a mine successfully without getting a reasonable return on the investment, therefore costs must be considered with safety and good mining practice.

Discipline and sufficient supervision will prevent accidents. Discipline means training or education. No mine can operate successfully unless the management has received proper training. No safety program can be carried out successfully unless all officials are properly trained and are in favor of carrying out all safety standards. It is folly to employ a safety engineer and mine inspector, purchase safety bulletins

and literature, if you do it because the insurance company allows a rebate for a safety organization. The best safety engineer in the country cannot get results without the support of the general management, and cooperation of all officials.

I wish to stress particularly the necessity of training officials in proper mine management. These men must be of good moral character and know good mining practice. They must be familiar with all safety standards, be honest and sincere.

Discipline means placing the mine in such condition that employees can work in safety; we may then go forward to the education and instruction of employees. In many cases, the mine management or general management having charge of a number of mines, becomes discouraged, because they feel their superior officers are more interested in production than they are in safety and accident prevention. These officers sit in conference with the general management, questions of major importance come up for discussion, very often the question of accident prevention is not mentioned. The mine manager leaves the meeting with the feeling that production and costs are the all-important points. I attended such a meeting many years ago, and after the meeting one of the superintendents stated: "Well, the Governor wants only three things this year, more coal, cleaner coal and cheaper coal." I have found after many years of experience, with discipline and sufficient supervision, production can be increased, costs reduced and accidents prevented.

The general management as well as the superintendent and his officials must consider the workmen as human beings, and not from the standpoint of producers only. The face man must be considered as the important cog in the organization. These men are capable of thinking and the successful official will work with this thought in mind, and act as a trainer or teacher as well as a foreman. It has been said that working for accident prevention and safety is about the finest social training any person can have. Fairness and justice in your dealings with the workmen brings a response of good-will and cooperation from all concerned.

In working for increased production, the management is inclined to criticize when the face man is slow in loading his wagon, when the locomotive is not hauling the number of trips prescribed by the efficiency engineer and when the turn-over of pit cars is less than the management feels it should be.

These are operating problems that the management is vitally interested in as costs are affected; however discipline must be maintained, regardless of costs or production. It is a mistake to speed up the haulage beyond good safe practice, to rush the face man in loading his wagon, and not give him time to properly clean his coal or timber his working place. He should not be hurried. Proper discipline in the inspection of all electrical and mechanical equipment is necessary.

We are all familiar with good operating practice, and should be using the safety devices that are practical; if our mine is in proper condition, haulage roads and man-ways clean, ventilation and drainage good, sufficient timber and supplies on hand, proper clearance on all haulage entries, potential hazards noted daily and taken care of before accidents occur, we will find the workmen contented, costs and production maintained. Our troubles are not with the face man. He will do his work in the majority of cases if he understands what should be done.

It is a pleasure to visit an assistant-foreman's section where proper discipline is maintained. We find the tracks clean, rooms well posted and timbered, properly rock-dusted and sprinkled, man clearances everywhere, even on the curves at room necks, track in good condition, ribs properly trimmed, and the rib line in good shape. The keep-safe card is in its proper place, tools are in good condition and the face man working in safety. We find the fire boss, shot firers and coal inspector co-operating, all working for safety and accident prevention. Here are five men who are acting in an official capacity, visiting the working face many times a day, taking time to observe and note all potential hazards. If the workman is performing any unsafe practice, one of these men makes a note on the keep-safe card. If he continues to be careless and refuses to carry out instructions, he is discharged.

This keep-safe card is a part of each employee's equipment, and is kept as a perpetual record. Should a man leave our employ and return to us at any time, his record is examined. If he was a safe workman, he will be employed, should there be an opening. If he was not, he will not be hired.

It is a mistake for a foreman to be hard-boiled with men. He should be an instructor rather than a boss. He should know his men, their families, their troubles, their likes and dislikes. If one of his men is sick or injured, he should visit with him. He should insist that man trips be provided. Workmen will not be good producers if they have three or four miles to walk every day in getting to and from their working face. Comfortable homes should be provided. An employee cannot think safety if he is worried about family affairs, if he is hungry or if he is being employed one or two days per week. I believe the use of the safety and potential hazard cards has been the outstanding factors in the maintenance of discipline at our mines.

If accidents are not reduced and compensation rates increase, there is something wrong with the management. Proper attention is not being given to accident prevention, investigations are not being made. Many times accidents occur that are not lost-time accidents and no investigations made. We must realize that any accident may result in a serious injury and a no-lost-time accident may become a fatal. The potential hazard card will be a help along this line.

I was asked recently what percent of accidents are unavoidable, and I cannot answer that question. Some mines with dangerous conditions are able to operate months and in some cases, years, without a lost-time accident. Why cannot we go along for a number of years without accidents? Many managers state that they cannot afford to put on a safety program, however if they will look up their compensation rate, they will find that it is high.

It would pay to get a disinterested, practical, mining man to make an examination of the mine and read his report. It may show that discipline, sufficient supervision and good management are needed.

Good house-keeping means safety. During the past number of years, it has been a difficult matter for any company to operate at a profit, and many are operating at a severe loss. Under these circumstances, superintendents are inclined to reduce their labor to a minimum, the mine gets in bad condition, and accident costs increase.

Mr. H. C. Henrie of the Phelps Dodge Corporation, has an excellent article in the *Mine Congress Journal* on accident prevention work, and he states, referring to discipline, "After correct methods have been installed and the employees instructed in these methods, then safety rules and safe practices must be enforced, and employees of the company, irrespective of whether they be foremen, bosses or workmen, who cannot or will not show the necessary interest or cooperation, should be eliminated from the organization."

We, as managers, must insist on discipline if we hope to get anywhere with the accident prevention and safety program.

Discussion of Mr. F. B. Dunbar's Paper

By MILTON H. FIES

Vice-President, DeBardeleben Coal Corporation, Birmingham, Ala.

In the paper, "Discipline in Relation to Accidents," one is immediately struck by the absolute sincerity of Mr. Dunbar. Here is a man who desires discipline with fairness, and it follows that from such a combination safety will be the inevitable result.

Of course I do not like to think—and I do not believe Mr. Dunbar likes to think—that the increase in insurance rates has been the sole motivating impulse in the added interest in safety which has developed in comparatively recent years. The

lessons to be learned from it, however, are striking. Mr. Dunbar quotes from the superintendent of the Coal Mine Section of the Pennsylvania Compensation Rating and Inspection Bureau to emphasize the economic losses, as a result of mine accidents, to the bituminous coal mining industry in Pennsylvania. Since this record typifies such a well-regulated state as Pennsylvania, we can only imagine the results in states that do not possess Pennsylvania's many advantages. It is also proof that saving in cost of production of coal can be effected through safety work. However, there is something fundamentally wrong with a man if his interest in safety is prompted solely by the results to be attained in his cost sheet.

Mr. Dunbar's paper sets out very clearly a method of approach to safety in any well-regulated company. I have been impressed, as, he no doubt is, with the fact that if the coal industry is to achieve the results in safety that have been attained by other industries, the management must take the lead. That mines can be operated safely has been demonstrated, and it has always invariably followed that where such mines have been operated safely the management has been the impelling force.

The Paramount Problem

If it is a fact (and I think it is) that the large, efficiently managed coal companies, generally speaking, have a good safety record, and that smaller, irresponsible coal companies have had accident records, the problem, then, that confronts the industry, among other things, is to determine how to interest the management of these coal companies with bad records.

We are always going to have the so-called small producers of coal. I am not one who believes that this class of producer—and I use the word "class" in the sense of tons produced—is going to disappear from the industry. We are, then, confronted with the duty of working out a plan that will appeal to those who operate the so-called smaller company.

I have great faith in the ability of the Chief Mine Inspectors of the various states to do this job. I know that it depends upon the type of inspector, his enthusiasm, his willingness to give of his time and energy, and his knowledge of the intimate technical details of safety. My experience with most of the inspectors in connection with the work of the National Coal Association has led me to believe that they are a dependable group. Where there are exceptions within the group, the very force of the movement will influence them.

The training of officials in proper mine management which Mr. Dunbar stresses is certainly an important phase of safety. I think it is a fair statement that one cannot have good management without an intimate knowledge of safety.

Down in Alabama we have achieved splendid results in the elimination of accidents from falls of roof and coal. It was accomplished by adopting standardized timbering. We are now confronted with an unusual number, based on percentage, of haulage accidents. Last year we had a great number of accidents due to electricity. I believe we can improve our record in both classes of accidents in our state by standardizing clearances, which is along the line of good operating practice as suggested by Mr. Dunbar.

One other point raised by Mr. Dunbar relates to mine inspection. Proper mine inspection, by company inspectors, consists not only in pointing out defects that may exist, but entails the duty of the inspector to stay with such defects until they are corrected.

Twenty-seven years experience among coal miners has established the fact in my mind, beyond any reasonable doubt, that working men as a whole are amenable to reason. One has but to point out the right way in the right manner and results will be forthcoming. The average working man means to do right. If he is ignorant, unlettered and of a type that has never had a chance in life, one needs only to combine patience with fair discipline.

I think that if this attitude on the part of employers were adopted as a definite basis of our safety work, making the selection of intelligent leadership only second in importance, instead of the accident record of our coal mines being a blot on the pages of American industrial history, we might even hope to transform it into an inspiring record for future generations.

ADJOURNMENT

ing ideas, reproduced in the form of text-books, put the word into the teachers' mouths, and the teachers are compelled to speak it. Youth, under compulsion, confronts this knowledge, assents to it and assimilates it. It is only by submitting to this educational process that there is any possibility of an individual developing into an efficient member of the human race.

John Stuart Mill, in his "System of Logic," writes thus: "The state of knowledge at any given time is the limit of the industrial improvement possible at that time, and therefore the progress of industry must follow and depend upon the progress of that knowledge." With this thought in mind, let us apply to my subject the two fundamental principles of pedagogy, to which reference has just been made.

The hazards of mining have been fully within the understanding of mankind from the beginning of the industry, but we are indebted today to the U. S. Bureau of Mines for the possession of as careful and scientific an analysis of the statistical and related facts as is possible to derive from a study of the accidents resulting from those hazards. In rendering this service, the Bureau obtains trustworthy data and employs competent engineers to inspect mining operations. It observes and studies the whole subject of mining casualties, embracing both coal and metal mining of the entire country for periods of sufficient lengths to validate the information which it diffuses. It cannot be charged with errors and inaccuracies in the advancing of conclusions and recommendations because of a lack of material. For these reasons its presentations of facts and conclusions may safely be accepted as correct in the determination of methods in pursuing a policy of accident prevention.

The data on accidents and the recommendations for their prevention, published by the Bureau of Mines, the National Safety Council and other educational organizations, are as varied as the circumstances which give rise to accidents. The wealth of information springing forth from these sources serves in the solution of the problems and situations that accidents present, and should form just as legitimate a part of a curriculum in mine safety as the subjects of science, mathematics, language and literature form in higher education. The briefest examination of the publications of the Bureau of Mines, since 1911 to the present time, should convince an enlightened operator that in them he possesses a record of professional experience, accompanied with a presentation of facts and an interpretation of principles that can be applied directly to most of his needs. It is of greatest practical importance therefore that management everywhere recognizes in this literature, permanent and accurate record by which fatality and injury rates can be reduced to more reasonable proportions than is at present the case. If it is true, as a writer states, that "Every science, such as physics, botany and sociology, is a body of organized knowledge and inter-related judgments gained from thousands of experiences or drawn from general judgments," then the vast number of experiences having reference to definite phases in mine safety and reduced to judgment form, now available to our profession, should be accepted as a "body of knowledge" and combined into a system that may be designated the "science of accident prevention in mining." It should be clear that progress is rendered possible and more rapid by management assimilating and turning to its own use those experiences which authorities have found to be most serviceable. The bulletin on metal-mine accidents, issued annually by the Bureau of Mines, is a record of the repetition of many accidents that occur by identical causes, and the mass of workers have little to do with the determination of the measures that must be enforced for the prevention of the same. Only to the extent that operators are wise in profiting by their own experiences and also by the experiences of others is there any hope that the accident rates of the future will show a consistent and permanent reduction.

That the negligences of workmen or their disregard of carefully prescribed rules intended to insure their safety is responsible for many accidents goes without saying. Such being the case, the opinion prevails that nothing will more effectively

tend to lessen accidents than the education of the miners themselves. Here we come to the consideration of a principle in dealing with men that is of fundamental importance in accident prevention work.

In the domain of economic production, the maintenance and progress of industry depend on the industrial obedience of the vast majority of men being subject to the control of a few. The need for the immediate means of subsistence is supplied by capital, which becomes efficient as a productive agent because it enables the men, who own or control it, to make with those who seek it a bargain that they will work in accordance with the former's directions. The worker's wage is essentially a payment which is made to him on condition that he perform certain tasks in a certain way. Orders are obeyed because the worker knows that unless he yields, at least one way of earning a livelihood will be closed to him. However appearances may seem to the contrary, workmen, as a class, are as much interested in the maintenance of this system of employment as anybody, for their hopes of securing the necessities and comforts of life depend, as do those of their employers, on progress in the processes of production.

In the operation of a mine there is one man who, essentially and permanently, is the repository of power. Regardless of the title he may have, be it president, manager or superintendent, it is expected of him that he shall be exceptionally efficient in the production of the coal or ore which is being mined. If competition is keen, as it usually is, productive power must increase, wherein the capacities of this executive are brought to a full and detailed effort in the study of the minutest details of the various factors involved in production. He is the dominating factor which leads and directs others to failure or success, according to his talent and energy in these things and also because of the power he possesses by virtue of the position he occupies.

The factors, then, that are of vital importance in the formal education of an individual, and also those that are of equal importance in the domain of economic production, to which brief references have just been made, are the ones that must be recognized by management if a satisfactory solution of the problem of industrial accidents is to be arrived at. It is the candid opinion of the writer that the secret of success can be summed up in this formula: Management must have a comprehensive appreciation of the necessity of accident prevention work. It must possess the capacity to profit by its own experience and also by the experience of others. As success in productivity depends upon the ability with which labor is directed and the power it possesses to say to labor "we will allow you to work only if you will consent to work in the ways we indicate," so likewise, the promotion of safety depends upon the same ability and power being used, as the dominating forces in dealing with men, in proportion to the exactness, intelligence and efficiency with which they guard themselves from accidental injuries.

Perchance an executive, who is being charged with this responsibility, may be interested to inquire what is the process by which he is expected to bring about progress. He would be advised that however many and varied be the methods he may employ otherwise, they are less effective in immediate and permanent application than the results which can be produced solely by himself in personally influencing the minds of others and seeing that they are compelled to confront, assent and conform to that knowledge, which experience has taught is of incalculable value. Since the scientific and impartial determination of the causes of accidents and the best methods of accident prevention, which have been carried on in this country the past twenty years, is the best curriculum available for the education of employer and employee alike, it is his responsibility to have this knowledge conveyed to and imposed on every employee under his jurisdiction, with the same zeal and energy that he displays in introducing improved methods of mining and in stimulating men so that production costs shall be reduced. In this work it is of great importance that the terms safety engineer and mechanical safety devices be

**Tuesday Afternoon Session
October 13, 1931**

RUSH N. HOSLER, Chairman

Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.

The second session of the Mining Section convened with General Chairman Hosler presiding.

CHAIRMAN HOSLER: The first thing on our program is election of officers. We had the report of the Nominating Committee this morning and accepted it. A motion to close the nominations will be in order.

FRANK B. DUNBAR (Mather Collieries Co., Mather, Pa.): I so move.

(The motion was seconded and carried.)

A. A. BAWDEN (Picklands, Mather & Co., Ironwood, Mich.): I move that the Secretary cast the unanimous ballot of the assembly for the election of those officers nominated.

(The motion was seconded and carried.)

CHAIRMAN HOSLER: The first paper this afternoon is by Wm. Conibear, of The Cleveland-Cliffs Iron Co., Ishpeming, Michigan.

The Educative Process in Accident Prevention Work

By WILLIAM CONIBEAR

Assistant Superintendent, The Cleveland-Cliffs Iron Company, Ishpeming, Mich.

Man comes into the world a helpless, dependent creature, with but few of the functions of complete development present. In the beginning, he assimilates experiences with reference to the primitive needs of the body, and as development continues, the primitive needs come to be overshadowed by acquired needs. Having at his disposal his own experiences and also those of his contemporaries and ancestors, it is unnecessary for him to repeat, step by step, the life of his predecessors. Through the assimilation of experience and under the influence of family, school and society he is subjected to an educative process by which he acquires his greatest and most potent characteristic—the possession of race experience. This is knowledge. In a sense, education may be defined as "the process by means of which the individual acquires experiences that will function in rendering more efficient his future action."

In the educative process, to which man must yield in order to complete his development, there are many forces at work. They are usually grouped into two classes, namely: (1) Those forces which are involved in formal or theoretical education; and (2) those which are involved in informal or practical education. The first group embodies those influences the control of which is assumed by the individual himself, or by some agency such as the home, the school, or the church. The second group covers the experience gained by an individual doing something personally, or by seeing others do it. In modern civilization these various forces of education have reached a stage of very elaborate specification and organization, and are being directed to develop man into a socially efficient individual.

Men and how to deal with them so that they will avoid accidental injury and death while in the course of employment is said to be largely an educational problem. But is there need that both employee and employer alike yield to an educative process in order to achieve at least a measurably adequate reduction in the wreckage and loss of life that is being sustained, year after year, by the mining industry? Does the employer possess the means and power whereby he is enabled to direct

his workers so that they will be more amenable to control, and thus be guided to use their faculties for their own well-being? Each of these questions would, if treated exhaustively, demand entire treatment to itself rather than a few, brief paragraphs, such as are given in this paper. The conclusions here arrived at do no more than answer the questions to which they refer, and no attempt is made to elaborate and defend them. The writer aims only to set forth certain factors, which, as the result of many years experience in mine safety, he believes are of vital importance in the construction of effective measures for combatting accidents.

It is hardly necessary to observe that our industry is undergoing changes which deal with the possibility of improving conditions, and that progress is being made in accident prevention work. But nobody should deny that there are opportunities for much greater improvement. The accident statistics, published annually by the U. S. Bureau of Mines, give us sufficient information to justify no other conclusion. There are many educational agencies insisting that the humanitarian aspect and the financial loss that go with accidents warrant the most complete precautions for their prevention. The attitude of labor towards the present situation was expressed recently by a member of the Department of Labor of the State of New York, in these words: "The record of industrial injuries is a challenge of the employer's ability to conduct industry. The question arises: Will they do a good job or must the State make them do it? As good business men they should change the record, for we all concede that present industrial injuries cost too much to say nothing of the suffering and misery they cause." Is this challenge to industry to pass unheeded?

It is true that workmen can be charged with a relative degree of responsibility for the occurrence of many accidents, but the burden borne by the employer is not lighter when an accident occurs because an employee failed to discharge that duty. The injured worker pays a two-fold penalty—physical pain and partial loss of daily wage, and the employer is obligated by law to pay compensation; and the accident was an event that fixes more indelibly the frequency and severity rates of his records. If an accident is productive of a valuable lesson in safety—as many are—and that lesson in turn is not profitable either to employee or employer, then it becomes a total loss.

It is a common saying that "Experience is the best teacher," which is intended to convey the meaning that the experiences that issue from practical life will have a more lasting effect and will function more efficiently than the experiences gained in school. The history of mining, however, is a record replete with accidents which go to prove that the education of the miner in safety through the school of experience is unsystematic and uneconomical. It exposes him to the haphazard operations of natural forces and does not see to it that he assimilates and utilizes, whether he will or not, those experiences which he has learned will help him most. It is a very disconcerting fact that whereas many accidents are object lessons in safety, yet the lessons do not invariably influence men with certainty that those precautions by which they secure their safety will take precedence over all others. Workmen feel comfortable by conforming to existing conditions. They resist changes and find arguments against the adoption of new methods. Old ways of acting become occupational habits which play an important role in the occurrence of accidents. And the disadvantage of it is that the men who have these habits do not know it, so firmly do they grip and hold. Experience may be the best teacher during the plastic period in the life of an individual but in dealing with men in industry this saying is not nearly so significant as the qualification that is often added: "Experience is the best teacher and also the dearest."

In the formal education of youth, it is the function of school and college to impart the most important knowledge that has been collected from race experience. The selection of the subjects which are to be taught and what it is to be taught about them are not determined by any legally controlled body, but by masters of knowledge, men of science, scholars, historians and philosophers. Knowledge and expand-

not confused as synonymous terms. Very often knowledge lags behind the desired attainment simply because the practical part performed by the safety engineer is altogether too limited.

There are a number of important and well-defined groups of accidents in mining that are due to falls of coal or ore and associated rocks, and to haulage and explosives. The fitness of the safety engineer should be gauged to a very large degree according to the value of the service which he renders in the direction of greater safety and security in these operations and also, according to the acceptability of this service to the management. The very essence of his position is that he takes all the facts which have a direct or indirect bearing upon the prevention of accidents and uses them to influence the thoughts and actions of the executive and his workmen so that both will think and act more safely than they would unaided. Progress will be retarded when men, who have the advantage of a thorough formal education in mining, accept this position as temporary and remunerative employment only, with the hope and expectation that it represents but a stepping stone that eventually will lead to a position of more importance in the production department. Such men have a complete misunderstanding of the practical significance of safety in industry, for it should be clearly understood by now that safety enters into all the important principles involved in mining, including equipment, methods of operation, selection of supervisory force, and management of labor. Economy in production and safety in operations are inseparable factors in industry. He who is given an opportunity to enter the field of safety engineering will find work that will tax his ability and training to a degree that is worthy of any man's efforts.

The importance of a full understanding of all the hazards incidental to mining requires no argument, for the penalty of failure to adopt precautions and safeguards in any one particular may be disastrous in the loss of life and property. For instance, we have been given many reports which draw attention to preventable fire hazards, but the lessons of experience that should be applied toward the deliberate purpose of preventing the occurrence of disasters, such as have happened in the past, are sometimes considered of minor importance, or are ignored entirely. In the introduction of Miners Circular 10, printed in 1912 by the Bureau of Mines, there appears this sentence: "The chief purpose of this circular is to call attention to some methods of preventing a fire in a mine and of quickly getting control of one in case it starts"; and under the heading of "General Precautions": In the same report, the first one reads: "Do not smoke underground." In bulletins and circulars of more recent dates the Bureau has reported upon underground fires, which it carefully studied with the specific object of ascertaining the most effective methods of reducing this element of danger which surrounds the miner's life. In recognition of the hazards involved in mine fires and the urgent need of paving the way by which they may be controlled, the American Mining Congress and the National Fire Protective Association, under the procedure of the American Standards Association, published a special report embodying recommended practices for preventive measures and fighting equipment. Unwillingness to give heed to these warnings and recommendations on the part of management is but indifference to a specific danger that some day may result in the loss of many lives and the serious damage of valuable property. An admittance that smoking underground cannot be stopped precludes the right and power of management to conduct its business in accordance with the best practices. As a matter of experience, the rule prohibiting smoking underground is simple and easy to enforce; more so than the rule requires men to wear goggles every time they are engaged at work that is dangerous to the eyes. In some instances obedience to this latter standard may properly depend upon the exercising of good judgment by the worker, but there is no valid reason for a violation of the other standard. Of the wisdom of fire-proofing shafts, pump rooms and fan stations, and the maintenance of ample equipment and trained personnel for fighting fires, there should be no difference of opinion. Common experience everywhere af-

ford demonstrations of the necessity and importance of every reasonable care being taken to provide against foreseeable occurrences of fires, for it is only by taking such action that there is any hope of averting costly calamities in the future.

Information, even knowledge, an executive may have in abundance, but the application of this knowledge to the problems that confront him is not easy. The fact must ever be kept in mind that notwithstanding the many methods and innovations in vogue for the expressed purpose of educating men in a safety program, there are no substitutes to take the places of competent supervision and rigid discipline. It cannot be expected that foremen with limited vision and education will qualify in successfully interpreting and administering this important work. Weak links in the supervisory chain that encircles the working force play a major role in determining the habits which many of its members pursue. Foremen have to exercise many functions of management, and if their ability and training do not fit them for participation in such matters, the responsibility for their administration must be borne by the executive.

It has been said "that probably the best single statement of intelligence is the ability to adjust oneself quickly and successfully to new and changing conditions." Efficiency in safety involves new plans and methods and the breaking down of old habits of thought and action. And, consequently, only those men should be retained in positions of trust and authority who have the intelligence and exhibit a willingness to look the inevitable in the face and readjust themselves to higher standards. After all, the executive is responsible for the work of his subordinates, and if they cannot be trained to be what he knows they should be, then the foundation essential to the structure of industrial safety cannot be laid.

MR. CONIBEAR: We all know what the statesman has to do in the domain of politics and what the preacher has to do in the domain of religion. The executive must have personal contact with the workmen; his personality must inspire and lead them toward safety.

CHAIRMAN HOSLER: I am sure Mr. Conibear has raised many questions in your mind which should result in a very spirited discussion. We will also discuss any questions on Mr. Dunbar's paper. The question of discipline and education are so closely allied, that we will take them together for discussion.

E. A. STROCK (Safety Engr., National Lead Co., St. Francois, Mo.): I would like to know what disciplinary measures Mr. Dunbar uses.

MR. DUNBAR: They depend a good deal on your organization and management. We send a man home. A certain amount of education and good hard common sense is needed. If a foreman makes the mistake of talking his head off to the men and using profane language, he becomes a scold. After a man has been taught how to do things the right way and to use the right tools and then doesn't do what he knows to be right, send him home.

We had a motorman who said the pole came off and in trying to put it back on the trip under motion, tore his hand. Investigation showed he could not have had the accident in that manner. He finally admitted he had back poled. After he got well and went to work, we gave him a week to think it over. That is discipline.

C. W. GRUBS (Harwick Coal and Coke Co., Pittsburgh): Mr. Dunbar, how do you route the information on the potential hazard to the foreman?

MR. DUNBAR: The fire boss takes the card in with him in the morning, for he is the first man to make a complete inspection of the mine. If there is timber needed in Room 3, it is noted. The fire boss tells the foreman, who notes it on his card. The assistant foreman copies the data on his own card.

The assistant foreman will be the first in on that section, ahead of the fire boss on the second round. If he has found any of the hazards corrected, the "X" is circled on the card.

The coal inspector comes around; if he finds a hazard he marks it on his card, and when he meets the assistant foreman, they compare cards. The shot firer is

the important man. He may visit a place three times to shoot it and, therefore, has three chances to inspect.

The mine foreman also has one of the cards. The cards go to the mine foreman at night. He checks them and if there are any remaining hazardous conditions they must be taken care of. The superintendent also checks the cards and then he looks them over; they come to my desk. In looking them over I find about ninety per cent of the potential hazards are at or near the face. In this way we catch our dangerous conditions before an accident has happened.

The Keep Safe cards are different. All employees have one. You would be surprised to know that quite a number of foremen are written up by miners. Men don't like to have a card written up because it goes on their record. If a man has neglected to put up a post and the foreman catches him, he is written up on the card, and at the end of the month the record is taken off, lines drawn under it, and given to the safety engineer who puts it on the permanent record of the man, and publishes it on the bulletin board. The men can see their records regularly. If a fellow has three or four marks, I tell the safety man to write that man's wife a letter and tell her what her husband is doing and if he does not reform, he will lose his job. If we can't teach him to "play" safe, he is discharged, but we give him a chance. We had a number of men laid off on account of no work, but if their record is good, we will hire them again; if not, we won't.

The Keep Safe card is part of a man's equipment. If he changes from one room to another, he must take the card with him. The card is printed red, and nailed on a little board with a hanger so that it will hang on a post. As a man comes into the room, that card faces him. He may be thinking of something else, but when he stumbles onto it, he sees the words, "Keep Safe." At the bottom it says, "This is a protection to yourself and family."

We had some trouble in putting in the cards; some men spit on them and tore them down, but we explained the card to them, and they got to know the value of it. I have used this card since 1924, and in twenty-three mines we had about a fifty per cent reduction in accidents. It will work.

K. S. HUGHES (Hudson Coal Co., Scranton, Pa.): Mr. Dunbar stated that, if he goes into a place and finds it needing a post, he sends the man home and has him stand the post next day. Our practice differs for the man must make it safe immediately, in the presence of the foreman; then he is sent home.

MR. DUNBAR: We send him home and send a new man to set the prop safe, and thus teach both fellows to set props when they should be set.

THOMAS E. LIGHTFOOT (Koppers Coal Co., Pittsburgh): Mr. Dunbar, where are the cards kept for brakemen and motormen?

MR. DUNBAR: Their cards are kept at the sidetrack on the section.

MR. LIGHTFOOT: Have you found any foremen unwilling to mark these cards for fear of reflections on their own management?

MR. DUNBAR: We have to be careful of criticism and encourage the foremen to fill out the cards.

If I find a man doing the wrong thing because of the negligence of the foreman, I will not write up the miner's card but the foreman's card. It is his job; he is responsible for that section of the mine.

Get your men fighting on safety and get them on their toes to avoid accidents, and then give them good sound standards without too many rules.

J. J. FORBES (U. S. Bureau of Mines, Pittsburgh): How do you train men on the proper methods of doing their jobs?

MR. DUNBAR: We have an official meeting twice a month. We go over all accidents and over the reports of inspectors, the superintendent and engineer and thus educate foremen in these meetings.

C. W. GIBBS (Harwick Coal and Coke Co., Pittsburgh): If a miner reports a

foreman do you require him to sign the card? What effect does it have on the feeling of the foreman toward the man?

MR. DUNBAR: In some cases it has a bad effect. In two or three cases it was necessary to transfer the man to another section. In two cases it was necessary to transfer the foreman. My experience is that you don't have trouble with your workmen but with the foreman.

CHAIRMAN HOSLER: I would like to ask Mr. McLellan what they do about violations of good practices?

G. N. McLELLAN (Butler Consolidated Coal Co., Wildwood, Pa.): In the year and a half I have been with the company our compensation costs have dropped 81 per cent; our lost time accidents have dropped around 71 per cent; and our preventable accidents, 53 per cent. These decreases have resulted from discipline. We try to educate our men and foremen in our different operations by holding weekly foremen's meetings at which we discuss various problems of operation. Once a month we have the Foremen's Safety Council where we take up safety problems and also once a month, we have a meeting at which all men assemble. We have entertainment and a speaker familiar with safety and coal mining. All of these activities do a lot of good, but yet foremen, like the ordinary miner, have a tendency to follow the course of least resistance. When I went to the mine, some of our foremen were not heart and soul in their work; it was only eight hours' work and their pay with them. They were not looking after the safety of their men but placing the responsibility of accidents upon the foreman has helped to reduce our accidents.

Some people think we have more accidents due to using more machinery. This is not true at Wildwood. We have a mechanized mine and it is necessary to train men to observe, because drillers, trackmen, timber men, etc. are constantly shifted from one working place to another and conditions vary in each.

We recently had a trackman suffer a fractured hip due to a fall of slate. The fire boss observed the condition of the roof but failed to post a warning sign and the assistant foreman sent a crew to the face before inspecting it. This was negligence. We demoted both men.

MR. DUNBAR: If any of you gentlemen would like to have the cards I have described, write me and I will be glad to send them.

MR. McLELLAN: The state mining law requires all dangerous conditions to be reported on the fire boss' book. The assistant foreman must see this book every morning before he goes into the mine, and if there are any bad conditions in his section, he must note them and leave his initials on the book. The fire boss did not report the case just described. This did not absolve the assistant foreman for he had sent the men in before he made the examination.

CHAIRMAN HOSLER: The most intelligent class of employees that we have in, at and about the mines are our mine officials. I think all of us agree that from the standpoint of training and education this is so.

A tabulation covering a five year period brought out the startling fact that, in proportion to the number of men employed as officials in and around the mine, one was killed every time an ordinary miner was killed.

How were these men killed? Thirty-seven of 49, (and five more probably) were killed by willful violation of their own rules and regulations. Some were killed by hunting for gas with an open light and others by jumping on moving cars. In the light of these facts we have a task of properly educating and training our official family in the accident prevention work.

I had a startling experience in addressing a body of mining men a few years ago in Johnstown, Pennsylvania. I was trying to put over the point that the official family could not take care of the other fellow until they had learned to take care of themselves properly. There were seventy-three men in an official capacity in the room. I told them that during the preceding five years exactly seventy-three officials in the bituminous region of Pennsylvania had paid the supreme sacrifice and I asked

those fellows to pick the next one who was to pay the sacrifice. It wasn't two weeks before two of that group had actually paid the supreme sacrifice; one by gross negligence and violation of his own rules and the other might be termed an act of God. We have our official group to educate as well as the miner.

J. A. GINERSON (Miss. Lime and Material Co., Alton Brick Co., Bluff City Lime & Stone Co., Alton, Ill.): I have been trying to reach the employee by direct methods. I send a verbatim copy of the minutes of the safety meetings to the home of the employee along with other literature with the hope that I can get the man to study safety at home when he is at leisure and also get his wife interested.

MR. DUNBAR: If you want to know how to reach the miner at home, adopt the Holmes Safety Chapters. In eighteen months in our town of about 3,000 people, no child has been burned in the home nor has an accident occurred to one of the family. I claim that the chapter plan is interesting the women.

We have meetings attended by men, women and children and furnish entertainment and speakers but emphasize safety. Sometimes we have a miner describe how he had an accident. He hates to do it. The chapter helps the miner's safety record by getting the women and children interested.

CHAIRMAN HUGLER: No organization connected with the coal or metal mining industry can afford to omit safety from the program at their conventions. We are fortunate to have Mr. Milton H. Fies, Vice-President, DeBardeleben Coal Corporation, Birmingham, Ala., and Chairman of the Safety Committee of the National Coal Association, to present his paper on the National Coal Association's safety plan.

The Safety Plan of the National Coal Association

By MILTON H. FIES

Chairman, Safety Committee National Coal Association, Vice-President,
DeBardeleben Coal Corporation, Birmingham, Ala.

The accident record of the bituminous coal mines of the United States is very unsatisfactory. It has been so over a period of years, and the unusual part of it all is that while many within the business have realized it, not until recently has concerted effort been made to remove this blight from one of the nation's greatest industries.

We have heard for several years the statement that the coal business is waning financially. This may be true. But when one considers that 70 per cent of the energy produced in the United States is from coal, that the coke from coal is the very basis of this so-called "machine age," one cannot help but be impressed with the fact that coal is the backbone of industrial America. Consequently, when a forward step like this national safety movement is initiated within the coal industry, it makes for American progress.

It is all the more to the credit of the industry that it has the courage and the vision, from the depths of its present business despair, to forward such a movement which has for its high aim the preservation of the lives of men who work in the coal mines of the nation. It strikes me that this evidence of foresight at this time is proof enough that the men who guide its destiny propose to move on.

The improvement in the safety record of coal mines in many of the states within the last six months, during a period of slack work which is usually conducive to increased accidents, is an indication that even the initial move of the association for safety in coal mines is beginning to produce results. For example:

During the first six months of 1931 several of the states have made striking progress in decreasing fatalities as compared to the first six months of 1930; viz: Alabama reduced its fatalities from 35 to 12, Colorado from 21 to 11, Kentucky from 103 to 45, Pennsylvania bituminous from 156 to 93, Utah from 43 to 5, Virginia

from 25 to 9, and Washington from 20 to 6. In other words, total fatalities in these states were reduced from 403 for the first six months of 1930, to 171 for the same period 1931, a reduction of 232 fatalities, or 57.5 per cent. Also there was no major disaster in the bituminous coal mines of the United States from January to July of this year, an unprecedented record!

Now, it would be absurd to attribute this remarkable accident reduction during the first six months of this year to the recent movement of the National Coal Association, but I do think the association is due some credit, for this reason: During the preparation for the inauguration of the national movement (which is to be intensively initiated the first of next year), the association held meetings with representatives of the coal industry, secretaries of the various operator associations, engineers of the Bureau of Mines and the mine chiefs of the various states of the country. The enthusiasm and determination of the mine chiefs on those occasions, which spirit they carried back to their respective states, has, in my judgment, contributed much toward the records made by these states the first half of this year. At the same time, the officials of the Bureau of Mines were encouraged to learn from these meetings of the Safety Committee that the operators in the United States were beginning to respond to their pleadings for safety which they have unceasingly stressed for many years. The secretaries of the associations became heralds of safety throughout the entire country. Operator organizations that had never manifested direct interest in safety, adopted it as an important duty in connection with their work. These initial meetings, calling together those representative groups of men for a common purpose, resulted in strengthened courage and determination on the part of all.

The National Coal Association is a forward-looking organization, and while practically all of its activities have heretofore been concerned with the matter of national legislation with reference to coal, and research relating to commerce and chemistry, only recently did it determine to branch into a phase of work which, after all, is most fundamental.

The National Coal Association has organized a National Safety Committee. Here are a few of the facts that present reasons for this committee's activities, and some of the remedies it intends to prescribe:

In the coal mines of the United States, from 1921 to 1929, inclusive, the number of men killed per one thousand 300-day workers was 4.53. For the same period in Great Britain, on the same basis, there were 1.28 killed; in France for the years 1921 to 1926, inclusive, 1.03; and in Belgium for the years 1921 to 1928, inclusive, 1.03. In other words, there were over four times as many men, based on man-days, who lost their lives in the mines of the United States in the periods mentioned as in the mines of the countries above set out. I am not very proud of that record, either as a mine engineer or as an American! There are, however, some who would attempt to justify this miserable comparison on the grounds that the number of men killed per million tons of coal mined in the United States for the years mentioned was 3.87 as compared to 3.93 for Great Britain; 5.86 for France, and 7.38 for Belgium. Even on the basis of million tons mined, Great Britain compares favorably with us, while we are from one and one half to two times better than France and Belgium, respectively. We should show immeasurably better than these countries, because our seams are thicker, hence more coal; and they are nearer the surface, hence less serious subsidence problems, gas and water.

Our record, as I see it, means that while we have increased efficiency of the men working in the mines by raising the tons produced per man, we have accomplished this at the sacrifice of human life. The argument has been advanced that because of our better record, based on production, there is "less blood on the coal produced in this country than in foreign countries", but I would state with all possible emphasis that there is more despair in the homes of the miners.

There are very plain reasons why, in spite of natural disadvantages, foreign countries have a better accident record than we. Their mines are operated under

strict national laws—certain definite safety standards must be maintained—and these rules are rigidly enforced. It is not left to the discretion of the mine owner or operator as to just how far he shall go toward making his mine safe for the worker—or to the worker as to just how careful he shall be. There are specific rules laid down with which both are compelled to comply. Therefore, every coal company, large or small, has to comply with these laws, whether they will or not. In the absence of such laws in this country, it has been left to some of the larger and more progressive coal companies to wage a fight against accidents, without the help, or little interest, on the part of a large number of others.

Then, too, in these foreign countries, one contribution to their better accident record may be due to the fact that the forebears of a great number of the miners in a particular area, or in a particular mine, had worked there for generations.

The Bureau of Mines, one of the most able and efficient arms of our government service, at the beginning of 1931 began a study of all lost-time accidents in coal mines. Based upon returns from somewhat less than 400 million tons, it developed that for bituminous mines, out of every thousand miners 244.7 received non-fatal injuries and 4.704 received fatal injuries per year; which means that for every thousand workers who go into our bituminous mines 249 are either injured or killed annually. If we consider the anthracite mines, the total injured or killed per year in those mines is 332 per thousand employed. The average for both bituminous and anthracite mines is practically 270 killed or injured annually per thousand employed. Or, to put it another way, one man out of every four who go into the coal mines of the United States each year is injured or killed!

This sort of record must not be permitted to stand, and the coal industry is going to correct it because of the sheer rightness of the cause.

Pennsylvania is a progressive state, certainly as far as mining laws and accident prevention work are concerned. I doubt very seriously if other states can boast of a very much better record over a period of years. Consequently, the following statistics taken from an article in *Coal Mining*, by Rush N. Hosler, Superintendent Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, can no doubt be applied with added emphasis to other states in the Union.

"In the five-year period 1925 to 1929, the cost of work injuries in Pennsylvania bituminous mining for compensation and medical treatment alone exceeded \$25,000,000, and time lost on account of these injuries amounted to 21,384,423 lost days, equalling 85,538 man-years. We can hardly grasp the enormity of these figures. I will break them up and give them to you in detail.

"During this same time, with an average number of approximately 150,000 employees each year, there were 192,090 injuries, including fatalities. This means that one injury requiring medical attention occurred for every 3.36 full time employees and that for each of these injuries there was mined 3,600 tons of coal. Of these 192,090 injuries, 1,972 deaths, or one death for every 350,434 tons of coal mined and one for every 327 employees. Three hundred and two men were injured severely enough to become totally disabled, or one out of every 2,138 employees.

"The picture illustrated above might stand out more clearly when it is pointed out that for every ton of coal mined, the cost of accidents is 3.6 cents, and for every ton of coal mined there has been fifteen minutes of working time lost to the industry on account of injury.

"Summarizing the above as the direct cost of this class of accidents, we find it can be enumerated in three principal items:

"First. The cost of compensation and medical treatment, amounting to more than \$5,000,000 per year.

"Second. The loss of time of 17,107 man-years per year.

"Third. A wage loss of more than \$10,000,000 per year."

It has been estimated that the direct and indirect cost per ton of accidents in the

bituminous coal mines of the State of Pennsylvania is 14.6 cents. If we were to assume the direct and indirect cost of accidents for the entire United States to be 15 cents per ton, on approximately 500,000,000 tons produced annually, this loss amounts to \$75,000,000 per year. If, through effective accident prevention work, such as the National Coal Association proposes, this loss could be cut in half, it would represent a saving of \$37,500,000 per year. It is safe to state that the seven and one-half cents per ton which this equals is greater than the profit per ton made by the average coal operator in this country. In other words, this safety program can change the industry from one of despondency to one of confidence.

And, of the first importance, the effects of this campaign will be felt in the homes and lives of thousands of workers by reason of the decrease in accidents resulting in death, permanent disability and loss of time. Human misery cannot be measured in dollars and cents, and the good to be derived from this work is beyond the capacity of the mind of man to estimate.

The splendid results accomplished by the Portland Cement Association in their accident prevention work was both a pattern and an inspiration to the members of the Safety Committee of the National Coal Association. While it is evident that the hazards at cement plants are more or less man-made, and that dangers about coal mines are natural and more difficult to overcome, there is enough evidence in this country that systematic, intelligent safety work can and will achieve extraordinary results.

The members of the Safety Committee of the National Coal Association, and those cooperating with them, after much study of the situation and after obtaining the benefit of the experience of those who have devoted much of their lives to safety work, devised a safety plan, or program, national in its scope, which it was decided to advance and to push with every conceivable effort until results are forthcoming. In it is an appeal to the national pride of the coal operator, and the miner, to bring the accident record of this country at least in line with that of foreign countries; a humanitarian appeal for the elimination, as far as possible in the naturally hazardous occupation of coal mining, of injury to the worker in the mine; and a plea on an economic basis to the coal operator of this country, who is in need of every economic advance which he can possibly contrive.

The outline of the safety program, briefly, is as follows: Its purpose is to spread a network of active and interested organizations throughout the coal producing sections of the United States and to keep those organizations, and through them the coal companies and miners, working constantly in the cause of safety and the reduction of accidents.

The Safety Committee of the National Coal Association acts as the centralizing and steering committee. The chief function of this major committee is to stimulate interest throughout the country in mine safety, direct the organization and operation of district groups, and collect and distribute the data and information obtained. In addition to its accident prevention work, the Safety Committee will, through the district committees, sponsor First Aid Meets and training in First Aid and Mine Rescue Work.

Directly under the Safety Committee are the local safety organizations, which are separated into district groups. These committees will arouse interest in safety devices and in the enforcement of safety provisions among the companies within their territory, and will serve as a clearing house and forum for the discussion of all kinds of safety questions. These local organizations, under control of the operators, will cooperate with all other local groups or officials interested in safety work, such as local mine inspectors, local representatives of the U. S. Bureau of Mines, the Jos. A. Holmes Safety Association, or similar organizations. They will also act as a clearing house between the company organizations and the Safety Committee.

Under the local safety organizations come the company organizations, composed of member companies. These company members will furnish to the district groups

detailed reports on all accidents, the total cost of such accidents, including not only so-called direct costs, but all the "hidden" costs involved through interruption of work and general demoralization that follows an accident. This information will ultimately reach the Safety Committee, which will assemble the data for all groups working under its supervision and disseminate such information among them.

It will be a natural procedure for the industry, at the beginning of the movement, to attack the cause which has resulted in the greatest number of accidents in the coal mines of America, viz, falls of roof and coal. Fifty per cent of the accidents in mines in this country are from this source.

In the solution of the problem of accidents from falls of roof and coal, the experience of some of the states along this line would be of great help if made generally known. For example: in the year 1927, in Alabama, there was one fatal accident from falls of roof and coal for every 330,999 tons produced. In 1931 there was a fatal accident from this same cause for approximately every 1,300,000 tons mined. In other words, the record for the first six months of 1931 is four times better than the record for the year 1927. These results were accomplished in my state (where roof conditions are relatively bad—certainly worse than the average) by adopting a standard method of timbering underground, followed by proper instructions and reasonable discipline. Prior to the adoption of these definite standards of timbering, it was more or less a custom among the so-called "old-time" miners in Alabama to resent the suggestions or instructions of mine inspectors as to when and where to set timbers, and unless the inspector was a man of considerable force the timbers were not always set. Now, in a great many mines of the state, timbers must be set at certain fixed distances, regardless of what the opinion of the miner may be; and at the same time the responsibility still rests with the miner to set timbers at shorter distances if conditions require.

The National Coal Association will give one prize each year for the most meritorious accident record based on reports that are furnished to that organization, and will urge all district associations of operators to give trophies yearly for the best records in their respective districts.

And this is the basis for the drive which has been started. It will be noted that it is a chain, or wheel, consisting of the employee, the mine owner, the local operator group, the district group, on to the National Safety Committee; then back again to the operator and employee with the most practical and worth-while methods from the whole group. It is a gigantic safety movement, reaching out to every one connected with the bituminous coal industry of this country. For it to accomplish the desired results, every cog in the wheel must work smoothly, or, in the oft quoted words it must have "the Everlastin' Teamwork of every Bloomin' Soul". And it will have it, because of the spirit and the purpose behind the drive.

It is also obvious that if the plan of the National Committee is to succeed, its very fountain of life must well from the unflagging zeal of the executive heads of our coal mining organizations. Only too true is the statement that heretofore their interest has been lukewarm and thus, in large measure, we account for the ghastly accident record of the American coal mines.

Now is given the opportunity to contribute constructively to their day and time. I am sure they will not fail.

Pride in the industry—pride in America and its standards—the human interest of men in those who undergo the hazards of our mines, will predominate. Thank God, the souls of men still rule the world.

SECRETARY HARRINGTON: Mr. Fies, please give us data on your no-accident record at Empire Mine.

MR. FIES: We have forty or fifty negroes in a mine producing 1600 tons of coal a day from a thirty-inch seam. They went from October 9, 1929 to October 8, 1931, without a single lost time accident, lacking one day of two years.

We are going to try again to achieve a record of two years without a lost-time

injury. It can be done. I don't think the nationality or color of a man's skin has anything to do with the problem of safety. My experience over twenty-seven years is that all are amenable to reason, and if your foremen are patient and show the right sort of consideration, the average coal miner will respond to square treatment. This is the basis of our educational work among the negroes of the state, and they responded in a splendid way. They are anxious to take advantage of their opportunity, and make splendid workmen, as some of you men in the North found out about '15, '16 or '17.

CHAIRMAN HOSLER: Has any one here anything to say on that part of Mr. Fies' paper covering the manner in which the Mexican has responded to the accident problem in the West and Southwest?

OSCAR A. GLAESER (United Verde Copper Co., Jerome, Arizona): Under normal operating conditions the United Verde Copper Company employs about sixty per cent Mexican labor in its mines. I have found that the Mexican is over anxious to follow the rules and instructions.

In his zeal to do as he is told, he is very apt to tell his boss "yes," when he doesn't understand the instructions. It is just a matter of making sure that the Mexican understands his instructions before leaving him to his job.

We had one crew of approximately ninety men who worked 30,000 shifts without a lost time accident. That crew was made up of approximately seventy-five per cent Mexicans, very few of whom speak English, and all worked underground.

R. A. SHAW (Murray Corporation of America): In Memphis we have a saw mill, employing 500 men which had a very high accident rate. We had to guard every point of contact but during the last three months we have gone without an accident. I mention this because we are adopting a system of thorough guarding, instead of depending on education.

C. W. GIBBS (Harwick Coal and Coke Co., Pittsburgh): In an effort to educate our miners in the state mining law of Pennsylvania, we published a booklet "What the Miner Must Know" in which we summarized state regulations pertaining to the duties of the miner. Each copy cost us seven or eight cents in a lot of 500. They were distributed to the men by their foremen. Later each foreman questioned his men on the contents to learn if the book had been read and digested. The last leaf in the book was a form which the foreman filled out and turned in as a record to show that he had examined the man. This method proved very successful.

CHAIRMAN HOSLER: One of the real live parts of our program is our Question Box. I now turn the meeting over to our Vice-Chairman, Mr. Comins, who will have charge.

(W. H. COMINS, National Lead Co., St. Francois, Mo., took the Chair.)

CHAIRMAN COMINS: The first question is "What is a lost time accident?"

The Missouri Compensation Act under which the National Lead Company operates, allows three days. If, however, the doctor says an employee can go back to work the next day on light duty, we don't call that a lost time accident. If the doctor says he should not go back, then we charge a lost time injury.

We follow the opinion of our doctor because many men live on farms, have the wounds dressed, go home, and do not return to work the next day because of other reasons, such as care of their stock or other business.

W. H. FORBES (U. S. Bureau of Mines, Vincennes, Ind.): A lost-time accident is any accident that incapacitates a man beyond the day or shift on which it occurred. Holidays and Sundays are excluded. If the doctor states that a man will not be able to return to work the following day, and the mine is idle, I call that a lost time injury.

MR. GEORGE (Madrera Hill & Co.): If the patient does not agree with the doctor, what do you do?

CHAIRMAN COMINS: Take the doctor's word until the Compensation Commission rules otherwise.

R. G. WAYLAND (Homestake Mining Co., Lead, South Dak.): In computing injury rates we count injuries which prevent a man from returning to work the next day but also keep a record of minor injuries too. Our insurance rate, we are self-insurers, instead of being around five and ten per cent is one per cent for compensation, and less than one-half for medical attention. We take care of injured and sick men and their families and provide medicine in and out of the hospital.

Mr. GLAESER: A lost time accident is an accident which prevents the injured from continuing his regular work either on the day of occurrence or the following one. We are somewhat more lenient. Our bosses are on a safety bonus and naturally they are anxious to see a man get back to work the next day. But if a man is injured and in a doctor's opinion he is able to do light duty on the surface next day at a rate which gives him state compensation, his case is a lost time accident and the shift boss loses his bonus. Our chief surgeon is inclined to favor the patient; if there is any doubt in his mind as to his ability to return, the man stays off the job.

SECRETARY HARRINGTON: One of our difficulties in the Bureau of Mines is developing uniform statistics and methods of keeping accident records. Comparisons between companies are misleading unless they compile their figures on the same basis. We get every conceivable sort of lost time accident definition. We feel, in the Bureau that some standard should be adopted to which all mining companies would conform. A reasonable definition is any injury involving the loss of time beyond the day or shift on which it occurred is a lost time injury. The injured should be unable to return to a job which he can perform with normal efficiency.

A large operator in the South said, "We investigated the cost of lost time accidents and the so-called trivial accident. The latter cost us plenty of money."

The base wage rate, according to him, was \$4 per day; considering coal mines, metal mines, steel mills, and other plants. "A result of that study," he said, "we know—we don't figure at all, we know—that every trivial accident, on the average, costs this company at least \$4."

Mr. HOSLER: In addition to 34,000 compensable accidents in 1926 to '30 in bituminous mines of Pennsylvania, we had over 50,000 accidents that were trivial, with a medical cost of \$8 apiece, or a total of more than \$400,000. These trivial accidents are important because every one of them was a potential death.

ADJOURNMENT

Wednesday Afternoon Session

October 14, 1931

RUSH N. HOSLER, Chairman

Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.

The third session of the Mining Section convened with General Chairman Hosler presiding.

CHAIRMAN HOSLER: The author of the first paper on the program is Prof. A. C. Callen of the University of Illinois. I am very glad to present him.

Inspection of Electrical Equipment in Coal Mines

By A. C. CALLEN

Professor of Mining Engineering, University of Illinois, Urbana, Ill.

For nearly fifty years electricity has been the servant of the coal mining industry. The introduction of electric mine haulage in the anthracite region in 1887 marked the real beginning of the extensive underground use of electricity and with it came the hazard that is still with us.

To attempt to estimate the number of miles of trolley wire and of insulated wire in our coal mines would be futile, but if such figures were available they would be forceful reminders of the ever-present hazard that accompanies our faithful servant. Not only do we have the initiation of mine explosions and the starting of fires, but a large number of men, about 100 each year, are killed by electrical contact. With the thousands and thousands of miles of electrical conductors, and with thousands of machines using electricity for their motive power, it must be clear that the hazard cannot be entirely eliminated, but, after all, is it not our job to see that it is reduced to the absolute minimum.

It is not necessary to present detailed statistics concerning electrical accidents to a group such as this, for you are already familiar with them in a general way. But in your own work, in your own study of those reports on coal mine fatalities that the United States Bureau of Mines issues each year, can it fail to have escaped you that this matter of electrical fatalities is a serious one, and that it can scarcely be said to be receiving the attention it deserves.

Just to refresh our memory let us turn to the latest information that I have been able to find—Information Circular No. 6419 of the Bureau of Mines, covering mine accidents in the United States for the fiscal year that ended June 30, 1930. It is by Dan Harrington and C. W. Owings. Let me read hurriedly some extracts: "Eighteen explosions started by electricity resulting in 154 fatalities or 77.4 per cent of all the fatalities from explosions; trolley locomotives and non-permissible mining machines again head the list of electrical causes of explosions; explosions were caused by broken light bulb, by mining machine nips, by ruptured mining machine cable, by non-permissible blasting device, pump motor, fan, wire, etc.; nine fires were of electrical origin."

Add to these figures the approximately 100 men killed by electric shock from contact with trolley wires or other wires or with electrical equipment, and we begin to realize that here is a field for accident-prevention that, while not exactly untouched, yet gives promise of being one that is entitled to more cultivation than it has yet received.

Perhaps one of the first places to which we may turn for aid in our attempt to discover safety regulations for the use of electricity in mines is our well-thumbed copy of our state mining law. Surely here we should expect to find that a subject

that has been of major importance for many years would be covered by detailed regulations for proper maintenance and inspection. But we search in vain, or almost in vain. Here and there we find a sentence advising that telephone lines shall be repaired promptly when necessary, or that trolley wires shall be kept taut at all times, or that electric pumps shall receive careful attention while in use at a permanent pumping station. Some states, of course, have more effective provisions.

But it need not worry us unduly that the mining law is all but silent on this question. That can be remedied, although the remedy may not be efficacious. Possibly present laws may be construed to provide our state inspectors with needed authority. Pennsylvania, indeed, created four electrical inspectorships back in 1928. Although this number has been reduced to one, yet I understand that the Department of Mines feels that much good has been and is being accomplished by these electrical inspections made by a special electrical inspector. It should be remembered, however, that Pennsylvania has an appreciable amount of its mine law devoted to the inspection and maintenance of electrical equipment and wiring, and I believe that the mines now have a book called the "Electrical Inspection Book" that the company electrician fills out and signs in the same way as the mine foreman and fireboss.

If I am correctly informed, the practice of the Pennsylvania electrical inspectors was to confine their work largely, if not entirely, to the inspection of permissible equipment. This procedure is quite natural, for at present permissible equipment is purchased in nearly all cases for mines that are classified as gassy, and it has been a real problem to see to it that such equipment is kept in the perfect condition that continued permissibility required. Permissible equipment improperly maintained is no longer "permissible", and develops a false sense of security that is a positive danger. Without detracting from the importance of such inspection work, it seems to me that it is equally important that all the rest of the electrical equipment be inspected. True, a permissible machine becomes a source of unexpected danger because of the omission of a bolt or a lock-washer, or any one of a number of parts, and this unexpected hazard is almost entirely an explosion hazard. Non-permissible machines are *always* explosion hazards, but every electrical installation of whatever kind presents other hazards against which proper inspection would guard. I am in favor of permissible machinery and believe that many mines are in need of permissible equipment today, but when it comes to electrical inspections, whether by the state or by the company, I think the whole territory should be covered. Some say that non-permissible machinery can't be made safe until it is made permissible; this is true as regards explosion hazards, but wiring and accessory equipment, and trolley locomotives will be with us for many years to come. Such equipment must not be neglected just because it is not permissible.

The question as to whether we should leave state inspection of electrical equipment and whether additional legislation is needed, therefore, is one that I must leave to your several states for an answer. My own feeling is that most of our laws confer sufficiently broad powers on the state inspectors to make additional legislation unnecessary. Standards or regulations can be and are promulgated by state departments, and while such regulations might not have the full force of law, yet they would serve as an admirable guide to proper practice. It would seem quite feasible to have the state inspectors do such work as this, for surely it is one of the most important things as proved by statistical and personal experience.

But, you say, would this really work? Would the inspectors really feel that they should add to their present burdens? I believe they would. Some of them do it now. In many cases the things they need to note would take very little time, but merely require special observation.

As proof of this it will be proper to cite an example showing that "it can be done." In 1930 Alabama lost 11 miners by electrocution. W. B. Hillhouse, the chief of the Department of Mines, decided something needed to be done. He didn't have a law passed, but he went to work with the law already available. He gave publicity to

the number of deaths in 1930 from electrical contacts. He sought and obtained the cooperation of the operators. He made suggestions regarding proper construction and maintenance. The state inspectors devoted attention to electrical defects and noted them in the reports. The result: up to September 22, and I hope time will prove for the entire year, not a life has been lost by electrocution.

Let me quote from a letter from Mr. Hillhouse:

"Alabama loss of life by electrocution, particularly from coming in contact with trolley wire, is high.

"The majority of coal seams range in thickness from 24 to 42 inches, necessitating the brushing of all haulage roads; and unless this brushing is squared on ribs it makes the proper suspension of trolley wires difficult.

"The Alabama state law does not require the guarding of trolley wires under 500 volts. All our power is 240 and 250 voltage and to require guarding all the wires as they stand today would involve terrible expense, so therefore we tried the next best.

"In making our inspections close attention is directed to electrical defects and setting them out in the reports. We make exceptions in reports to such as:—

Hangers improperly spaced.

Improper suspension of wires.

Requiring all trolley wire to be not less than 3 inches on outside of rail.

Requiring the guarding of trolley wire at cross-overs, turn-outs, side-tracks, sand stations, engine rooms, pump rooms and repair shops; where men mount and dismount mantrips, in fact all places except straight haulage.

Insisting that all wires be on opposite side of room-necks.

Careful examination of cables to mine machines and see that mine machines are grounded with a separate cable.

Insisting on all transportation men using electric cap lamps for continuous illumination.

Assurance that current is off any electrical switches—rubber matting in deck pan of locomotive.

Requiring that employees, where work requires close proximity to electrical equipment, wear insulated shoes.

Adequate clearance on opposite side of wire so as to allow free passage between cars and rib for travel.

"Last year we lost 11 men by electrocution—to date this year none. We attribute this improvement to interest manifested by all concerned in carrying out the above suggestions. Finally the whole proposition is one of strict supervision and proper disciplining of violators."

Does this Alabama experience not prove that electrical inspection, as a part of the regular state inspection, can accomplish much?

From what has gone before it must not be inferred that I have the slightest opposition to the revision of state mining laws so as to include suitable rules covering the inspection and maintenance of electrical equipment and wiring. My point is that it is unnecessary to wait until the laws can be amended. If our state inspection departments will take the initiative all of them can doubtless find a section of their law that can be construed to include electrical inspections.

It seems to me that the very inertia of our governmental system will always permit our mining laws to lag behind approved practice. For that reason I favor a state mining code that confines itself to fundamentals and that provides for detailed regulations to be issued by the Department of Mines. Laws must be made and changed by legislatures; regulations can be made or revised in as brief a time as is required for the necessary hearings.

But whether or not we can have state electrical inspection without a change in the laws, let us have the needed changes for the effect that it will have on those mines that use the state law as an index of the maximum rather than the minimum requirements. Suitable laws and regulations will mean higher standards in such mines.

And let us remember also that better-trained men will be needed all along the line. Systematic inspection of electrical equipment has been followed for years by many of the larger coal companies. It has been found, aside from the immediate effect that this inspection work accomplishes from the safety standpoint, that there is also an economic phase. By frequent inspections it is possible to discover and correct minor difficulties which, if neglected, might develop into something requiring costly repairs, together with the loss of tonnage that would result from the machine being out of service.

With such companies the number and size of the mines have made it not only possible but necessary to have an experienced man in charge of electrical installations and equipment. His training has given him an appreciation of the needs for and benefits from regular inspection, an appreciation that the average mine foreman or mine electrician at a small mine often fails to have. With these latter men a considerable amount of additional training will be needed. Here is a place where our night schools and short coal mining courses can help. It has been my experience that much antagonism to safety regulations has been the direct result of ignorance. Most men lose their hostility when they get to understand the "why" of things. Evident as electrical hazards and the need for regular inspection may be to us, they are not so clear to many mine officials and sub-officials.

The United States Bureau of Mines has been active for years in keeping us informed on this phase of the safety question. The publications it has issued have been numerous and of real value, although one feels that present-day accident data indicate that not enough heed has been given to the suggestions of the Bureau. It may be worth while to remind you of some recent ones that are very helpful in this connection:

Information Circular 6037 (May 1927). "One Hundred and One Questions on Electrical Inspection in and about Mines."

Information Circular 6098 (January 1929). "Electrical Safety Inspection: Suggestions for Mine-Safety Engineers," by L. C. Ilsley.

Information Circular 6100 (February 1929). "Electrical Accident Prevention," by L. C. Ilsley.

Information Circular 6269 (May 1930). "Suggested Safety Rules for Installing and Using Electrical Equipment in Coal Mines," by L. C. Ilsley and Charles M. Means.

There is enough material in these four circulars to enable any company, any state, to make a splendid beginning on a program of adequate, systematic electrical inspections.

In conclusion, may I summarize the points I have tried to make:

1. The use of electricity in coal mines is accompanied by inherent hazards that occur in normal operation or as the result of defects.
2. Among these may be mentioned the ignition of gas or coal dust explosions, the starting of mine fires, blasting hazards, and electrical contact hazards.
3. Statistical data prove the seriousness of these hazards in actual mine operation.
4. Experience has shown that suitable regulations governing installation, use and maintenance of electrical machinery and equipment have reduced these hazards.
5. State inspection under present laws has shown remarkable results in two states where it has been tried.
6. Our state mining laws might well be revised, and added to where necessary, to provide proper regulations governing the use and inspection of electrical equipment.
7. Some of the larger companies have had company regulations and inspection reports, with results that have been profitable from the standpoints of safety and economy.
8. Sufficient information is now available through the United States Bureau of Mines to enable any company or any state to formulate a satisfactory program covering installation, operation and inspection of electrical equipment.

CHAIRMAN HOSLER: The Executive Committee of the Mining Section made no mistake in selecting Professor Callen to present this paper.

SECRETARY HARRINGTON: Electricity in mining is an actuality and we will use more of it in the future. This is a situation we must face even though many of us are opposed to the manner in which electricity is being handled. I can cold-bloodedly say that much of the electrical installation in mines is very poorly done.

I have recently summarized the explosions and fires in coal mines in the United States during the last four years. In four years 897 men were killed and 74.8 per cent of them died in explosions started by electricity.

Coal mining men can look that in the face and sidestep it if they want to, but it is coming home to them in compensation costs. It is up to them to stop these injuries.

Mr. Callen gave you the experience of Alabama in the reduction of fatalities from contacts. I think fifty-five of the seventy killed in five and one-half years in that state came in contact with 250 volts, D.C. When people say 250 volts D.C. is safe to handle, you tell them that it has put many a man in his grave.

Pennsylvania has been able to prevent deaths from explosions due to electricity. It has not had an explosion in a bituminous mine for over two and a half years which has resulted in the death of more than five men, and not a major disaster in a bituminous coal mine for over thirty months. I asked the chief inspector what he thought was the reason and he said that our mining companies and state mining inspectors are making electrical inspections and minimizing the hazard. Other states can do it, but they are not.

Mr. DUNBAR: I think electrical inspection is a very important part of our job as operators. The electrical inspectors of the Mining Department in Pennsylvania have covered all mines as rapidly as possible but the fact developed that inspections were not being thoroughly made. A majority of the inspectors were not qualified.

We do need close supervision of electrical equipment. We have a man who spends all his time inspecting electrical equipment. We have a piece of inch and a half pipe about fourteen inches long, with a screw cap on each end, and inside of the pipe is a small pin container. Inside that pin container is an inspection report. Every time the machine is inspected, the mechanic makes an entry on the report in the container which is available to the mine inspector, mine foreman, superintendent and all officials. If there is anything wrong with the machine, a flag is put on it until the trouble is corrected. A copy of the report is sent to the mechanics' office above and below ground.

W. T. MEZZER (Hudson Coal Co., Scranton): Our Electrical Department has their own men to inspect trolleys, locomotives and other equipment regularly.

R. S. LONG (Koppers Coal Co., Elkridge, W. Va.): We inspect weekly at our plant, and don't have a very big mine. I think wiring is one of the greatest hazards we have.

JOHN LYONS (Bell & Zoller Coal and Mining Company, Zeigler, Ill.): If our motor man reports a defect at night, it is fixed immediately. On week-ends all motors are inspected, but my inspection covers cables and trolley wires, etc. I report equipment that needs fixing and the electrical department fixes it.

CHAIRMAN HOSLER: Mr. Callen brought up two points on which I should like to have some discussion. One is that it is not necessary to change a law to correct a condition, and the other is discipline.

I should like to point out the effect that the lack of discipline had on a particular mine in the southwest part of Pennsylvania. This company did not have a fatality from electricity for many years. There were so many fatalities from electricity during this same period in other mines in the state that we made an investigation. During a visit to the mine we found the answer in a few minutes.

Every foot of trolley wire in the mine was guarded. The management of the mine changed, and before two years had passed there was hardly a thousand feet of wire guarded and the mine had several electrocutions from trolley wires.

Why tarry for change in law? Why seek authority to do something that will insure the safety of the men?

Mr. METZGER: We have, in the anthracite region, a law which prohibits men from riding on or in a loaded trip. The bituminous field of Pennsylvania, however, has a law which permits men to ride on or in loaded trips, and prescribes their duties and safety precautions which must be taken to guard them. In operating our mines we find it necessary to have what we call trip riders, but according to law, we are not allowed to have them, and we are at a disadvantage, if any men are injured. We should have a change in law to protect ourselves.

The object of electrical inspectors of Pennsylvania, I believe, was to inspect only permissible equipment. Mr. Dunbar told me that the first inspection made at their mine was only the general electric inspection. At our operation they confined their inspection to permissible equipment. It brought out a few effects in some permissible equipment but until a few years ago we made no pretense of having permissible equipment. A permissible equipment became available, more efficient and generally adopted, we changed our program and installed new equipment. It is now our policy to buy permissible equipment.

The electrical inspector criticized the so-called flame proof type of cutting machine which was one of the first cutting machines built in an effort to prevent explosions. They were never considered gas proof. The inspectors condemned some things on them, but passed an open-type equipment. I am heartily in favor of permissible equipment, and think much good can be done through electrical inspections by competent men.

Mr. METZGER: We have no anthracite mining laws covering electrical equipment. It may seem strange because we have mining laws covering the installation and operation of electrical equipment in the bituminous field.

Mr. LYONS: We had an interesting accident with one of our Joy machines. The machine had been working two hours loading coal, when something went wrong. The cover was taken off the motor. I don't think it was a permissible but a flame type motor. The repairman stood in front about four feet from the side of the motor and told the Joy operator to start the motor. There was an explosion.

There was a little dust accumulation in the motor, but we concluded that the explosion was caused by the distillation of lacquer with which the coils were impregnated. While the machine is closed up there is not sufficient oxygen to form an explosive mixture but as soon as the cover was taken off sufficient air was present to cause an explosion.

Mr. Harrington thinks electricity is guilty of many deaths but where there is an accumulation of gas and it is exploded, does he put the blame on electricity or the accumulation of gas?

SECRETARY HARRINGTON: On the ignition, but some Illinois mines are not ventilated as they should be. I have some figures I can show to you to prove it.

Many state mine inspectors are like a lot of us, not competent to make electrical inspections. I have been doing safety work in mines for thirty years; I am a graduate mining engineer and have had the mining engineers' course in electricity but I don't claim to be able to go underground and make an electrical inspection. There has not been agitation to hire men competent to do that work.

I am not blaming the state mine inspectors. The state mine inspector is doing his duty to the limit of his knowledge, but the companies and the states are doing little or nothing about electrical inspections.

If you read the technical press of Great Britain, you will find meetings mentioned of mine electrical inspectors. We need electrical inspectors more than they do in Great Britain.

Mr. LYONS: Do you believe that a mine with poor ventilation and permissible motors is more dangerous than a mine with good ventilation and open type motors?

SECRETARY HARRINGTON: Ventilation, by all odds, is more important than any consideration as to type of electrical equipment.

G. N. McLELLAN (Butler Coal Co., Wildwood, Pa.): I don't think permissible electrical equipment should be opened in any working face. We have Joes that break down in our working face. When it is possible to move it out beyond the last open break though we do so; our mechanics then open the machine to make their inspection. If it is impossible to move the machine, the mechanic cannot open up any part until the assistant foreman makes a thorough examination of the working face to determine whether there is any explosive gas. Should there be gas, the foreman must extend his canvass or get the gas out before any repairs are made.

Mr. GIBBS: I expected to start an argument with the Chair on the practicability of guarding all trolley wires throughout the mines. We have difficulty maintaining the guards at the intersections, crossings, and places where we feel it is vitally necessary to have them—let alone attempting to guard all trolley wires over some twenty-five or thirty miles of workings.

CHAIRMAN HOSLER: Don't misunderstand me. I didn't recommend the guarding of all the trolley wires. I brought that out as illustrating that such conditions do cause electrical accidents.

There is one point Professor Callen brought out that has not been discussed. Should electrical inspection (and I believe you all agree we should have it, and you all have some kind)—be applicable to both permissible and unpermissible electrical equipment?

SECRETARY HARRINGTON: Yes, absolutely. Several years ago I investigated an explosion in a Colorado mine where nineteen men were killed. The company, state mine inspector, and the Bureau of Mines agreed that the explosion started at a point within about 200 feet of the face of an advancing entry where the nips had been attached to the power wires to furnish power to a mining machine. The nips had been pulled off at a time when there was a mixture of gas close to the roof. The machine was being pulled across a slant cross-cut near a door. The gas came back to the point where the nips were attached and when the cable was given a pull, an arc set off the mixture.

The state mine inspector then recommended a method of putting the nips on the exposed part of the wire close to the floor, instead of close to the roof. A jumper ran down from the wires and fixed the attachment point close to the floor. Even if an arc occurred, gas would only be ignited when the entire place was filled with it. Many such points can be brought out by efficient electrical inspection without reference to permissibility.

WM. CONIBEAR (The Cleveland-Cliffs Iron Co., Ishpeming, Mich.): In the state of Michigan we have four mining laws: the first, every company conducting mining operations shall employ a mine inspector; the second, it is the duty of the state mine inspector to inspect each mine in his district once in sixty days; the third, the mine inspector at his discretion may warn men working in dangerous places not to work there; and the fourth, it is the duty of the mine inspector to see that all abandoned properties are properly protected. Mr. Harrington gave Minnesota, Wisconsin and Michigan credit yesterday for being three of the foremost states of the Union in accident prevention. Management of companies in these states appreciate the necessity of accident prevention. Information is available for accident prevention work. Education in safety is carried on in Lake Superior district through a chapter of this organization known as Lake Superior Section of the National Safety Council; the chapter has met regularly each year since its organization about fourteen years ago.

The safety inspectors of that district impress the necessity of attending that conference on the management. They attend.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): We had a meeting on financing of our Section. Some one said, "This is a pretty tough year, maybe we had better not ask for so much money."

We made the assessments on the same basis as in 1929, and within thirty-six hours I had seven contributions in my office. The management in the Lake Superior district is perfectly willing to support this program and finance it, too.

CHAIRMAN HOSLER: We will pass to the next paper. We have had a telegram from Mr. Pett, Safety Engineer, Utah Copper Company, Bingham, Utah, saying that, owing to sickness, he could not be here today. In his absence our Secretary will read his paper.

SECRETARY HARRINGTON: Mr. Pett is a representative of a mining company with an outstanding record in safety. Mr. D. J. Parker, of the Bureau of Mines, recently wrote a paper for the National Safety News on the safety activities and accomplishments of Utah Copper. They have reduced accidents in recent years, I think, over ninety per cent. They have established one of the outstanding records in the United States.

Mechanical Safety in Mines and Mills

By L. FERN PETT

Safety Engineer, Utah Copper Company, Bingham, Utah

In a discussion of mechanical safety in mines and mills, I am conceding that you guard your machines, maintain good housekeeping, make regular inspection of mechanical equipment, have proper light, heat and ventilation, have good sanitation, and that you have ample supervision and use every available means of educating the employees. I assume this plant condition because you are endeavoring to create a safety atmosphere and much has been written regarding these fundamentals. They are interlocked with and necessary for mechanical safety. Yet accidents occur.

An examination of these mechanical accidents over a period of years tends to place them into four classes. Those due to (1) poor selection of the employee for his particular job; (2) bargain guards; (3) jobs done with equipment in action which should be done with equipment at rest; and (4) disobedience to State General Safety Orders.

How often we say of an accident, the injured employee is responsible, when it isn't his fault at all. His capabilities allow him to do no more. In most companies men are placed, so to speak, in a bottle and every so often the bottle is shaken, the larger ones rise to the top and the small ones settle to the bottom. That may be nature's way of finding where a man belongs, but it is slow and in this machine age of speed we should do something more to aid in the selection of men for their particular jobs. It is not unusual for the physician to make a rather thorough examination from the tonsils down and give the applicant an official company approval as a fit employee.

Let us follow a man, "Gordon," who is thus hired for the mechanical department. Perhaps he gave the fellow who hired him a nice story with good references (we know how some of those fellows get references). He probably was on the job with nothing happening until he knew the "ropes", until some morning somebody had to be selected to go out on the traveling crane. Were you ever selected? I suppose you were. Gordon had been on the crane several months, and as we said, all possible means of education had been used to make him a safe worker. One day the brakeman had not made the tie rods secure and as the crane went along, the boom suddenly came loose, swinging right and left near the overhead trolley construction. Several other men on the car took their time and got in the clear, but not Gordon, he waited—just could not make up his mind which was the best thing to do—until he looked up and saw fire works and the 750 volt line coming down; then he jumped off, spraining his ankle. This was just a rattle in the bottle, but it wasn't Gordon's fault. He was just unable to make a mental decision in an emergency.

The next time we meet Mr. Gordon is several months later at the beginning of shift. He was anxious to help and, realizing that the stack was not straight, decided to climb up to make it secure without telling anyone. For some reason Gordon wasn't needed where the work was going on, although he had been on the job longer than some of the other men. He had been selected for the job. He could save time, he thought, to do it while the operator in charge and crew were busy unloading material from the car. To get in position he put his hand out for a few seconds on the cable, but he happened to choose the few seconds when the operator, following signals, began to lower his load and Gordon's thumb was caught between the cable and sheave. This was just another rattle in the bottle.

Eventually Mr. Gordon is found out on track maintenance work. The pay isn't so much but he is well satisfied. He has rattled out of the mechanical department and so we will leave him except to say it is the Gordons who are selected for jobs of a mechanical nature, jobs which require the best men available who cause their full share of mechanical safety failures. Assuming the ratio of 1:29:300, as developed by the Travelers Insurance Company, additional effort made to trace a man among the 300 items before he has too many of the 1 class accidents should be productive of results. We may read the writing on the wall, for his operating efficiency will probably parallel his safety efficiency. We hear considerable about a periodic physical examination. That may be fine, but a periodic check up and examination of men in safety and operating efficiency will produce results which will save several rattles of the bottle, money for the company, and give safety to the men.

Recently a new mill was put in operation with everything the best that experience and money could buy. The designers had, according to instructions, provided guards for all equipment. In operation, the conveyor belt, leading from the coarse crushers to the fine crusher bins, slipped over the idler sheave occasionally. But since a guard had been provided which covered the sides and end of the sheave, it was considered safe to place belt dressing on the conveyor belt. This plant being something of a model, the workmen had been told several times to be careful and not work too close to the idler sheave, always using a paddle so the hands would remain in the clear. One cold day part of the belt dressing fell off before it reached the sheave. The mill was operating to capacity and the conveyor had to be kept in operation, so with a paddle full of dressing the operator climbed upon the supporting frame and placed the dressing nearer the sheave. It worked fine. He decided that another paddle full would make things work just right so up he came with another, close to the sheave, so close in fact, that the end of the paddle was caught. Due to shock, he held on to the paddle and in followed fingers, hand and arm.

Needless to say, the guard covering the sheave was extended to cover the belt over the supporting frame so that no workman could climb the frame and come within several feet of the sheave. The guard, instead of following the contour of the sheave, follows the belt line across the frame. It improves the looks of the equipment and guarantees safety in its operation. The maker of the original guard provided a guard, but he did not stand back far enough to see the perspective in operation. We may think our own plants have no such partially guarded equipment until we look at the guards over the emery wheels which need packing every so often or guards which require bolts to be made secure once a month. These are only bargain guards, and the accident always happens when they are at "one-half-off."

There probably are operations in all plants where a mechanical guard would interfere with operating efficiency; and since operating efficiency and safety efficiency have the same source, it follows that we cannot always build a barrier around all operations. Fine ore bins are usually filled by a conveyor belt and emptied through mechanical feeders at the bottom. Soon after the bins are filled in cold weather, a frozen crust forms over the top, interfering with feeding operations below. In order to keep the feeders working, the material must be loosened with bars. In such a situation, one man recently started the feeders and tried to break the top crust so that he could work the material down. The crust being hard, considerable time

was taken to break through. In the mean time he couldn't see the feeders at work pulling the material out in a cone shape below, leaving but a shell above. When the top of the cone became large enough, the man on top fell through, and in falling the top crust pulled the loose material, covering him with several feet of fine crushed ore. He was removed through the feeder below too late.

This happened because the operation was bargain guarded. Since we could place no barrier over the bin, we should have looked a little longer and seen the operation as it existed, made up of machines and men. Yes, every man now wears a safety belt or harness on this operation. We are prone to look at a flow sheet without a man in sight. Again let's stand far enough back to see the perspective in operation, to see the men and machines which make up any operation and plan the guards for the operation, not the machine or not the man.

One of the finest lessons I ever received was from a coach who told me I could play basketball twice as well if I would run around half as fast. A lot of the romance in safety engineering yet to come will be the discovery that we can do jobs just as well with the machines or power at rest as we have been doing them with the machines or power in action. Perhaps American industry with all its rush and hurry is only growing to maturity. When capacities of machines and equipment have been doubled and re-doubled until the element of time has lost much of its significance, when we don't work twelve hours day after day but are somewhat fortunate to work fewer hours and fewer days, the door of opportunity has been opened to mechanical safety in doing many dangerous jobs better with equipment at rest than we did them formerly with equipment in action.

An examination of the mechanical accidents of our company during the past eight years shows them falling into seven groups. The first, second and fourth most productive causes were due to jobs being done with equipment in motion, which we have recently found can be and are being done as well, if not better, with equipment at rest. This has been found true despite the fact that the mine has produced and transported in excess of 140,000 tons of ore and waste in 24 hours. The end is not reached yet, for we still have jobs being done hot which eventually will be done cold.

A lad was working in a clean-up gang cleaning under a conveyor belt near an idler sheave when the end of the handle of the shovel he was using caught under the sheave. He was a new lad on the job and needed work so he tried to hold the shovel, but as he tugged, thinking that it meant his job to let loose, the sheave wheel began to gain a little more and more of the handle so he got down to give all he could in a final pull on the shovel but he lost and as he did, the blade of the shovel in passing into the sheave cut across his neck and severed the jugular vein.

A check up showed this conveyor belt was handling 20,000 tons of ore per day, yet it was found there was time to clean up while it was down; and so with most plants the work is done by multiple units not all of which are operating at the same time. Many jobs can be done more effectively and safer on the units as they become idle rather than the hurry-rush system of doing the clean up, oiling and minor repairs while they are in operation. In this day of electrification when live shafts are giving way to separate electrical installations let's not forget that it's the same operation to effectively break the electric current as it is to stop the live shaft; that just as much precaution is necessary to keep the circuit broken as the shaft still, and that no one except the man who broke the operation should be allowed to start it again.

Our company has lost the experts who until recently boarded or left a train at top speed because they didn't want to slow up the operations. They've lost the brakemen and dumpmen who could pull on a dump, and off again, without stopping to dump cars. They have lost the men who had to oil the shovels and equipment while it was in operation. We can't do this any more. The men get on and off while the train is standing. The brakemen spend some time on the dumps cleaning cars and getting them properly closed. The men who clean and oil the shovels do this only

while they are down. They have lost perhaps a lot of other things including 90 per cent of their accidents but have doubled production per man.

Theoretically, the development of our mineral wealth is open to everyone. It seems an American custom—part of our heritage—this privilege of digging a hole in our public domain. Often work is commenced on a small amount of capital by men of little or no mining experience with a pick and shovel. Purposely we play the "hands off" policy at the beginning of these operations as far as state or government regulation is concerned for fear we may nip in the bud some future bonanza. Natural mortality takes care of a vast majority. The survivors of this first enthusiasm find that a lot of things are necessary; the word "equipment" (too often a good buy from an abler company's salvage) replaces the pick and shovel and the hole becomes a shaft. Shaft accidents are mechanical accidents since they always occur when some part of the mechanism goes wrong. The men are probably going up and down in a bucket. The assessor comes to tell them their stuff will have to be put on the tax rolls, the Industrial Commission (or some other commission) tells them that since they have taken on the extra two or three men they will have to take out compensation insurance to cover the employees at \$4 per \$100 of payroll, paid in advance; and some inspector brings a bunch of rule books, tells them to see that each man gets one and that all operations are carried out according to the State's General Safety Orders. Thus they're regulated.

One morning three men were riding down on the rim of the bucket when the clutch on the hoist began to slip. The hoist operator seized the brake and threw it on in desperation to stop the descending bucket. He did this so suddenly that one of the men was thrown off and fell to the bottom of the shaft. An investigation was made and recommendations were given, resulting in the installation of a crosshead for the transportation of men. There are a lot of crossheads in use but a recent development in crosshead construction combines several safety features with good operation. Safety dogs controlled by the operating cable eliminate the construction of a bulkhead to control the descending crosshead. The lack of this safety feature recently caused the death of two men when a flimsy bulkhead permitted a descending cage to crush the men working in the shaft. These crossheads also have a positive release on the safety dogs whenever the tension is released on the operating cable.

Accidents often occur because the men riding the crosshead or cage know they have no reliable safety device if some part of the mechanism fails and so are led to take chances when it is unnecessary. Recently, two men ascending a crosshead from a level had reached a point about 40 feet above the level when the crosshead came to a stop and began to descend very slowly, going down about three feet. One of the men, knowing they had no safety dogs, jumped off as the crosshead began to descend and, grabbing the center girt, threw his arms around the girt above. Immediately the crosshead began to ascend and he was caught between the edge of the crosshead platform and the girt he was holding. The clutch had slipped causing the hoist drum to reverse slowly. True, some part of the mechanism had failed. The State inspector, their only contact with safety, told them the engineer should not have removed his hand from the clutch when men were being handled in the shaft, and after the hoist drum had reversed he should have set the brake and remained stopped until he received a signal from the men below.

Small operators are not alone. No matter how many times a State inspector tells some companies that men are not to ride cages with tools or with cage doors open, they are still doing it with an annual toll of lives to show for the disregard and disobedience to State Safety Orders.

A bright feature on the horizon for the elimination of shaft accidents is the installation of an induction system of signalling for cages. The device, described in circular IC6487, permits conversation between the hoist operator and men in the cage to control the cage operation. The development of such mechanical devices will do

much to eliminate shaft accidents, but so long as 90 per cent of shaft accidents are due to the disregard of State regulations you will be unable to build a fence around the men until wholehearted cooperation between the operators, the men and the State mine departments is obtained. No need to issue more Safety Orders, no need to tell the foreman he can do this or do that, or the operators that they will have to pay this tax and that insurance; but if we can show that the installation of safe crossheads or induction speakers or what not will speed up operations, or if we can prove that to display safety posters long enough will decrease accidents, or that a little better living conditions make more efficient miners, we have our opportunity.

As teams don't learn to play football by reading a rule book, neither do mines or mills become safe by issuing safety orders. The best football teams need no additional time or effort to observe the rules in the execution of their effective plays, because the plays have been made to come within the rules. So with the mines or mills, when the operations become effective, when efficiency is reached, the operations will have been made to come within the safety orders.

E. A. STROCK (National Lead Co., St. Francois, Mo.): I think I have read that in some milling operations it is not possible to shut down machinery and oil it. Is this your experience?

OSCAR A. GLASSER (United Verde Copper Co., Jerome, Arizona): We have a number of gasoline and electric shovels which require oiling in several places, and it is only while the shovels are in operation, but those particular places have special oiling equipment, so that a man does not have to reach down among moving machinery, cables, or chains to oil. Practically all other oiling is done while machines are down.

H. W. GRESSING (Commerce Mining & Royalty Co., Miami, Oklahoma): We haven't any place in our mill, to my knowledge, that needs oiling while the mill is in operation which is not provided with an extension to feed the oil to the part. Oiling can be made safe.

R. G. WAYLAND (Homestake Mining Co., Lead, South Dakota): We have arranged our equipment so that oiling during operation is safe. A great deal of the lubrication is automatic and oil or lubricant is handled at points away from the machinery.

MR. O. F. McSHANE (Industrial Commission, Salt Lake City): I want to speak on how the Utah Industrial Commission approaches regulation of various industries. We are given almost carte blanc authority to make all safety rules and regulations in all classes of industries. These have the force and effect of law until they have been set aside as unreasonable by a court of competent jurisdiction. We do not wait for the legislature to fuss and log roll on a matter of primary importance.

When we have a set of rules and regulations to promulgate covering metal mining, coal mining, or building code, we have the interested parties appoint representatives. We meet, formulate a program and discuss the matter from the employers' angle, from the employees' angle, and from the technical angle. If possible, we have all parties agree unanimously on the rules and regulations to govern the operations of the particular employers; we always succeed in getting unanimity of opinion. In enforcing the code we can say that these are not the rules of the Industrial Commission, but your rules, made and entered into with your knowledge and with your consent. We insist that you play the game by the rules you have laid down, and if you don't like them, we are willing to give you a further hearing for an amendment.

A. H. FRIEDRICHSEN (Industrial Commission of Wisconsin, Madison): The tentative codes are made up by the Industrial Commission, and then a committee composed of representatives from employer groups passes on them. If there are changes in mining methods or new developments and the orders get out of date, the code is revised.

CHAIRMAN HOSLER: We will pass on to the next part of our program, the Question Box. Mr. Comins, who was to lead this discussion has asked Mr. George Martinson, Pickands, Mather & Co., of the iron district in Minnesota to preside.

(Mr. Martinson took the Chair.)

CHAIRMAN MARTINSON: About fifteen years ago we had our first experience with physical examinations, and had the usual difficulties. Operating officials insisted that they were better judges of whom to employ than any one else. They knew a good strong back when they saw it, and they were going to take care of that job themselves. We convinced them that was not the correct attitude.

We have examinations of our men before they enter our employ and an annual re-examination. Both have been a great deal of benefit to us. We have had no objection from the men because we have been very careful that anything of a private nature was not disclosed.

J. J. FORBES (U. S. Bureau of Mines, Pittsburgh): I am a strong advocate of physical examinations for workmen before employment.

In Alabama we were examining one young fellow on the timber gang and found he had a leaky heart. That man was on a timber gang, one of the hardest jobs in the mine. His condition was called to the attention of the management, who immediately removed the man from that hard job to one he could do. I think that the men should be rehabilitated and placed on jobs they can handle.

R. DAWSON HALL (Coal Age, New York City): It is grossly unfair to put a man up against a proposition in life which he can't meet, or give him a job which musters out in damage to him and injury to his family. He should know exactly where he stands and just what kind of a job is safe for him to do.

Many of us are going to experts to find out about our physical conditions, this is to the advantage of the employer and of even greater advantage to the man himself because he has to carry the greater part of the insurance. Compensation is not supposed to entirely replace the loss which is sustained by an accident. It has been kept below that figure, and therefore, the working man and his family are carrying the larger burden. Those people have a right to the protection which comes from physical examination.

O. F. McSHANE (Industrial Commission, Salt Lake City, Utah): I want to stress the purpose of the employer behind the examination. If a physical examination is given for the purpose of ascertaining defects in order that a man may be intelligently placed where he won't hurt himself, it is praiseworthy.

I think there is no smelting company in this country that has more favorable accident experience than the International Smelting Company of our state. They have conducted physical examinations for years but never for the purpose of putting a man on the industrial scrap heap.

H. W. GRESSING (Commerce Mining & Royalty Co., Miami, Oklahoma): We have had three or four years' experience with physical examinations. Our men are examined at the Bureau of Mines clinic before they are accepted for employment. After they are accepted we have them examined yearly, providing the man's examination on card shows that he does not require more frequent examinations. During the first six months of the system, there was a lot of talk against it; the men were afraid the clinic was used to eliminate men from employment. We disabused their minds and have not had any trouble.

Recently we laid off a good many men; no less than a half dozen were tubercular. I know of six that applied for permanent total disability on their group life insurance policies and got it, some of them passed away and some of them are still living, enjoying their benefits.

MR. COMINS: When a man has been working for a company, say ten years, and has a physical examination and is found unfit, I don't think it is fair to let that man out; some kind of work must be found for him. In the minds of many workmen is the feeling that there is something not entirely humanitarian about physical examinations.

Pension plans also have elements of trouble, if companies are not careful about them. Some say they are the finest systems ever created. The men say jobs can't be had after a man is thirty-five years of age. The management says the men haven't

the right point of view, because they will give a man a job up to forty, forty-five or fifty years of age, but he must go on a pension, or quit at sixty-five; they want him to have twenty years of employment so he can get the pension.

A great deal is not explained to the men, and they don't understand it. My sympathies are with the men. We are headed for old age pensions or the dole unless industry takes hold of the situation.

C. W. GIBBS (Harwick Coal and Coke Co., Pittsburgh): What are we going to do with a man who is absolutely physically unfit for work? We don't always have a proper place and there is nothing to do but turn him down.

We had a man who was unfitted for any mining because of a bad hernia. We sent him to the hospital. He had no money. He was operated, and he is physically fit now. I don't think the potential employer can be burdened in every case with a man who cannot pass a physical examination prior to employment.

CHAIRMAN MARTINSON: I don't believe the number of men who cannot pass the initial examination is very large. In my experience the proportion is very small. I don't believe that criticism can be directed to an employer who won't take on a man who has never been in his employ and who is utterly unfit. I don't think that is fair, and that the fair-minded man will permit such criticism.

I would like to ask if there is anyone representing employers here who do not have physical examinations as a requirement for employment. (Six.)

How many have physical examinations without an annual re-examination? (Eight.)

How many have the annual re-examination? (Five.)

MR. GIBBSING: I don't believe that we can be criticized for turning away a man in our employ when he refuses to take treatment, suggested by a doctor, when it is given to him absolutely without cost or without loss of time. We have had two or three fellows who refused to take treatment, particularly for venereal disease, and we discharged them.

MR. McSHANE: A physical examination should be made by some competent physician and not a young doctor, fresh from his internship, who is anxious for experience. If companies have surgeons who are determined to find something, industry will be making industrial scrap heaps out of a lot of pretty physically fit fellows.

MR. MERZGER: We are not against physical examinations, in fact we have made several attempts to induce our men to accept a physical examination.

The United Mine Workers in the anthracite field are unalterably opposed to the physical examination largely because of what they call miners' asthma. Older men have it particularly, and fear they might be turned down. We do have a check because every miner must have a state certificate from the Board of Examiners stating that he is fitted and qualified to be a miner.

MR. MERZGER: Our company maintains a surgical department with a chief surgeon and an experienced surgeon in charge of each colliery. In registering an employee our mine foremen's clerks note of any physical disability they can observe. We have a rule that every injury, no matter how slight, must be reported and dressed. Eye injuries must be dressed only by a surgeon and anyone else who undertakes to dress an injured eye, even with a small particle in it, is subject to immediate dismissal.

MR. JOHN CAMPBELL (Eagle-Picher Lead Co., Joplin, Mo.): We don't require a physical examination, but I have been endeavoring to institute a real pre-employment physical examination.

My idea in submitting the program to the Company is not to eliminate men now in our employ, but for their classification, and for information and rejection of applicants for jobs.

Until the Bureau of Mines clinic card started functioning we averaged, out of approximately 1,400 employees in the mines, about five hernias per year, but three years after we had required a clinic card from a miner before he went to work, we averaged 1.4 a year. Also, sixty per cent of our clinic cards show one eye, at least,

partially defective. The compensation laws in Oklahoma, Kansas and Missouri, where we operate make us liable when a man has a defect and an injury accelerates the disability. We are liable for the difference. You can see how the clinic cards help us in checking his disability.

Wm. GEORGE (Madeira Hill & Co., Compensation Bureau): We don't have physical examinations. In our field there are very few operators who require physical examinations, but we are beginning to be the dumping ground for the companies that do have physical examinations. As a result we will finally have to come to them.

MR. MERZGER: We have found, since the depression, that we have had many more applicants for compensation than we had before. We have to be extremely careful in diagnosing and examining the different claimants to make sure they are entitled to the compensation. I wondered if that was general experience? (General assent.)

ADJOURNMENT

Coal Mines." Miners Circular 31. It was compiled by J. W. Paul, which fact bespeaks its value. It is worthy of a place in the reference files of every one interested in safe mining.

In closing these few remarks, I want to emphasize the fact that systematic timbering supplemented by close supervision will in every mining district, as it has in Alabama, reduce to a great extent, the appalling number of accidents from falls of roof.

K. S. HUGHES (Hudson Coal Co., Scranton): I was particularly interested in the remarks on longwall mining. We have less roof falls in longwall than in any of our other types of mining, because the face moves so rapidly that there is no disintegration of the roof from air slack.

I wanted to call your attention to the steel props we have introduced within the last year. Their use on account of their cost requires systematic timbering.

We have, I believe, in the steel prop longwall operations the safest operations anywhere in the anthracite field.

R. DAWSON HALL: I am glad that Mr. Hillhouse mentioned systematic timbering. I think we will have to adopt the plan; systematic timbering is one of the reasons why the European mines have it all over us in safety. A systematic order is not a matter of opinion, but a matter of rule. The only question of opinion is how far it should be supplemented with some further timbering for special dangers and special conditions.

I think the time is coming when we will have also steel caps that will carry the load a great deal better than our present cap pieces which protect the miner from unforeseen falls of roof. Corrugated steel caps have been found very effective in Europe. In this country, although metal mines make wedges for caps, we in the coal mines are disposed to think the men should make their own wedges. This takes the miner's time and produces a hazard in using the axe, and the wedges are not equal to machine made wedges; consequently, the props are set hurriedly.

JOHN LYONS (Bell & Zoller Coal and Mining Co., Zeigler, Ill.): Mr. Simpson, please describe your systematic timbering. I have seen a notice posted above and below ground that reads: "Props should be set not more than four feet apart and the face not advanced more than four feet beyond the last prop."

O. V. SIMPSON (Alabama By-Products Corp., Dixiana, Alabama): The spacing of the timbers will be governed by the kind of roof.

BEN BROCKBANK (Castile Mining Co., Ramsay, Mich.): I believe our biggest accident maker in coal and metal mines is loose ground. Our hazards in metal mines are greater from loose ground in raises, especially after blasting.

If we got our heads together and worked out safe methods in raising, we could overcome the hazards. Some of us have adopted forepoling in our main level drifts but our raises are left to the miner.

Falls of roof or loose ground is still the leader in both fatalities and serious injuries. It seems to me that we are not getting very far when we have not conquered our largest accident maker.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): A number of years ago we had considerably more injuries from falls of ground than we have at the present time. We adopted an operating rule that all loose backs or loose roofs must be forepoled ahead of the timber, but we still had falls of ground because some one was allowed to use his judgment. One operator decided to forepole every back and not to leave it to anybody's possible faulty judgment. I believe every mine operator in the Lake Superior District forepoles every back. Forepoling is done now on the level above which helps operation.

I wonder if men in the coal mines are trusting someone's judgment in the placing of props rather than saying, "We put them so many feet apart."

FRANK B. DUNBAR (Mather Collieries Co., Mather, Pa.): Loose roof conditions are quite easily determined in metal mining but not in coal mining. Our real danger

is due to the slip, spar, or kettlebottom that may be hidden in apparently good roof. I think that is true particularly in the Pittsburgh district, in the Central Pennsylvania field and in Kentucky, particularly for kettlebottom and spar conditions.

The method of timbering can be almost any method, a two by three center or four by five center, but it is necessary to insist on the miner putting up a post wherever conditions are dangerous. We don't have as many accidents under poor roof as under what is termed good roof because miners are inclined to think a roof is good and not put up timber until forced and many times put it up loosely to fool the boss.

Often timber is not used on main haulage roads until too late. We know that the place should be timbered, and eventually is going to have to be timbered, but we don't have enough money to timber it immediately. That is the point we are inclined to overlook many times.

Wm. GEORGE (Madeira Hill & Co., Philipsburg, Pa.): We have had systematic timbering for the past five years. Our rooms are driven on approximately twenty-five feet width. We require three posts at a distance of five feet on the gob side, and require, in rooms that are driven by pick mining, that posts be kept within four feet of the working face at all times. In machine mining we have to allow a little more distance between the face and the last row of props, approximately seven feet, but just as soon as the new cut is placed, props must be put within three feet of the working face before the coal is shot down.

Our experience from falls of rock has been very good. We do not have many fatalities, and as a result of systematic timbering, we have cut down the minor accidents at the working face. While I cannot say that we have reduced our fatalities caused by falls of rock, because, when we get a fatality it is generally due to a fall of rock, yet we feel that due to systematic timbering we have gotten results.

In another section we shoot all coal out of the solid with black powder, but our fatality rate is not any greater under those particular conditions than it is where we use the other method of shooting and cutting the coal.

Recently I found that, due to the depression, some of the men are mining the tip in this field where we originally did all shooting off of the solid. I have been concerned about those men because of getting hurt while undermining and it is difficult to convince the men that they must sprag while undermining where they have always shot off of the solid.

W. F. BROWN (Lynch Coal Operators Reciprocal Association, Terre Haute, Ind.): We have no systematic timbering in Indiana. We have some timbering in No. 3 coal, but don't have any legs under the cross-bars. That is a good system.

We have machines that drive in on each side of the rib with a steel cross-bar slipped in on one side and pulled back on the other, one about thirty inches and the other eighteen; this is also a good system of timbering.

K. S. HUGHES (Hudson Coal Co., Scranton): I have never seen a place where a prop was not needed for twenty feet. I don't care how safe it seems. Our Company has, for each sectional foreman, a sketch of systematic timbering or propping.

CHAIRMAN HOSLER: That is a fine piece of work the Hudson Coal Company is doing. I wish you would go into detail.

MR. HUGHES: Each sectional foreman or face boss may have workings in two or three different veins. For every vein condition he has a sketch, which fits in to his loose-leaf daily report book and is kept there for reference, giving information on both solid and fillers and different kinds of mining in that bed, and the minimum amount of timber for props that should be used. On every sketch we note that if any additional timbering is required, it must be put up either on the miner's judgment or the foreman's.

CHAIRMAN HOSLER: We will have to close the discussion on this paper. I want to digress from our set program and come back to a question raised on Tuesday

morning by the Chairman of our Poster and Slides Committee. I want to give Mr. Forbes twelve minutes.

J. J. FORBES (U. S. Bureau of Mines, Pittsburgh): I am placed in a peculiar position, as chairman of the Committee; I get little help from you fellows. I think I am safe in saying that for the past two years I have not had a dozen pictures sent in from the field. If we are going to make this service of help to you, it is up to you to cooperate more with your chairman.

What I want is your reactions. What kind of posters do you want?

JOHN LYONS (Bell & Zoller Coal and Mining Co., Zeigler, Ill.): The other day Mr. Forbes mentioned that there were only 100 posters distributed showing the man testing for gas compared with another he thought much inferior with a circulation of around 2,500. In our locality the only men who carry the safe lamp are the examiner and bosses and consequently, they are chiefly interested in that poster. The more general posters are put in the bulletin case, pasted on concrete tiers, and places where the men pass. The posters are not large enough. I think we ought to have the seventeen by twenty-three posters.

THOMAS E. LIGHTFOOT (Koppers Coal Co., Pittsburgh): Why not have the benefit of some of the artistic work for the Council. We are dependent on photographs. I agree that the larger poster is more efficient for only one out of a hundred will stop to read small print.

MR. FORBES: Those are exactly the reactions I want. You notice that practically all posters are positive; they do not convey the negative side of the story. Do you want the negative opposite? Do you want the wrong way and the correct way?

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Mich.): If a man doesn't know the wrong way, why put the idea into his head?

On the other hand, if he is doing it wrong, he knows it, and if you put the right idea up there, he has the chance to learn something.

MR. FORBES: That is why I try to stay along the line of positive suggestions for posters.

EARL F. BLANK (Jones and Laughlin Steel Corporation, Pittsburgh): If everybody would send suggestions on what they would like to see in an illustrative poster worked up by the artist, the poster committee and the National Safety Council would be glad to get the suggestions and have their artists work up posters, preferably posters of large size depicting just the thing they want to bring out.

THEODORE MARVIN (The Explosives Engineer, Wilmington, Del.): I had an experience about four years ago in publishing an article on a coal company. In that article we depicted by photographs of conditions under which a number of men had been killed. Each one was posed and the photographs were used on bulletin boards. I believe the practice has been stopped. It made the men very nervous, and probably was productive of more harm than good.

The Institute of Makers of Explosives has been putting out a lot of negative rules on how to handle explosives. We are rapidly juggling the language into the positive.

If we could take an artist into the mine and show him what the mine is like, we might get better results. I think a man should see a mine before he attempts to illustrate anything.

CHAIRMAN HOSLER: Now we come to the live part of our program, I am sure. I am going to turn the Question Box over to Mr. Comins.

(Mr. W. H. Comins, National Lead Co., St. Francois, Mo., took the Chair.)

CHAIRMAN COMINS: We have two subjects this morning: The first, "What is the best and safest method of illumination in coal mines?" and the second, "What is the best and safest method of illumination in metal mines?"

SECRETARY HARRINGTON: I don't have to tell anybody in the Mining Section that the Bureau of Mines is definitely in favor of closed lights. However, while we are in favor of closed lights, some of us are not wedded to the types of closed

lights now in use, and I, for one, am very decidedly of the opinion that all lights in mines are wholly inadequate for the service. We have skirted the outside of this question for years in the Bureau but now we are tackling it, and have instituted a study so that by the next meeting I think we will be able to give you some definite information on what the actual lighting situation in both coal and metal mines is at the present time.

About a year ago we had some help from an expert from the U. S. Public Health Service, who handles lighting matters in practically all the public buildings in Washington for the government. Realizing that he knew little about mines, we placed an engineer with him and had him go into a few coal mines in the Pittsburgh district. He gave us a short report in which he stated that the coal miner at his ordinary work (whether he is using the up-to-date electric cap lamp or the acetylene type lamp) is working in from one-twentieth to one-thirtieth of the light required in an office building.

You send your coal miners underground, put them under the most dangerous conditions and give them from one-twentieth to one-thirtieth of the light required for your clerks in your office buildings. I am not sufficiently foolish to think that we should have as much light in the mine as is required for an office worker handling printed or written matter, but one-twentieth or one-thirtieth of the required amount of light in an office is insufficient under the dangerous conditions in existence in our mines.

We are not particularly in favor of the indiscriminate use of incandescent lights at the faces. This, I know, will step on the toes of our metal mining men and the toes of some of our coal mining men, particularly when either is using the present day intensive methods of loading coal or ore mechanically.

In coal mining we know that a number of explosions of methane and a number of fires has been caused by lighting wires. There were several explosions in the Hetch-Hetchy tunnels in California wholly chargeable to incandescent light globes. While we are in favor of the much greater light we are definitely fearful of fires and explosions from the wired system too.

O. F. MCSHANE (Industrial Commission, Salt Lake City): Did the report of the lighting expert include a careful examination of well rock dusted mines to the face?

MR. FORBES: The light reflected from rock dusted areas was approximately fifteen times more than the same light reflected from coal surfaces. This is tentative.

MR. BROCKBANK: I was a boy about twelve years of age when I went underground to work with my Dad. When the men got out of the cage, they stopped by the shaft, pulled out their pipe and smoked until they got their "pit eyes." They used the candles which they had to make at home. From the candle we went to "sunshine," but there was not very much sunshine about it. After working in a closed place a man came out black in the face. Finally we adopted the carbide lamp and you know how much kicking there was about them.

Lighting is going ahead very fast today. In our main drifts the men do not need carbide lights. We have flood lights. It is almost like broad daylight. Some companies have lighting even in the stopes.

Wiring in working places should be inspected every day. Wire carrying power must be removed or shifted as the work progresses, during blasting and filling, for example.

Loose wire should be picked up. Some miner had accidentally scraped a piece of wire about twelve feet long into the chute. When the trammers were blowing out the chute with a blow gun, the wire came in contact with the trolley wire and the blow gun, knocking out a man. He might have been electrocuted.

P. M. ARTHUR (American Zinc of Tenn., Mascot, Tenn.): We use flood lights and ordinary incandescent lamps but all miners are required to carry individual lights, which are needed in a good many places where flood lights cannot reach.

THOMAS E. LIGHTFOOT (Koppers Coal Co., Pittsburgh): We use closed lights in the Pocahontas field and acetylene lights in the New River field. In other mines our main headings are illuminated by ordinary electric lamps which are the only type available on the market.

A. A. BAWDEN (Pickands, Mather & Co., Ironwood, Mich.): At our Lake Superior Section two years ago we had a paper by a mining engineer who said that the only mines in the Lake Superior district which were properly illuminated were the open pits working on the day shift only. In a short time one superintendent had his mine so well illuminated by electricity that the miners' lamp was not needed. We are putting in the incandescent lamp but using a vapor-proof globe around pump rooms and powder houses.

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Mich.): The dangers of wiring should not be used as an argument against the light. Use the incandescent light but take care of the hazard.

SECRETARY HARRINGTON: I went into a mine in your district in June in which incandescent globes were used throughout. The lighting in stopes was excellent. The wiring in stopes was excellent. I can truthfully say that the electrical installation in that mine was the best I have ever seen. If we had any guarantee that installations in other metal or coal mines would be as good, there would be no opposition.

FRANK B. DUNBAR (Mather Collieries Co., Mather, Pa.): I am in favor of the incandescent light. You will find them in mines in West Virginia which have the best safety records in the United States. The incandescent light has played a prominent part in their records.

SECRETARY HARRINGTON: I know the installation to which you refer. That company uses electric lights at the faces which give off plenty of gases and dust. The installation is a fine one, and if all other installations as well as ventilation were like that one, I would be in favor, too.

(Mr. Hosler resumed the Chair.)

CHAIRMAN HOSLER: We have completed the formal program. The Hudson Coal Company of Scranton has seven representatives here. Are there any companies represented here with as many as five?

MR. TRESTRAIL: There are seven of us.

CHAIRMAN HOSLER: I guess you have all heard of Pickands, Mather & Company. How many Bureau of Mines men? (Six.)

I want to take this opportunity to express my sincere appreciation to the officers, the members of the Executive Committee, and the committee members that have so faithfully served us for 1931. It is really with sincere regrets that I turn over the duties to the incoming officers: Mr. Comins, the incoming chairman. Mr. Lightfoot, first vice-chairman. Mr. Alt, second vice-chairman. Mr. Dunbar, third vice-chairman. Mr. Arthur, fourth vice-chairman. This would not be complete without Dan Harrington, our Secretary.

Gentlemen, I want to congratulate you. You have no apologies to offer to the public for the service that is expected of you. The work you are engaged in is humanitarian. It is the highest, noblest, and I think one of the greatest works that man can do. I wish you every success, and Godspeed.

(Mr. Comins took the Chair.)

CHAIRMAN COMINS: I wish to thank you gentlemen for electing me to this position. We will all do our best to carry on. We are going to leave in a few minutes. There are three points that we can follow with success: (1) Keep everlastingly at this safety game; (2) Don't take yourself too seriously; (3) You are leading in safety work, but if you didn't have a following, you wouldn't get very far. Your followers are your employees, high and low, and don't forget to let them have a little something to say about where you are leading them. This is not socialistic or communistic but cooperative.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Paper and Pulp Section

Officers 1930-31

General Chairman—W. J. BRENNAN, State Department of Labor & Industry, Augusta, Maine.

Vice-Chairmen—

A. S. COOK, Price Brothers and Company, Ltd. Kenogami, P. Q., Canada.

W. A. GLEASON, Hammermill Paper Company, Erie, Pa.

M. G. HOYMAN, Kimberly-Clark Corporation, Neenah, Wis.

W. H. JENNINGS, Bugalusa Paper Company, Inc., Bogalusa, La.

ARTHUR MURRAY, Container Corporation of America, Chicago, Ill.

G. W. PHILLIPS, The Champion Fibre Company, Canton, N. C.

Secretary—H. G. GILSON, Oxford Paper Company, Rumford, Maine.

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JAMES J. HASTINGS, Port Huron Sulphite and Paper Company, Port Huron, Michigan.

R. G. McCONNELL, Defiance Paper Company, Niagara Falls, N. Y.

JAMES M. McGIVNEY, Brown Company, Berlin, N. H.

EMILIE I. RAUB, Dill and Collins Company, Philadelphia, Pa.

B. D. ROGERS, Bird and Son, East Walpole, Mass.

F. H. ROSENUSH, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

R. H. SCANLON, Powell River Company, Ltd., Powell River, B. C., Canada.

ARTHUR E. WISSELOW, Hollingsworth and Whitney Company, Waterville, Maine.

Executive Committee—OFFICERS AND

KENNETH L. FAIST, The Champion Coated Paper Company, Hamilton, Ohio.

THOMAS E. LIGHTFOOT (Koppers Coal Co., Pittsburgh): We use closed lights in the Pocahontas field and acetylene lights in the New River field. In other mines our main headings are illuminated by ordinary electric lamps which are the only type available on the market.

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JOHN LUNDRIGAN, International Paper Company, New York City.
W. J. PEACOCK, Northern Paper Mills, Green Bay, Wis.
SAMUEL PRUYN, Finch, Pruyne and Company, Inc., Glens Falls, N. Y.
GEORGE ROLLER, Rhineland Paper Company, Rhineland, Wis.

**Tuesday Morning Session
October 13, 1931**

W. J. BRENNAN, Chairman
State Department of Labor and Industry, Augusta, Maine

The first session of the Paper and Pulp Section convened with General Chairman W. J. Brennan presiding.

CHAIRMAN BRENNAN: We are gathered together again at probably the most pleasant occasion of the year. It is certainly gratifying to see this attendance in the face of our many uncertainties. A few faces are missing and we regret that they are not here.

As you all know, in the middle of the summer I completely severed connection with the pulp and paper industry in favor of governmental activities, and now have the state of Maine to sell this great idea to.

Preliminary to the formal reports, I will run over some things which may be of interest to those newcomers among us. We met in Pittsburgh last year and had a very excellent meeting.

The Executive Committee met in Boston this winter. Perhaps the most important thing was the attention that the Executive Committee gave to the subject of Section set-up. The consensus of opinion was that the Section set-up was more or less loose, elaborate and somewhat ineffective. That is perhaps our own fault, but nevertheless, the person in the Chair and those closely connected with him are at a serious disadvantage with the present arrangement and responsibilities; and in view of that I have recommended strongly that a change be made for the good of the Section, perhaps a weeding out of something of little consequence at the present time, and more pressure brought to bear on the more important angles. I hope that change will suit you, and I hope you also realize the intention behind it.

I had the pleasure of representing the National Paper Section at the Massachusetts Conference, at which there was a very excellent attendance, following which I visited our old friends, Nat Bartlett and Ben Rogers. The Maine mills have been visited completely with the exception of one or two which will be visited shortly. Because of the isolation of Maine with regard to the Section it is impossible to do better.

One thing I have emphasized throughout my connection has been the importance of the News Letter, not for the particular subject matter which is in it, but because the letter serves to tie the boys together. There are a great many intangibles in that letter which bring a return that we sometimes don't fully appreciate. In other words, the News Letter is of tremendous value, regardless of who writes it. It is our only contact with one another. I have emphasized the need of a News Letter every month, regardless of the value of the material. Under some difficulties we have done it this year. The News Letter will always be a chore which will fall upon somebody, and we all must have a better appreciation of that job if we are going to have those monthly contacts which I think are so valuable. The response has been, in general, very excellent.

We tried out a new scheme in that a different editor was appointed each month. We found a great deal of hidden ability among our members, and we have taken advantage of that this year. I think some of the members have a better com-

ception of the work entailed in drawing up that News Letter. They also, perhaps, know that the response with regard to material is not so good.

The front page of the News Letter has had just one object and that is to present to the Section a different phase of our problem each month. I think perhaps you realize the importance of that. Each month more or less pressure was brought to bear and I tried to convey the idea that something needed to be done and had to be done if the Section was going to maintain its proper place, the place we have had for years. I tried to combat that "Let George do it" attitude that seems to be our most chronic ailment. We must realize now, and continue to realize, that every one connected with this thing is also busy. We also have other duties. We have our accidents. We have our unemployment. We have our mill duties, remote from the subject of safety, and yet we have to jump in there and pinch-hit if we are going to have a Section. The boys are doing it, and I will just write into the minutes another appeal for those whom we very rarely see to come forward and give us that little bit of help which, when consolidated into a Section of two hundred, would make a tremendous amount of material of value.

This is the proper time to speak of the program which has been arranged this year. We all realize it is a difficult thing in a year such as this to arrange a program, and I want to close that subject by reiterating my comments in the News Letter relative to Walter Gleason, who has done a noble task, under extreme difficulties, and I am sure that any one who has ever taken that assignment can fully realize the amount of work that he has done in our behalf. Such jobs are pure and simple sacrifices.

As for our secretary, H. G. Gilson, he has also been discussed from time to time, and I can only say that were it not for Gil things would not be in the order in which you see them and much could not have been accomplished. He has been a great help, and I believe he has written upwards of six hundred letters this year.

Now, to get on to the reports of Sections and Regional Directors. I have a few. Because Maine is the most easterly report and has always been taken up first in this Section, I will read the Maine report. This report has been submitted by Arthur Winslow, who was appointed even though he was not here last year, who came to us and staggered us by his enthusiasm for his task, and staggered us also because we could not tell him what his task was—a very embarrassing situation, upon which there was some comment in the News Letter. He has swung into the thing in very remarkable style, and has carried it through to our extreme satisfaction.

Regional Report for Maine

By ARTHUR E. WINSLOW
Regional Director

Being a newcomer to the safety movement and having the honor of being a Regional Director thrust upon me I was somewhat disturbed as to my ability to assume such duties.

It occurred to me that during the first year our company was a member of this Council we did not make personal contact with anyone officially representing that organization and that such a contact might be of value in bringing to the various members the feeling that the Council was something real and was more than a membership organization.

With this thought in mind I firmly resolved to personally visit the plant of each member within our state. Regardless of how much value there may be in this thought and in spite of my failure to carry out the idea to fulfillment I am frank to say that the safety work being carried on by those members, I have had the pleasure of meeting personally, has been a revelation and inspiration.

It has been my good fortune to visit at six out of twelve of the mills of members exclusive of those of our own company. The first call was at the plant of the Saint Croix Paper Co., Woodland where I was taken in charge by W. J. Brennan, chairman of our Section. We were shown the various departments of the plant and given an opportunity to meet some of the men who have done so much to make possible St. Croix's enviable safety record.

We personally met some of the key men and every one of them was bubbling over with enthusiasm for safety.

Many of the methods used to keep up the interest of the employees were shown and explained so that we have been able to make use of some in our own work.

At the plant of the Cushnoc Paper Co. in Augusta we found Frank Farrington in charge of the safety work. He is devoting about half of his time to this work. Regular safety meetings of the foremen are being held. They are using the Safety Posters furnished by the Council and are making definite progress in their work.

They are planning a departmental contest in preparation for their entry in a National Contest.

We had a very pleasant call at the Madison plant of the Great Northern Paper Co. Here we found one of the clerks in the office giving part time to the safety work. A very efficient first aid room is located in the office building with a Red Cross nurse on duty two hours each day and on call at all times. No plant physician is employed but they depend on whatever local physician is available. Safety is discussed regularly at their foremen meetings. Various safety problems were discussed to mutual advantage.

At the Eastern Manufacturing Co.'s plant at South Brewer we found Mr. Doran in charge of safety work on a part time basis. They are well organized with a very complete first aid room with a nurse in attendance but no regular physician. They have their safety committees, bulletin boards and regular safety meetings and inspections. Their records are showing results of the efforts of those in charge of this work.

At the Webster Mill of the International Paper Co. located at Orono we found an old timer in the safety game. Mr. Kinney had been in charge of the safety work for about four years, attending two National Congresses. While he has relinquished active participation in safety work to Mr. Thompson very recently, he is still keeping up his interest.

At this mill we found those in charge of the safety work very strong in their belief that foremen are the key to a successful safety program. They were equally loud in their disbelief of so called "high pressure methods" employed by so many mills to successfully compete in the National Contest.

At the plant of the Great Northern Paper Co. located at Millinocket we were royally entertained by a group of enthusiastic safety men. Here too we found a well organized group with regular safety meetings and frequent inspections. Several men were devoting part time to the work. Due to the fact that Bangor is the nearest center where extensive medical facilities are available, a very complete first aid room and hospital are maintained at the plant by the company. All serious cases are kept in this room until it is possible to move the patient to Bangor.

Records are being kept and accidents analyzed in a constant fight against the accident hazard.

At the time of our visit a class of about twenty men and women was being instructed in first aid work by a representative of the National Red Cross. This is a feature that every member of our section should take advantage of provided they have not already done so. It is offered gladly by this great organization at no expense and its value is unquestionable.

At the three mills of the Hollingsworth & Whitney Co. located at Garfield, Madison and Waterville, safety work is organized along the regularly prescribed lines. We have not reached the point of regular safety meetings or inspections at this time but our departmental committees are in operation. The work of compiling a safety code or rather safety rule book is in progress, its publication being delayed until after the Congress in October. We hope to receive many ideas and suggestions at that meeting which we will want to incorporate in our book. We have progressed far enough along the Safe Road to be able to appreciate its worth.

We regret we have been unable to visit the plant of every Council member in this state. This was impossible of accomplishment before the Congress but we shall endeavor to complete our program eventually. We feel such visits are very much worth while and the exchange of ideas valuable.

The one thing that has impressed us is, how so great a number of mills can do so much along the line of safety in such a quiet way without the fact becoming known to the public. Personally we believe those of us who are so vitally interested in safety work should be very careful not to overdo in our efforts to overcome accidents. It has been brought to our attention several times by different individuals that the product of a paper mill is paper, not safety.

CHAIRMAN BRENNAN: Supplementing the report from Maine I will say I recently visited the Fraser Paper Company at Madawaska, Maine, and in one year they report a reduction of 90 per cent in their accident frequency. They have a very remarkable plant and when times turn upward will be in regular attendance at these meetings; although they are on the extreme northern border of Maine, they are with us in spirit and want to be considered along with the rest as being for the Section.

I have a report from Ben Rogers which I will read; also one from Earl Grant, of Ohio.

Massachusetts Regional Report

By BEN ROGERS
Regional Director

The interest and support of both industrial and public safety has been well maintained in this section during the past year.

Last February our general chairman stopped off for a day in Boston to discuss Paper and Pulp Section matters with five representatives of Maine and Massachusetts mills.

Last spring twenty-five organizations, a majority of them state-wide in their scope, cooperated with the Massachusetts Safety Council in the Annual State Conference on Industrial and Public Safety in Boston, April 29 and 30. The first day was devoted to plant and industrial safety and the second to public safety.

The Paper and Pulp Section was well recognized. Our own general chairman, Walter J. Brennan, gave one of the best papers at the industrial session. His subject was "Mental Guards and How to Build Them." The section was further represented by men from at least nine different plants.

The Engineering Section of the Massachusetts Safety Council has planned its program on plant safety covering nine monthly meetings in 1931 and 1932.

During the past year assistance has been given the National Safety Council in securing additional members in this section. I hope it has helped.

It is my hope that Bill Brennan will continue as Chairman of our Section. I consider that he has done a wonderful job and especially so because of the general business conditions during the past two years.

I am sorry to be unable to attend this year's conference. My best wishes to all.

Regional Report for Ohio

By EARL GRANT
Regional Director

We had two sessions devoted to the Pulp and Paper Section at our All Ohio Safety Meeting. The first afternoon the opening talk was made by Mr. Graham W. Cole of the Metropolitan Life Insurance Company, whose subject was "Using Facts to Prevent Accidents." This talk was followed by our very good friend, Don C. Hunter of West Carrollton, whose talk was on "Inaugurating a Safety Program." We had about 50 foremen present at this meeting, representing different paper companies throughout Ohio. There were lively discussions following each address.

The next morning we had one speaker, Mr. Allan Hyer, of Black-Clawson Company, Hamilton, Ohio, manufacturers of paper machinery. He spoke on "Safety as Applied to Paper Machines." This topic proved so interesting that the entire morning was spent in discussion following the address. As a result, Mr. Hyer was invited and accepted the invitation to speak at the National Safety Council before our session in Chicago.

Our effort in Ohio in 1930 produced very good results, when you compare the following figures:

	1929	1930
Total accidents	6419	3246
Fatalities	19	11
Permanent disabilities	81	36
Temp. total (over 7 days)	1368	622
Temp. total (under 7 days)	962	450
No. lost-time accidents	3989	2127
Total days lost	195443	111913

This picture certainly shows that we have been working hard during the year and the results are flattering, to say the least.

Some people have taken the standpoint that accidents were reduced due to shorter hours and also the fact that older employees are kept on the job, but I disagree with both these, because I believe that the depression has necessarily caused a great deal of worry in the minds of workers and therefore increased the accident hazard. I also believe that the older employees are as susceptible to accidents as the newer, in as much as familiarity breeds contempt and oftentimes our more serious accidents are caused by the old timers on the job, who work automatically.

I hope that this will give you some idea of our convention and assure you that I also wrote Mr. Gleason of the Hammermill Paper Company, in regard to accident statistics for Ohio.

Report of Membership Committee

By N. F. BARTLETT
Chairman

The past year, in my mind, has been one of progress. We may not have taken in a large volume of members but I feel certain the seed sown the past year will reap its reward in the future.

We were very fortunate in securing as a member of the National Safety Council Compania De Los Fabricas De Papel De San Rafael Y Anexas, S. A., Mexico City, Mexico. I also wish to state that the letter which was received

from Mr. A. S. Cook, safety engineer, Price Bros. & Co., Ltd., Kenogami, Quebec, in which he offered to be of whatever service he could to the membership committee, was gratifying. Mr. R. H. Scanlon, Powell River Co., Ltd., Powell River, B. C., showed also that he was interested in submitting several prospects for membership in the National Safety Council.

On the other hand, we should all be optimistic as we have so many things to be thankful for, particularly that we have all been able to keep our own positions and, at the same time, be of service to others.

I feel, and to me it will be a great disappointment, that owing to conditions that have presented themselves since the first of August, it will be impossible for me to go to Chicago next month. I will appreciate it if you will convey to the other members present my greetings and express to them my sincere wish that they will meet with greater success in their endeavor along the lines of safety. You can rest assured that if I can get away I shall visit the Pulp and Paper Section if only for one day. At the present time my duties are three-fold and strictly confined to Boston.

CHAIRMAN BRENNAN: Nat did a great deal of work to bring that Mexican Company into the fold. It might be well to add that perhaps no absence in this Section has so universally been commented on and so keenly felt as the absence of our friend Nat Bartlett, and we hope that 1932 will see him with us, and we appreciate his kind comments.

In closing I want to write into the minutes a few ambitions of mine in view of completely severing relations with this Section. I have been keenly interested in this work, have enjoyed it more than anything I have ever done in safety, and I want to say this: that this Section needs an objective.

We are prone to wander listlessly about, touching hither, thither and yon and not actually getting down to facts and developing one or two or three outstanding pieces of work. We must also realize that we have basically an engineering status, and in view of that we must concede something to it and tackle those problems which seem rather difficult, rather than follow the path of least resistance. I want to recommend that this be given serious consideration—that this Section set up an objective and make up that objective of difficult problems still involved. We all know what they are. There are several very pertinent important things, and I hope that you will evolve some sort of program whereby we can at the end of three or five years point to an accomplishment, or several, and say that this is what we have done.

I feel that a closer connection should be had with our brothers in Canada, and we all know that a most capable, a most efficient and a most genial group are doing exactly what we are doing on the other side of the line, and why we should not profit from their experience, and why they should not profit from ours, I cannot understand. Our approaches to them, in so far as I have approached them, have been most cordial. So in speaking of objectives I can think of no better objective than to formulate some method whereby Canadian experience can be brought to us in a quick, concrete and satisfactory manner, and our experience, in turn, given to them for what it may be worth.

Furthermore, they should be here. They should be encouraged to be here and welcomed here, and we should pay more attention to their achievements as they come about from time to time. It is ridiculous to think that lives are being saved over there, while we are struggling with parallel problems, perhaps, for want of knowledge of what has been done. So I recommend for your consideration today that something be done about establishing that Canadian relationship and affiliation.

This Section should have somebody who can exchange material after the fashion of the set-up which we projected into the full-time secretary. Obviously, that is on the shelf for the moment. But the advantages still exist, and we should take advantage of those things, get them into the News Letter and send them about. No one can stay long at this sort of thing without realizing the amount of good which comes from informal contacts. It naturally follows that if two people can be benefited by the ideas

of the third in a room in this hotel the entire Section membership can also benefit if there is some means of distribution.

We have the News Letter. It can be as good a News Letter as you see fit to make it, and I am highly in favor of abandoning some other projects in favor of the development of this particular angle. I feel that the News Letter should develop a technical angle, sketches, designs and that sort of thing, because we must realize that we are only a handful when we consider the entire nation's set-up in paper with regard to membership in this Council, and those men here need this work less because they have done more in it, have had more opportunities to learn. We must not lose sight of those who never appear here, whom we never contact except to get the check for membership. So the only remaining approach seems to be to feed the material to them; it is not logical to expect them to come through each year with a membership when they can point to nothing tangible in return. That is in the face of the old argument that those who don't ask don't receive. We should step over the fence and give them service and then ask for membership.

Those other ideas of mine will be given to the proper people following the report of the Nominating Committee. I only want to apologize for taking so much of your time, and say that this work has been very dear to me, and the friendships developed here are most precious. I can't think of any more enjoyable occasion than to come back each year and meet the gang, and you may be sure that whatever my affiliations may be in the future my heart will be in Pulp and Paper.

I will now call on the state of New York for an informal report. George Adams, have you a report for the state of New York?

GEORGE J. ADAMS (International Paper Company, New York, N. Y.): We have probably about eight plants in New York State, including the largest mill in the state, and our work has been the same as it has in the past. We consider we have a pretty fair record, and although some of the mills have been operating part time this last year they have kept their record favorably, compared to previous years.

There has been no general meeting of the Pulp and Paper Section. One year when Mr. Pruyn was Director for New York State, the Pulp and Paper Section got together, from New York State, at the state department of labor safety meeting. I think that is the only time anything of that nature was ever tried, and it has not been tried since. I'd like to see something like that come up every year, because it is a wonderful opportunity to get together at that State Labor Department meeting.

CHAIRMAN BRENNAN: I will call on Mr. Walter Gleason to report for the state of Pennsylvania.

WALTER GLEASON (Hammermill Paper Company, Erie, Pa.): Pennsylvania, as you know, is not very well represented in the Pulp and Paper group. The Regional Chairman for the state of Pennsylvania was Miss Enid L. Raub of the Dill and Collins Company, Philadelphia. I took up with her the question of attending the Pennsylvania Conference, which was held at Harrisburg last October, and in the News Letter she gave a full résumé of that meeting.

Pennsylvania laid down a campaign to follow during the year of 1931 to reduce the accident peaks which throughout the state occurred in March and October. The March campaign closed and resulted in a lower accident rate for that month than had ever been had in history as shown in the Department records, which go back for fifteen years.

The October campaign is now in progress, and I believe it, too, will show a considerable decrease over the previous October.

Miss Raub saw fit to resign from the chairmanship the following meeting, and since that there has been no appointment. I presume there will be following this meeting.

CHAIRMAN BRENNAN: Thank you, Mr. Gleason. The state of New Jersey? We have a very excellent membership in New Jersey, the Paterson Vegetable Parchment Company, who wrote in and volunteered to do anything. I have great hopes for that company.

The South Atlantic Seaboard, Mr. Phillips from the Champion Fibre Company, will you report on the South Atlantic Seaboard?

G. W. PHILLIPS (The Champion Fibre Company, Canton, N. C.): There seems to me to have been some mistake in appointing me Regional Director. We have no organization down in that section. I suppose this grew out of the fact that at Blue Ridge each year we have an industrial conference at the Y. M. C. A. I might state we are still having those meetings, which are very interesting and quite helpful. All of the representatives from the various industries, not only paper but other industries throughout the South, are there. We have a Safety Section connected with it. It has been very interesting and helpful, in a way, but there is nothing of particular interest to this Section that I can report this morning.

CHAIRMAN BRENNAN: Mr. James J. Hastings, will you report for Michigan?

JAMES J. HASTINGS (Port Huron Sulphite and Paper Co., Port Huron, Mich.): In regard to the activities in the state of Michigan, at the time I was appointed I found conditions very bad; that is, in the two years previous, in 1929 and 1930, nothing really had been done, and it has taken me practically all this year to get things straightened out. However, the safety records and the activities are now in much better condition than they were in 1929 and 1930.

I hope in 1932 to have a session in Detroit. I tried to have one this year but with conditions as they were I was unable to accomplish this. I might say that I am really proud of what the mills have done, and the safety records have shown a great improvement.

CHAIRMAN BRENNAN: Wisconsin Regional Director, Mr. H. D. Banta.

H. D. BANTA (Hoberg Paper and Fibre Co., Green Bay, Wis.): The work of that assignment has been confined to cooperation and help in the Pulp and Paper Section of the Fox River Valley and the Lake Shore Division. I think that is the way it is designated. They made a mistake in electing Mr. Hoyman chairman in that he knew so much more about it than I did that it left little for me to do, except to sit back.

I have found in my contacts through the Fox River Valley that there is an exceptional interest in safety work, and they are usually so well organized in each mill that there is little that an outsider can do except as we come together to exchange ideas.

At our Pulp and Paper Section meeting at Fond du Lac this year we had an unusually large attendance. There were two hundred there, with over one thousand in all the Sections.

I believe, from talking with the men from the different mills as they came to our mill or as I went through theirs, that the safety work is really improving and progressing. The safety records in the various mills are gradually improving.

We have some publicity that was gotten through my acting as chairman of the Publicity Committee. Unfortunately, we have been unable to get those printed right away. I specified the journal we wanted them printed in and we have had several letters from them saying that the articles were fine and what they wanted, but they could not use them just at that time and would use them later. These articles indicate that there is special interest in safety work throughout the Fox River Valley.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Some of the members may not know that the Fox River Valley has a permanent organization that carries on from year to year in safety work. The Wisconsin River district has not a permanent organization, but two years ago we had a regional meeting. It does not seem quite in line that the two localities hold one meeting, one reason being that for a day's meeting it is rather difficult for the men in the Wisconsin River Valley to get to Fox River and back the same day.

This year we tried to have a meeting in the Fox River Valley and after writing to the various mills it became apparent that, due to the business depression, it was not wise to attempt such a meeting, so that the Wisconsin River Valley has not had any meeting this year.

There are three places in the Wisconsin River Valley that father these meetings. Two of those were agreeable but the third one, which is the largest, did not seem to

think that it was wise to attempt to hold a meeting this year, so it was passed over.

CHAIRMAN BRENNAN: Are there any states remaining in the East who have not reported? If not, I can call on the far West, and it has always been a pleasure to find Mr. R. H. Scanlon here, from the Powell River Company, British Columbia. During the year Mr. Scanlon wrote that his connections with the company have changed somewhat, and they will no longer be on the Pacific Coast, and that there was some doubt about his attendance this morning. We have a gentleman here by the name of E. R. Brown. He is manager of the Oregon and Columbia Basin Division of the National Safety Council, and a friend of Mr. Scanlon, and is carrying a message for us.

E. R. BROWN (Oregon & Columbia Basin Div. National Safety Council): This is the first time I have had the pleasure of meeting with you gentlemen. I might say the greatest pleasure I have had in the last year is attending the Regional Conference at Powell River, B. C. Mr. Scanlon could not be here, as you know, but I can assure you that he made the meeting at Powell River very, very interesting. Some of us had to travel almost two thousand miles to attend that meeting. There were some 300 of us. They were not all pulp and paper men, but you understand that our territory out there is more or less scattered.

I don't know what I can tell you about the activities on the Pacific Coast other than to quote some of the results of the past year. We have been rather unfortunate on the Coast in a way. Our activities have been more or less curtailed and our laws out there are rather peculiar. In the state of Oregon our compensation laws are set up in this way: each different manufacturing establishment or group takes a certain rate. But a company carrying on various activities—I might mention the Crown Lambert Paper Company: you are all familiar with that—their woods hazards and paper hazards are grouped so that the hazard in one reflects upon a hazard in the other. That is true, to a large extent, along the whole Coast. The rates are very high. We have on the Coast six dollars out of every hundred dollars of payroll set aside to cover the compensation in the woods. Our woods activity is very hazardous. We have large timber. The contour of the ground is such that it makes it hazardous to get the stuff out.

In the paper mill the rate has been \$2.20 and this year it has been raised to \$2.50. That might be taken as a reflection upon the accident rate or the accident hazards, but it is not. It is a reflection on the hazard of the other industries.

Despite that fact, the majority of the mills on the Coast have had an experience of less than 50—when I say that I mean for every dollar that has been paid out the state has only had to pay back fifty cents for accidents and for medical charges, etc. So the work that Mr. Scanlon started on the Coast is bearing results, very definite results. One of the largest companies has an experience rating for the past year of 43, and we are hoping that the states will reduce those rates to the point where they will be back where they were before.

On the Coast we have held several conferences at which the attendance has been up to 1,000 people, coming those long distances, so you see that the interest in safety work is very keen out there. We believe on the Coast that our Suggestion Box has been the greatest help that we have, and we have overcome the difficulty of getting men to offer suggestions, after signing their names to them, in quite a unique way. Our suggestion blanks carry a stub, and they are numbered in duplicate. The man writes his suggestion and turns it in and retains the stub. Nobody knows who has offered that suggestion. It is handed to the various committees and sometimes they hand it to the central committee. Those suggestions then are acted upon purely upon their merits alone, and to see that they are acted upon purely on their merits we have the superintendents and general managers occasionally write suggestions which have to be passed on by these committees. Then the result of those suggestions is put up on the various bulletin boards of the mills.

The manager of one firm told me the last time I visited his mill that aside from the good that had been done from a safety standpoint these suggestions had brought out the fact that their mill alone had saved \$30,000 in a year in mechanical improvements

through the various suggestions that had been offered. And the peculiar thing about it was that when they traced them down to the end and the awards were made (which is done in most cases) they found that the suggestions came from the rank and file of the men, from the machine tenders and back tenders, oilers, apprentices, and various men like that. The suggestions that really carried merit came from the men on the job.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): A thought has come to me in line with your suggestion about contact among the mills. I don't know how many members here have received the *Powell River Digest* which has given very pleasing accounts of the safety conventions held on the Coast. The thought just occurred to me that there might be more of an exchange in house organs between the different members of the Section than there is. I don't know how many exchanges there are, but personally, I have been very much interested in reading the *Powell River Digest* and keeping track of Mr. Scanlon's activities on the Coast, and I have gotten a lot of inspiration out of the things that have been done out there, and a lot of good suggestions.

CHAIRMAN BRENNAN: A lot of you remember the time when Mr. Scanlon went back home and invited the men along the Pacific Coast to his mill and entertained them royally, and he has held several meetings since. It is very true that we don't have a full appreciation of the distances out there and the amount of work entailed in bringing that about, because they are remote from us. We are apt to pass it over as just another casual thing in this safety business. But we must realize that the Pacific Coast country is a country by itself, and that it has a paper industry of its own, and that it has excellent mills and tremendous problems, and what goes for Canada goes for the Pacific Coast. We must get over the Rocky Mountains and bring those men into the fold if we are going to make progress rather than run around in circles and deal with trivial things. The approach is not going to be difficult because those men are progressive. My contacts with a few of them have been very cordial. I recommend for your consideration, that a definite approach be made on the Pacific Coast problem, in view of the seventeen mills, perhaps, who are just awaiting the glad hand.

Are there any other Sections in the United States and Canada? If not, I will call on Mr. Smith of Corner Brook, Newfoundland, our farthestmost representative this year.

S. K. SMITH (International Paper and Paper Company of Newfoundland, Corner Brook, Newfoundland): I am sorry that I am unable to make very much of a report. Had I known about this previously I could have, perhaps, produced the figures for 1931.

However, I want to say that in our procedure in accident prevention we have a safety committee which meets at least once a month. That committee is made up of the superintendents, headed by the manager, and at least two representatives from each department must attend. In that way we rotate our committee.

In case of an accident we have the superintendent of that department, a foreman, a manager and a witness make a thorough investigation of the accident, so that if there is any carelessness on the part of the injured person we remedy that right away. In that way we get a lot of help in cutting down our accidents.

We have several hazards that would not apply to other mills. For instance, our shipping ends about the end of December or the middle of January. From then on we have to store our paper in warehouses, somewhere between forty-five and fifty thousand tons of it. In the spring the shipping season opens again, in May, and we put about 125 men on the shipping end. A man that has laid off for five or six months has to start the same story over again. After all the preaching we have done on the safety program, he is apt to forget and the same story has to be repeated again. This year in all the shipping to date there has been only one slight accident in the shipping department.

I might say that we have something over 1,000 men employed, from the time the work starts in the woods until the product is shipped away. We did not have any lost time from accidents. In our woods department, that covers the handling of the wood, we had no lost time accidents up to September 25th. Then a slight accident oc-

curred, practically through carelessness, in removing a sprocket, when the point came off the hammer and hit the man in the chest, with a time loss of three days.

We find that the best way is to keep on with the propaganda, and with a clean mill half our battle is fought. The mental attitude of the man working on the job enters into the problem. If he has home worries or financial worries we find he is more liable to have an accident than the man who is free of cares of that kind.

CHAIRMAN BRENNAN: Speaking for the Dominion of Canada I will just say that our approach has been superficial but very pleasant, and Mr. A. S. Cook has done a great deal, even though he has a tremendous territory for which to speak. We will leave the Canadian matter until next year, and I hope at that time they can add their bit to this session if we do our bit to encourage it. It certainly is a credit to the International Paper Company and to Newfoundland that a man has come this far in these times to bring us a message like that, and perhaps only those of us who live adjacent to the Canadian boundaries have an appreciation of the distance that Newfoundland is from Chicago, and Columbia River, as well.

For the first time the secretary, not content with his multitude of other contributions, has seen fit to formulate a brief report. I will call on Mr. Gilson, and before he takes the floor I will add him to the Maine quota, inasmuch as I am familiar with what he has done, and he has done much. I am familiar with his company's attitude and it is wonderful, and we can bank on Oxford at Rumford as well as Oxford at West Carrollton, and realize that their addition makes up in large part those losses which we have suffered in the last year.

Report of Secretary

By H. G. GILSON

Oxford Paper Company, Rumford, Me.

It has been said that the success or failure of carrying on the work of such a section as ours depends largely on the efforts of the secretary. To this I cannot wholeheartedly agree, for during the year I have served in this capacity, I have found that although considerable effort might be put forth, it must be restimulated through leadership.

To this end, I wish to pay particular tribute to our leader, General Chairman W. J. Brennan, who has caused much of the effort that I have put into the duties assigned me.

Through the cooperation of my predecessor, Mr. N. F. Bartlett, and the National Safety Council, I was able to get a well defined outline of the duties of my office.

It has been a pleasure to have been able to cooperate in the accident prevention movement for this section and also to know that in a small way, some of the effort has caused new memberships in the National Safety Council. The welcoming of these new members was one of the most pleasing duties.

Not that the following was part of the duties of a secretary, I did however make a visit to fifteen other paper and pulp mills ranging from the east coast of Maine to the west of Ohio. In so doing, pleasant contacts were made, valuable information received, and we hope, valuable information passed on.

One of the first matters the chairman assigned to me was to notify Executive Committee members of the first Executive Committee meeting he was calling on November 12, 1930, in Augusta, Maine. Unfortunately there were not sufficient members present for this meeting to be held. In this instance, I assure you, things could have been made a bit more comfortable for our chairman and myself if executive committee members had at least replied in the negative.

Later, the chairman called a second Executive Committee meeting to be held in Boston, February 7, 1931. There were at this time sufficient members present for a fair meeting, and there was also very fair response from members of the

Executive Committee informing us they would not be able to be present, which helped in arranging the details for that meeting. Minutes of this meeting were mailed to all members of the Executive Committee.

There were numerous matters to be handled at the request of our chairman that need not be mentioned in this report, but such things as handling and re-handling much of the News Letter material, sending out questionnaires, and checking up on their failure to return, calling to the attention of regional directors of coming regional conferences in their territory, are but a few of the major items that required time and attention.

One of the most interesting parts of the work of secretary was in answering questions from members throughout the United States and Canada. I do not imply I answered them all, but the answers had to be obtained from one source or another. The most valuable assistance of the National Safety Council made this pleasant duty much easier than it might have been were they not in existence and so eager to cooperate.

May I express my deepest appreciation for the honor of having been permitted to serve as secretary of the Paper and Pulp Section, and may it be known that I stand ready to do all possible to assist my successor.

CHAIRMAN BRENNAN: You have heard the report of the secretary. The Membership Committee's report has been read, and Mr. H. D. Banta, I hope, will report on the Publicity Committee's progress.

H. D. BANTA (Hoberg Paper and Fibre Co., Green Bay, Wis.): I sent a letter to every member, asking them to have some one in the organization write an article on some phase of safety. I received a lot of interesting replies. I received some very interesting negative replies.

I was able to secure four articles. Two are on climbing and tree surgery. One article came from Mr. Rosebush, of the Nekors Edwards Company on "Good Housekeeping," and one was by Mr. J. M. Conway, manager of the Hoberg Paper and Fibre Company, on "Industrial Nursing," that is, the effect of industrial nursing or first aid on our accident records.

An unfortunate thing occurred in sending these to the National Safety Council in that I specified the preference I had for the magazines they were to be published in, and they were accepted as material they could use. I think probably they will be published very shortly.

A great majority of the members did not reply to this letter.

CHAIRMAN BRENNAN: In view of the fact that Mr. Grant has a paper on the program his report will be taken care of later, and I will ask Mr. Hunter to briefly tell us his difficulties with the Poster Service. I say difficulties because if there are any difficulties in the Section they are in the development of the Poster Service.

D. C. HUNTER (Oxford Miami Paper Co., West Carrollton, Ohio): I am both ashamed and embarrassed to stand here this morning and tell you that the chairman of the Poster Committee fell down on the job. The Poster Committee was not at all active. We did make one effort to get ideas and suggestions for a series of posters. Maybe that effort was somewhat half-hearted. Nevertheless, we wrote a number of letters asking for ideas and suggestions, to which I received one reply, with the result that we did not get out any posters. I have no excuses to offer, other than that if the various men in the various mills would submit their ideas to the Poster Committee or to the chairman of the Section we could formulate their ideas into posters.

I think most of us have the idea that when we have something happen in our mill that it is an individual problem; whereas we might be able to work up a poster on that which would apply in all our mills. When all is said and done, probably each one of us has the same problem and the same idea could be used throughout the Section. I make that as a recommendation or suggestion and leave that thought with you for the chairman of the next Poster Committee, so that possibly we may have some posters next year.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): I would like to make an ad-

dition to Mr. Brennan's report, thanking him for the study he has made as a chemist of the hazards of lead from litharge used in preparing cement for digester linings, which he failed to mention in his report. He gave us a very full outline of that in the News Letter, and I think all of us who do have that operation benefited greatly.

I would like to offer a resolution that we first congratulate Mr. Brennan on the promotion he has attained in the furthering of safety work, not only in the paper and pulp industry but in the entire state of Maine; and then I would like to add our regrets that we have to relinquish more or less Mr. Brennan in the work of the Section. I think he has done a great work during the past year, and the Section suffers a great loss in his leaving.

JOHN LUNDRIGAN (International Paper Co., New York, N. Y.): In seconding that I would like to raise a little objection to some of the language our chairman has used with reference to himself. He said that he had completely severed connection with the Pulp and Paper Section. I believe that the pulp and paper industry is a very large factor in the industries of Maine, and I hope we are not to interpret the chairman's remarks as meaning that he is going to leave us entirely. I assume in seconding this resolution we are still going to claim Mr. Brennan at least as a part-time member of this Section.

W. A. GLEASON (Hammett Paper Co., Erie, Pa.): That was my thought.

CHAIRMAN BRENNAN: Before submitting the resolution, which is a matter of formality, I want to correct any misunderstanding. I think that most of us understood it correctly. The pulp and paper industry in Maine forms our nucleus without which the future would be drab, indeed. I will be here at every opportunity.

Now, for the resolution that has been submitted, and without going through the formality of that I will extend my appreciation to you fellows for it, and we will now proceed with Mr. Hyer's talk.

(The resolution was unanimously adopted.)

Safety on the Paper Machine

By ALLAN HYER

The Black-Clawson Company, Hamilton, O.

Several years ago my company was invited by one of your members to have someone talk here on the subject of safety on the paper machine. This was our reply. "It may sound strange to you, but in our experience in selling a large amount of paper mill equipment, we do not recall that any of our customers has ever requested or specified the safeguards that should be used. For this reason we have not made an exhaustive study of the subject and apply only such safety features as we think are practical for protecting the operators." Conditions have changed since then.

Safety now has a different meaning. It is more than providing guards and appliances to protect fingers, arms and legs; this is important from your point of view, but to us a paper machine must do more if it is to run safely. It must be able to run at the maximum speeds for which it was built, yes, and sometimes much faster and produce good paper. It must run at these speeds with a minimum of care and maintenance and with as little manual help as possible. The battle for profits is a paramount issue and to successfully wage this battle has meant the introduction of new designs and new methods that were unknown five years ago. It may be a coincidence, but these modern improvements have brought with them the safety features that are of so much interest to you, and we, therefore, are entitled to the conclusion that the machine of today is a safety machine.

Unfortunately, very unfortunately, for the builders of paper machines, there are many of the old machines still doing business at the old stand. How long they will continue, time alone will tell, but the present tendency of the paper industry seems to

prophecy that their end is in sight. With these old machines we must do the best we can. Many have been partially rebuilt and modernized and in every case that we know of such improvements have been profitable.

But in spite of all we can do on a paper machine to reduce accidents it is quite unlikely that an occasional injury can be prevented. There is always a certain amount of danger from revolving rolls, steam heated dryers, gears, etc. and these things are the paper machine. It is not my intention to discuss with you the percentage of accidents that are due to carelessness, unguarded hazards or a bad liver. In justice to your operators, let it be said that they have been compelled to work under severe handicaps on the old machines. There was a time when most anything could get by as paper mill machinery and why the paper mills put up with it so long I don't know unless it is for the same reason that Chinese eat rice—they don't know anything different.

I have a few slides by which I will try to show you what has been done in the last four or five years by us specifically to improve the paper machine, both to make it safer, work better and make paper at a lower cost.

Here, first, is a typical Fourdrinier part, with which you in fine paper mills are familiar. It is just a plain type Fourdrinier section. The wire shown here will last from three weeks to eight or ten.

The hazards on this particular section are not so much in the operation, because this is automatic. The stock comes out, flows down with the wire and is taken care of. But when it becomes necessary to change a wire the hazards increase. All the small rolls must be removed. This is an endless wire and everything has to be taken out of the middle of the machine before another wire can be put in. The big roll has to be removed, and the roll at the opposite end also, and the hazards are very great. The floor is usually wet and slippery, and the men have heavy loads to lift.

The next slide shows the breast roll end of a Fourdrinier section of a little different type. Here we have taken the first step to make a change of wire not only easier but more rapid and safer. We see here the breast roll end. This breast roll has to be removed and all these rolls have to be removed. We have now developed what we call a removable Fourdrinier, so these parts are taken out of the machine intact. I want you to notice particularly the hook, a special design.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): What is the operation of the exposed gear?

MR. HYER: The exposed gear carries a small cable that connects with a roller and has to do with the lowering of the roll into the hook position when the Fourdrinier part is removed. That is only used when this part is lowered and raised again into operating position. This gear does not operate except upon motion of the hand wheel when it is used as a lift.

A Shop Picture

(Slide) This is a shop picture. The breast roll here has been removed through this cable, dropped into a lowered position, and hung on this hook. The whole thing now is ready to move. It is moved out by means of a hand ratchet and a shaft extending along this member, and brought out on tracks that are laid into a machine room floor, so that the only hard labor necessary, in addition to removing the roll into position, is the ratcheting of this framework to bring the Fourdrinier out to the front side of the machine. The table rolls, the wire rolls at the bottom, the trays, everything, are all there intact and the only operation necessary in changing a wire is dropping this roll into position and then working a hand ratchet to pull it to the front end of the machine. That can be looped on so this same framework can be shoved into this position; the wire is tightened, and then off you go.

(Slide) To those of you in board mills this picture will be familiar. This is a part of our cylinder section on a board machine. It shows clearly some of the

modern things we have been talking about—roller bearings on the cylinder rolls, roller bearings on the couch rolls, roller bearings on the wringer rolls, roller bearings on the felt rolls. The roller bearing, of course, is today's bearing, and in addition to being a smoother bearing, preserving the alignment of the rolls, it is a much safer bearing. The old type bearing some of you have in your mills has to be oiled frequently. None of them are adequate. They were built along with the old machines and little thought was given to design or the necessity of doing certain things to make the bearings operate correctly or retain the oil sufficiently to operate for any length of time. The oil poured out on the floor, making a greasy condition which is always dangerous, and a man had to fight the oil all the time to make the machine run smoothly.

The roller bearing, completely enclosed and lubricated in most cases by grease, is filled up once every month or six weeks, sometimes at longer periods, and stays that way without attention.

Overhead we have lifts operated by a hand wheel and gears to raise these rolls, the top wringer roll, to raise the couch roll, instead of the old way of doing it by chain blocks.

(Slide) Another cylinder machine, in a new mill at Lynchburg, Virginia. You can see here part of the word "Safety." The first impression of the mill shows a large room, clean and well-lighted. I think cleanliness and light are probably the most important factors for safety in a paper mill. This particular mill had those factors 100 per cent.

(Slide) The primary press section of a cylinder machine showing again the use of roller bearings. To avoid constant oiling and also to preserve a better alignment of the rolls and better operating conditions the felt rolls are also equipped with the same kind of bearings. The housings are made especially large and roomy, so that the men will have access to the rolls easily when it is necessary to change a felt, and there is a lift here for bringing the top roll up when that is necessary.

Method of Raising the Top Roll

(Slide) A close-up view of what five years ago would have been called a standard press part. This was just a step ahead of a standard press part because at that time we had begun to design bearings of a little better type than had been familiar to us before. This is a sleeve type bearing, but an oil bearing that had to be fed with an oil can.

The feature that I want to show you (that I will compare with others later) is the method of raising this top roll. It is necessary to raise the top roll almost every time there is a shutdown, particularly over the week end. The top part is covered with a hard brass shell and the bottom is covered with rubber. It would be ruinous to allow the brass to rest on the rubber during a shutdown. The only way to lift it was with a hand ratchet. The man had to climb up on the frame with a small step which was provided and work the ratchet with a very slow motion. It took from fifteen to thirty minutes on a large roll to raise it sufficiently, and the same length of time on Monday morning to lower it into operating position. The frame that supports the roll is a solid frame all the way through. This bottom bearing rests on a part of that frame. When it becomes necessary to take this rubber roll out to grind it, as frequently happens, this roll has to be cleared, and it is necessary to bring chain blocks and put over the journals of the roll on the front and back sides and lift it, and gamble in taking it out that the roll will not hit the sides of the frame and scar the roll, and gamble everything will hold all right until you get it out where you want it and put another one in—a laborious and usually a very dangerous job.

(Slide) This is what we are pleased to call a modern press part. We have made some changes. We have now adopted the hydraulic lift. There is an oil cylinder

here working on an arm that comes down. By the simple operation of a small lever on a hand pump this roll is raised by hydraulic pressure. Probably eight or ten strokes of a hand pump away from the machine in a safe place will raise this roll into its position, and it will stay there until Monday morning, when by reversing the valves the roll can be lowered to its proper position. The whole operation can be done in five or six minutes, at the very most. The wet paper that comes over this is collected on a doctor right off the roll. On the old machines it was necessary for a man to climb up here, cross on a foot-walk, bundle that up and throw it on a truck outside of the machine. This applies to both cylinder and Fourdrinier machines. We have simplified that by using an automatic broke conveyor. A belt comes back to this pulley. The broke falls into the conveyor box on the side and the broke truck on the floor receives it and no one has to get on the housings at all.

In removing a roll we have gone a step further. This lower block in the housing is a loose block. You will see a track under the framework. When it is necessary to remove either one of the rolls for any purpose whatever these two rolls are lifted out with a hydraulic lift, a very simple operation. Then this roll is lowered on a truck that has been slid into the frames. This block is taken out. We make this block of cast iron. We put an aluminum piece on the top to lighten it. This block is easily lifted out and put aside, leaving the framework entirely open, so that the roll can be brought to the front side of the machine on a truck, which is put in for that purpose. After it is on the truck, out of the machine, it can be rolled right to the grinders or wherever you want to take it, and in putting it back the operation is reversed. Here again you see roller bearings wherever bearings are necessary.

Guard the Points

H. G. GILSON (Oxford Paper Co., Rumford, Me.): Do you leave both sides on the pulleys open like that? If a machine like that came into our mill one of the first things we would have to do would be to invest our money to guard those points.

Mr. HYER: That could easily be done. This conveyor only operates when the broke is being taken off the top mill. There is a clutch to start it, and whenever it is necessary to convey broke away from the machine they throw in this clutch and this pulley turns just as long as it is necessary, in order to take the paper away. At other times it is idle. But I am glad to get your point. That had not occurred to me. We have not especially studied these things from the standpoint of safety. They have come along with the improvement in machine design, to make things easier and less costly in operation. That is a point that I will remember. This pulley only runs a short time and it also runs very, very slowly, and it is quite a distance from the floor. On the face of all that I don't see how it could be very much of a hazard. The arms are inside the pulley quite some distance: they are not out on the edge.

Mr. GILSON: The handling of any kind of equipment, even an iron bar, around a machine for one purpose or another, might cause it to get in there accidentally and cause damage to the machinery as well as injury to the men.

Mr. HYER: I think that is possible, but it is very remote. That could easily be guarded. We could extend this guard out to cover the end of the pulley.

J. J. PLZAK (Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.): I should think you would want to guard that lower chain and gear.

Mr. HYER: That is used only in working the stretcher on the felt. That does not run with the machine. That may only be used once or twice a week. The objection to too many guards is the expense. You people in the paper mills can devise your own guards and put them on, but if we were to attempt to sell your general managers or purchasing agents a machine with all of these things we might put on, it would be just a lot tougher than it is now.

MR. GILSON: It would cost us as much, if not more, to make the guards as it would you.

MR. HYER: It probably would. Sometimes you can make those things more cheaply than we can, in the mills, but those are good suggestions, and I will remember them.

W. A. GLEASON (Hammernill Paper Co., Erie, Pa.): That lower one is a hand feed and there is no law that requires you to guard a hand feed.

MR. HYER: I don't know about the law, but that is something that you may only use two or three times a week to take up the slack in the felt. That is its purpose. It is operated by a hand wheel.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Can you tell us how high from the floor that conveyer pulley for the broke is?

MR. HYER: I imagine it would be just about the height of my head on most machines.

MR. ROSEBUSH: How far does it protrude from the side of the machine?

MR. HYER: That pulley is about eighteen inches in diameter, or twenty inches, at the most. It would come out just about that far from the machine. The inside face of the pulley is pretty close to the machine frame. It would not extend out over two feet.

MR. ROSEBUSH: Do you think a man might crack his head against that?

MR. HYER: It is possible. I don't know how it could be avoided. We have to carry this out quite a distance in order to catch the broke from this end of the roll. This end of the roll is pretty close to the frames on the inside. I can conceive of a possibility of some one carelessly running along and bumping his head, but usually there is a trough along the machine for taking away water, and that comes out eight, ten or twelve inches. I don't know that I ever heard of any one being bumped in that way.

MR. GLEASON: We have never found it so. We have never had any trouble with that particular thing.

The Loose Broke Removed

MR. HYER: (Slide) This shows the loose broke removed. The rolls have been lifted, as I explained, with a link carrying both rolls to the top. Then when the truck is underneath the hydraulic is reversed, the roll is lowered onto the truck and brought out to the front side of the machine. The roll is pushed out by hand on a truck. It is then taken away to the grinder or wherever it is to be put. In reversing the operation it is rolled in, collected by the link and the hydraulic takes it, it is pushed off and away it goes. There is no block in the back frame. You can get some idea here of the extension of the pulley. There is another small roll that acts as a tension for the belt; that may come out two feet or a little more, perhaps.

(Slide) This is what we call our vertical dryer section used principally on cylinder machines, and now coming into some use on light weight machines where the dryers are carried in columns to conserve space to almost any height, thereby conserving space, and also improving the drying because of certain features. This is equipped with a rope. The dryer bearings are all lubricated here continuously by a lubricating system so they require no attention.

It is necessary sometimes for some one to go up a ladder to the foot walk at the top and watch the sheet go over from one section of the dryers to the other. I don't believe there is any hazard there except lurching up and down the ladder. Attempts have been made to put an elevator in here, but the elevators are not successful, and they are also too expensive. There is a back ladder coming out two and a half feet from the tie rod. Thus when the man gets up ten or twelve feet he has an additional guard in the back, so if he slips he can reach back and

grab the other one. That has not happened to our knowledge more than once or twice.

(Slide) This, no doubt, is familiar to all of you, and you will tell me this is the most dangerous part of the paper machine, no doubt—the gear side of a vertical dryer section. There are 138 rolls on this dryer section, all geared rolls, and guarded just at the bite of the gears. You will probably complain that that is not sufficient as a guard, and then I will have to tell you that there is no reason why a man should be anywhere near this dryer section while it is in operation. The bearings cannot be reached. They are here behind the gears. We have put on an automatic lubricating system to take care of that. Our steam joints are made of the oilless type, requiring no lubrication. So there is no necessity for a man being in this dryer section at all while the machine is running. Ladders are put up for minor repairs on steam boxes and other things which might happen which have to be taken care of during the shutdown periods. To get over here he has to cross over the steam section and cross over the steam pipes which are always hot, and that is very nearly a guard in itself, and there is no necessity for him to go up on that dryer section while it is operating. There is nothing he can do and he ought to keep his feet on the ground. This shows the open gear drive stand.

The Calender Stack

(Slide) We have come now to the calender stack. The calender stack itself is a hazard. I don't want to say it is an unavoidable hazard, but it is practically that. The paper has to be carried through rolls, and the only way that I know of that it can be carried is by hand. Air appliances have been used on high speed light machines, but the paper must be fed by hand. We have put various kinds of doctors on the rolls, nips on pipes and things of that kind. All of those things have been done by the mills.

We have improved one condition that has accounted for more accidents than any other one thing, and that is at the time that the calender stack becomes choked and the rolls turn for a while until there is a wad of paper in here and the rolls won't turn any more. The only way you can go ahead then is to stop and get that wad of paper out. Sometimes that takes an hour. They throw kerosene all over the rolls—perhaps you are familiar with that—they jerk the shift lever back and forth, trying to run it one way and then the other, to loosen the paper. They work a hand ratchet on the front side of the rolls and try to pull them around. It is quite a difficult task.

We have put in what we call a reversing gear drive. This is the main drive going to the first calender stack. To this is connected a pair of reduction gears. Whenever there is a choke the rolls stop and it is necessary to clear them. The operator goes to the back side of the machine, throws out the main clutch, throws in the reversing clutch, and the calender stack operates in reverse, and by doing just the opposite to normal operation he starts the stack again, all in three or four minutes' time, whereas it might have taken an hour under the old method to pick that out, and then possibly finally resorting to lifting these rolls by means of a hand ratchet, which is a hazardous and unsafe job.

This is the reversing mechanism. We have two or three modifications of this. We have a different one now which is not quite so large. This reversing mechanism is carried in the drive itself by simply throwing in one clutch lever and pulling another, thus reversing the calender stack, and in most cases it will clear itself immediately and be ready to start again. That probably is the greatest improvement in safety on the calender stack.

(Slide) A very dangerous part of the machine is the two-drum upright reel. That has been termed a man-killer, and I guess it is practically that. It has been responsible for more serious accidents than anything else I know of. When this

reel is going this way, winding up the paper, and the other one is pulling off this way, these two rolls running together, if a man should get in there to work on this sheet where the space between the rolls is not more than six or eight inches, it is easy for him to lose his balance and fall in—this roll going at a speed two and a half to three times faster than the rewinder—a frightful thing to think about.

JOHN LUNDRIGAN (International Paper Co., New York, N. Y.): The state of New York is pretty fussy about guards. A guard across there absolutely provides one dead surface.

MR. HYER: Just a dead bar?

MR. LUNDRIGAN: With that bar there you can't go in there unless you shove yourself in.

MR. HYER: I think I have seen that. This is what used to be called the English reel. The reel is over here and consists of a single drum with a winding mandrel on each side at the top of the drum. The paper is brought over to one winding mandrel. When that roll is completed they just slit the edge of the sheet and it runs over to the other mandrel. This roll is being lifted off while this is being wound. It is all down at floor level, where a man can get at it. It is the only reel that can be used on high speed machines. There is no choice in the matter. The two-drum reel is positively out because of the difficulty in getting the paper on at high speed. This roll must be used on certain types of high speed machines. You have no choice.

Experience with the English Reel

MR. LUNDRIGAN: I want to tell you how to make that English reel safe. We, unfortunately, killed two men on those English reels. We have simply put a dead plate at the front of that reel the full size of the roll, that is, the maximum diameter, and we have never had an accident with those reels since.

MR. HYER: You just follow the contour of the roll?

MR. LUNDRIGAN: Exactly, although we don't quite follow the contour of the roll on account of its design. It is our own design for the purpose of giving free use of the air hose, but it does cover, and in some places more than covers, the full circumference of the roll of paper.

MR. HYER: The uniform speed reel, the English reel, is dangerous. You have one roll of paper on a drum. They are all going at high speed, and the least little slip might cause an accident if a man gets up near the nip of the roll.

MR. LUNDRIGAN: The danger is in putting the reel onto the winder. There is no particular danger that I know of on the reel next to the calender stack if you are using air equipment. In both instances our man was caught by the bolts in the end of the reel itself so we just covered it with a dead plate. The upper portion is all you need to cover; the lower portion is covered.

MR. HYER: I see your point. The wound roll is taken from the reel, placed in an unwinding stand in position to be rewound on whatever type of winder you have. This is a four-drum type. This winder must run at a speed of two and a half times, at least, greater than that of the paper machine in order to keep away and compensate for the time required to bring the paper over here and get it through, so they run very, very rapidly. If your machine is running at one thousand feet your winder will be running at two thousand to twenty-five hundred feet. I don't know of any way of handling that except by hand, unless you do it by air. When you feed from the rewinder you feed by air?

MR. LUNDRIGAN: Yes.

MR. HYER: (Slide) We have modified the two-drum reel by putting the two drums on the floor on separate stands. The sheet is carried to one reel, and after that is completely rolled it is carried over the top into the winder. In the meantime, the sheet is carried to the second reel while this is being rewound, and then the operation is reversed.

MR. LUNDRIGAN: All that does for you is to permit the winder to keep up with the machine.

MR. HYER: It is the same thing, but instead of having one drum over the other with the possibility of those two rolls building up to a point where they might become dangerous and having to reach way up in the air, the stands are down at floor level in both cases, and it is very much easier to handle from the operating standpoint.

(Slide) This is looking at the dryer side. Here is the slip belt drive coming through the floor and the friction pulleys are over on this side, and by means of extended rods the friction on the pulleys is controlled from the operating side of the winder, so that the operator never has to leave his winder. If it slacks up a little he tightens it a fraction; if it is too tight he loosens it a little. That is all done from this side of the winder, so there is no occasion for the man to come through here and pass over the motor cages, drive parts and other things that might get him into trouble.

MR. LUNDRIGAN: Is it not true that in a great many mills the mill requires the paper to be turned and the man has to go in there and turn the paper?

MR. HYER: I suppose that is true. I am speaking of the mills where that is not required.

(Slide) This is the familiar type of old drive stand with the open compound gears. We have usually guarded these gears with a bite guard that comes up part way here and part way here. The rest of it we generally have left exposed. This is the same way in which we guard the bite, especially where they are turning together, and that is about all that has ever been done, unless the mill builds a guard rail around the drive, but the gears are wide open and the bearings are the plain type bearings that have to be oiled with the oil can frequently, probably a couple of times a day; sometimes on each shift a man goes around and passes in between these dryers that, in the older mills, are very close together, on greasy floors, to put oil in these bearings, perhaps as much as three times a day in some cases. I think I can show you an improvement on that.

Gear Drive Completely Enclosed

(Slide) This is a spiral bevel gear drive completely enclosed. The gears are all in this oil casing. No oil can come out. The oil is carried here in a reservoir to lubricate the gears. This is completely arranged so that the oil cannot leak out of the casing. The pulley is guarded completely in this case by a shroud with a flange on the side to further protect the moving part. That comes as near to being a safe drive as anything that has been done so far. I have a little better picture of it.

(Slide) This shows the same type of drive. The floor is down here. This height is about three feet, I should say. These were put up on concrete pedestals to suit connections with our vertical dryer section. In this case the pulleys were not guarded. They could easily have been guarded by putting a piece of sheet iron over them. The gears are completely enclosed. This is the end of one bearing. You will find no oil spots on the floor. This mill had been running for some time when these pictures were taken, and this floor is perfectly clean, and I believe this is about as safe as it can be made. That is a very clean drive section.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): There is less energy utilized in a drive like that, is there not?

MR. HYER: Yes, considerably less. It has better gears, smoother gears which are constantly lubricated.

(Slide) In conclusion I want to show you an installation that Mr. Faist is familiar with, with the spiral drives. They now have all their machines except the Number Six (built four or five years ago) equipped with this spiral type of drive. They have gone further, not only in guarding the pulley itself, but in putting rails around the drive. This floor is perfectly clean, dry, well lighted, and it would be almost safe for

children to play on the drive side of this machine. I don't know of any more complete job of guarding than has been done on these drives. They require absolutely no attention while running.

That concludes the picture show. We appreciate very much the opportunity of coming here to talk to you. I have some literature on this subject and prints of these pictures if you'd be interested. I'd like very much to send them to you.

CHAIRMAN BRENNAN: Mr. A. Scott Dowd, Editor of Paper Industry Magazine, left this report to be read into the records.

Report of the Contest Committee

By A. SCOTT DOWD

Chairman

The Contest Committee begs to report that there were a total of 125 mill and plant members of the Paper and Pulp Section of the National Safety Council registered in The Paper Industry Annual Safety Contest, beginning January, 1931, and terminating June 30, 1931.

These were divided into two divisions: 107 mills being registered in the class of pulp and paper mills, and 18 registered in the class of paper and board remanufacturing plants. There were employed a total of 39,796 people working 48,715,543 man-hours; having 787 lost time accidents and 17,263 days lost; an average frequency rate of 15.744 and an average severity rate of .354.

In accordance with Rule 4 of the Contest Rules adopted last year, there are at present registered in the 12-months contest beginning July 1, of this year and ending June 30, 1932, a total of 121 mill and plant members of the Section, divided as follows: 103 registered in the class of pulp and paper mills and 18 registered in the class of paper and board remanufacturing plants.

A more detailed account of the records made by the groups into which these divisions were divided, and awards of certificates to leading mills in each group will be given at the luncheon of this section on Thursday.

CHAIRMAN BRENNAN: We will ask Mr. Plzak, who is Engineering Committee Chairman, to give you a report on the engineering status of the Section. Mr. Plzak.

J. J. PLZAK (Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.): There was still some carry-over work which took quite a bit of my time relative to the health work that had been begun by this Section. I refer to the work that we were doing on the effect of chrysoidine or peach-colored dyes on the employees, and it seemed that after I left the Congress last year and thought that I had submitted a full report which was to be incorporated in the proceedings of the Section that the work was completed, but to my surprise I continued to receive inquiries and correspondence from the health organizations, from the medical men of our universities and from dye stuff corporations and from other paper mill executives.

The interest in the work was very keen, especially in the outcome of the final analysis, in that we felt that we were justly assuming from our experimentation that the results of chrysoidine upon the workers or operators who handled it were not injurious to their health. It seems that this year, although our company has practically not handled the dye, the examinations that we continued to make upon the operators showed no deviation from the results at the time they were handling the dyes and the time before they were handling the dyes.

Incidentally, that work seemed to arouse interest along other lines relative to other dyes and dermatitis and many of the other industrial diseases that we are confronted with. With that taking up quite a bit of my time there was very little time I could devote to the Engineering Section.

However, this much was accomplished: We had had meetings prior to the last

Congress relative to the completing and revising of the Pulp and Paper Safe Practices Pamphlet. This Pamphlet is now in such form that it will be printed shortly after the Congress.

Our committee, under the chairmanship of Mr. Altman, has done everything in its power to incorporate the very recent features of paper mill hazards into the pamphlet.

ADJOURNMENT

**Tuesday Afternoon Session
October 13, 1931**

**W. J. BRENNAN, Chairman
State Department of Labor and Industry, Augusta, Maine**

The second session of the Paper and Pulp Section convened with General Chairman W. J. Brennan presiding.

CHAIRMAN BRENNAN: Without further introduction, in view of the fact that you all know Earl Grant, I will ask Mr. Grant to give us his paper.

**Trend of Accidents in the Paper and Pulp Industry
During 1930**

**By E. E. GRANT
Chairman, Statistics Committee**

The paper and pulp section has one of the best records in the Council for reducing accidental injuries and that reputation was maintained during 1930. Records of 115 companies that have reported in each of the last three years show that lost-time injuries per million hours worked declined 17 per cent from 1928 to 1930. All but 2 per cent of this reduction, however, occurred from 1929 to 1930. While the decrease in frequency indicated for our section is considerably less than the average of 28 per cent for all industries, our reduction in severity is far larger, being 28 per cent in comparison to only 8 per cent for industry as a whole. We can regard the decreases in our injury rates with considerable satisfaction because activity in our mills, as indicated by reduced working time, declined only 3 per cent from 1929 to 1930 in comparison to an average of 17 per cent for all industries.

Most outstanding in the experience of our three-year identical plants was the decrease of 29 per cent in the frequency of fatalities. This is three times the average reduction for similar injuries in all industries, and largely accounts for the improvement in our severity rate. On the other hand, we were not quite so fortunate with permanent partial disabilities; the frequency of these injuries decreased from 1928 to 1929 but rose again in 1930, although the rate for the latter is still 9 per cent below the 1928 rate. The variations in the frequency of the permanent partial disabilities during this period was accompanied by similar variations in the severity of such injuries. We can also point to a sharp decrease in our minor lost-time injuries, temporary disabilities, during the last two years, but unfortunately, no reduction in their severity. On the whole, identical plants in only a few industries have equaled or exceeded the reductions made in the paper and pulp industry.

In spite of the continuous progress which we have made from year to year, however, we still have much ground to cover before we are one of the safest industries in America. Our 1930 frequency rate was 23.65 in comparison to 18.47 for industry as a whole. We are having, therefore, about 5 more lost-time injuries per million hours worked than the average. Our severity rate, however, makes a better comparison, being 1.89 against 1.97 for industry as a whole. We have, for example, much lower severity rates than the steel and cement industries, although these industries are among the five with the lowest frequency rates. In comparison with 28 major industries, the paper and pulp industry ranks twentieth in frequency and thirteenth in severity.

Industries with more than average hazards have been more successful in reducing temporary disabilities than in decreasing serious ones. Their experience shows the necessity for a careful investigation of each injury and the need for passing on

the details, particularly for serious cases, to other members so that they may avoid the occurrence of similar cases. We can do well to profit from the experience of other industries with serious injuries, even though they are not so outstanding in our own. Our frequency rate indicates that we have numerous hazards, but our comparatively low severity rate shows that they do not result in proportionately high severity. There is, nevertheless, always the possibility of a serious case resulting from apparently trivial causes.

An analysis of the records of members in various divisions of our section show that manufacturers of envelopes and other paper goods have much lower frequency and severity rates than other classifications. Paper and pulp mills, on the other hand, have the highest injury rates, ranging from no-accident records to frequency rates of more than 100.00 and severity rates of 12.0 and 13.0. Rates for paper box and container manufacturers also have a wide range and their average rates are only slightly lower than those for paper mills. Fatalities are most frequent in paper and pulp mills whereas paper box and container manufacturing establishments have the highest permanent partial disability rate. Our miscellaneous paper products division, composed of 46 plants with an exposure of over 30,000,000 man-hours, deserves credit for going through the entire year without a single fatality.

Excellent Individual Plant Records

Some excellent no-accident records for the entire year were made by individual plants in all branches of the industry. Of the 24 no-accident records reported, for 1930, a tissue paper plant had the largest exposure—584,000 man-hours. A paper mill which worked 582,000 hours led its division of 150 plants by going through the year without a single lost-time injury. The largest paper box and container manufacturing establishment to make a no-accident record worked 327,000 man-hours.

These records can, of course, be exceeded in a month or two by large organizations but they serve to show the effectiveness of accident prevention work in some of our smaller mills. The latter, on the whole, did not make as favorable showings during the year as the large plants. A study of the records of plants of various sizes shows that injury rates decrease as plants increase in size. This situation exists in practically all industries. It need not continue, however, because as I have just shown, medium and small sized mills have clearly demonstrated their ability to reduce injuries to the vanishing point.

I desire to point out, in conclusion, that the statistics of our section are increasing in reliability each year. In response to requests for 1930 reports, we received the records of 232 plants with an exposure of almost 210,000,000 man-hours. In no year since the organization of the section, have so many plants reported to headquarters. The gain over 1929 was 17 plants and 13,000,000 man-hours of exposure. The number of our identical plants, on whose records we must base the progress of the section in accident prevention work, was half of the total number reporting for 1930. This growth and consistent reporting shows very active interest by members in their own records as well as in the work of the section. We hope that the 77 members who have not yet cooperated, will add their experience for 1931.

CHAIRMAN BRENNAN: Although most of us know the next speaker, it might be well to say that he represents an immense organization, that his work involves every angle of the safety approach, and his records are outstanding. He has not only the problems common to pulp and paper, but the allied problems of lumber, etc. I want you to fully appreciate the status of the next speaker and his genuine efforts in behalf of this Section, which perhaps in the past have not been fully credited. Without further introduction I will introduce Mr. Arthur Murray, Insurance Manager, Container Corporation of America, Chicago, Ill., who will speak, with the aid of slides, on "Hazards Peculiar to the Box Board Industry." Mr. Murray.

Hazards Peculiar to the Box Board Industry

By ARTHUR MURRAY

Insurance Manager, Container Corporation of America, Chicago

The box board industry consists of the raw stock people who pick up the waste paper, primarily in the cities where it is so abundant. Then we have our country mills making strawboard, primarily from wheat straw, and then the city or urban mills concentrated near large towns because of the source of supply, making the chipboard and liner. And then in connection therewith the converting plants that convert that liner and chip and straw into finished containers.

We will in this discussion, however, leave out the waste paper production, in view of the fact that they are only an allied line of the box board industry, and we will just touch upon the converting plants which have been so well taken care of in a recent Code of the Safety Council.

The straw mills in our organization are in the country, primarily due to the fact that they need large tremendous areas for storage of straw. Straw, of course, is a seasonal commodity and cannot, as a rule, be drawn upon from month to month as your requirements demand. We have a big season starting late in May or early in June in the midwest. Of course, it will vary in different parts of the country. That means that we have to put thousands of tons of straw in storage for our next ten or twelve months' requirements.

I want to touch upon more or less a personnel man's viewpoint in regard to our safety problems. The hazards require the selection and training, primarily, of our personnel. It means that the hazards as they exist are not dormant hazards, but involve action on the part of employees.

At a recent engineering session in this city we had the pleasure of hearing a time study man evolve what he described as the operations in any job. He outlined first the "make-ready" operations, then the "do." That means doing the job. Then the "taking away."

For myself, I have formulated what I call a fourth operation, which is so often overlooked. Those are the emergency operations which are necessary to facilitate these normal three when some unknown quantity or some unknown event has crept into the work to throw off the regular schedule.

I will illustrate what I wish to say with a number of lantern slides.

(Slide) This is an outline for the standard of procedure for accident prevention. The first is labor control. Selection through physical examination standards. Selection through alertness tests. Selection through adequate personnel records and specifying the type of apprenticeship necessary for performing special hazard operations.

The second is the job and occupational analysis to classify the jobs and operations presenting the greatest exposure to injuries and accidents with their attendant danger points and hazards. To classify the types of errors precipitating injuries and accidents. To classify the special hazards subject to special treatment.

This occupational analysis is, to my mind, one of the essential points in training, not only of foremen but of the workmen who are under them.

This planning, which is the result of the analysis previously mentioned, requires that we specify in writing the consolidated experience of the staff as to the best way of performing each operation. The known tools or devices or guards required and the schedule of inspection and maintenance best suited.

Those who attended the session yesterday afternoon heard quite a talk on these maintenance standards as required by the Westinghouse people. I believe they hit the nail right on the head with their requirements, their schedule requirements of inspection and maintenance best suited to specific operations and tools and devices.

Continuing, we specify the remedies for each type of error which may cause

injury to man or damage to material or equipment. It is not only necessary for us to know what is happening in our plants but we must be able to apply a remedy which will suit the type of error which is of a repetitive character.

We have our supervision—of uniformity in how the foremen teach. Not every foreman knows how to teach. You have foremen who have just been promoted, maybe, in the last thirty or sixty days. Other foremen have been in the job for possibly that many years. They all have their ideas. There is no standard or uniformity in the average plant that I have observed in the methods that they are going to apply.

We have uniformity in what the foremen teach. For example, I have had a foreman in a meeting, and I have given him a pencil and paper and asked him some question on a well-known machine, such as a woodworking saw. I have given him five minutes to put down the five chief causes of hazards on that particular machine, and I have had as many as twenty-five different answers on it. I think that is quite a stunt in any plant to test just what the foremen are thinking of in that particular machine's hazards which may be under discussion.

(Slide) This continues this personnel viewpoint, the typical operations involved at time of injury. This was a similar test to the one I suggested a minute ago, in giving the foremen an opportunity to write down in a limited length of time what the typical operations were of the man who was hurt. Of course, I am interested—I believe you are, too—in knowing exactly what that man was doing at his machine. It seems to me that the important injuries, the serious injuries, are those occurring due to unusual events. As a rule, they do not occur in the regular line of work. By that I mean, it is seldom when a man is threading a machine that he gets hurt unless he has lost his balance or his attention has been diverted or some other event has occurred to distract him.

(Slide) This is one year's experience of six box board paper mills. No straw mills are included. I am showing this to point out the theory that we have heard before, that departments that are prone to numerous minor injuries seem to be prone to the greatest lost time frequency rate.

The lost time frequency rate, I think, is the common denominator that we understand best. The beater room is the first department with a rate of 42.20 per cent, while the paper machine room has a frequency rate of 69.43 per cent. Another marked department is the maintenance department, marked "repairs" on this chart, with a frequency rate of 47.95 per cent.

Now, charge the number of all cases reported to the First Aid room against lost time accidents and we find that the mill as a whole averaged eleven per cent of their cases that resulted in lost time.

In the beater room 11.9 per cent resulted in lost time while in the machine, paper machine room, 12.9 per cent resulted in lost time. There is always a chance of a factor entering in there, though, as to the proneness of one department, due to their position in relation to the first aid department, reporting all accidents, so we would say the probability of lost time from this one year's experience is about the same in the beaters as in the paper machine room.

Another factor of interest is the probability of lost time to exposure. Exposure is denoted by the number of cases that have been reported to our first aid department. The item, 101 moving machine parts, figures in one-third of the total cases that occurred on moving machines with lost time. Power transmission, the second item, shows that 27.8 per cent resulted in lost time, while the point of operation, which includes rolls and nips of all kinds, resulted in 27.8 per cent lost time. That emphasizes, of course, where we may expect to have our heavier injuries. Here is another large one. Falling objects result in 22.7 per cent of the total cases resulting in lost time, while factory trucks or vehicles resulted in 34 per cent of the cases having lost time.

This experience probably is a little different from the rest of the Paper and

Pulp Industry, but it does show more or less the types of injuries and the seriousness as they occur.

There is one further point that I would like to get in here, that because certain types of accidents are so remote we are prone to overlook them. In other words, they are not repetitive enough to scare us. But the fact, for example, in connection with power transmission, where there is a chance of injury, results in 30 per cent of the cases resulting in lost time should be initiative enough for us to go ahead and keep after those particular hazards.

(Slide) This is the way the straw comes in to our companies' strawboard mills. You notice in this picture that the straw is in bales, all ready to go out to the straw rick in the straw yard, where they will be pulled off and turned over to the yard superintendent and run up on a conveyor or a ricking machine.

(Slide) I will show you another picture on the receipt of the straw as it comes in the old way. This is an old picture, but they still have scenes similar to this. Loose straw comes in from the farmer, presenting to us a particular labor hazard, due to the fact that these men, as a rule, are working under contract. They may be casual employees, but the average Industrial Commission requires us to insure them where they don't have specific insurance themselves.

(Slide) Here is a picture of a straw rick on the left which has been built up. This probably stands about thirty-two to thirty-four feet high. You can see how well balanced it is down here. Over here is a rick in course of progress.

The conveyor is one of the yard hazards that we have. It is a slow-moving conveyor, but there is always the opportunity for a man to take chances in walking on it while it is running, or having a bale fall off, dropping some five or six feet to the ground. These bales, incidentally, will average in the neighborhood of eighty to ninety pounds, and while that is not a very heavy weight compared with our paper bales, it means quite a severe injury if it falls onto a neck or back.

(Slide) There is a bird's-eye view of a straw yard, showing one of the ricking machines, one of the portable conveyors. They present a special hazard in themselves, in that you will find in country mills, particularly, the machines are not guarded like stationary machinery. It is particularly important to check up on them. They are generally gear-driven. They derive their power ordinarily from portable electric wires plugged in in the mill. These electric wires in themselves are a fire hazard and frequently, if they are not properly maintained under a schedule of maintenance, we will have shorts, electric burns, and shock.

The hazards in ricking, of course, are that the men have to climb up the rick itself as it builds up, and they are liable to step into holes between bales as they are piled together. That means sprained ankles and sprained backs. The material itself is prone to fall, injuring men on the ground or men who are on a lower level of the rick. One of these bales might tumble off while they are building up inside of the rick.

The bales, too, are wired together. That presents possibilities of puncture wounds and cuts from a generally rusty wire. That is a problem, too.

The use of the hand tools is one of our chief sources of minor injuries. By that I mean puncture wounds, usually to the leg. They will have a laborer in there who is employed for a temporary season—the straw season. While we have maybe one hundred to one hundred and twenty-five men in this yard during June, July and August, there will be but four or five during the fall and winter months, depending upon the amount of outgo of this straw into the mill.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): Do you have much trouble with the freezing of the straw in the wintertime due to rains, etc., or are these plants located in that part of the country where the climate is ideal?

MR. MURRAY: Our plants are in the midwest, in Indiana and Ohio. The freezing, from a safety standpoint, does not embarrass us at all.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): Is there any settling after the thawing?

MR. MURRAY: There will be a settling of the ricks. That presents a constant hazard that we must inspect. The watchman not only reports on that, but he has to make a physical inspection of the rick. The watchman has a daily report which takes care of inspecting not only for the fire hazard but also for the loose bales in a rick, or a bulging. You will find a tendency when they settle for a rick to bulge out, and very frequently we have to prop them up to prevent caving of the rick itself.

MR. GILSON: Do you build your ricks on the ground?

MR. MURRAY: Yes.

MR. PLZAK: Have you experienced much trouble with dermatitis caused by some of the poisonous weeds getting into the straw?

MR. MURRAY: No, we have not. What we do experience, though, is a hazard in the way of a lot of eye injuries during the summertime, due to chaff flying into the men's eyes. Those are purely local cases. The man's lost time amounts to probably an hour or an hour and a half and then he is back on the job again. It is just a nuisance, you might say, rather than a serious hazard.

This straw comes in, of course, in the conveyor, and runs in past the lime house up into a high conveyor system in the straw room. The straw room is like a big hay loft during the busy season. That means that men are up on the conveyor handling that straw as it comes in. The straw, of course, has been loosened from the wire which has been binding it in the bale form. It comes in loose, but nevertheless, it piles down, and there is always a likelihood of a man being buried alive under tons of straw.

The straw is pitched down onto the floor level where the rotaries or digesters are located. The digester is a big metal tank with a cover at the top into which the straw is pitched by hand and then rammed down with a metal ram. This metal ram itself is on a universal joint and is operated by steam. The ram pounds the straw in, pounds ton after ton of it right into the rotaries, after which the rotaries are covered, locked up, and live steam forced in on top. They are rotated for about four hours' time during which the cooking process is going on.

Of course, we add different chemicals. Different strawboard manufacturers have their little trade secrets which they use, but primarily lime is added, which I mentioned a minute ago. That is one of the main ingredients.

In the straw room we have the use of tools, such as hooks and pitchforks, presenting a tool hazard, which is confined to small places among a moderately large crew of men. That means that we have to have them well trained in their use to expect to have any sort of safety record.

The ram that I mentioned is a machine which can cause considerable damage if it is not properly handled, due to the fact that it is continually pounding downward. If it gets loose from its moorings it can cause fractured legs or still further damage.

The use of live steam is another potent danger in this operation. It requires expert maintenance of the steam lines and the proper use of valves, due to the pressure which is involved.

The lime room is a little separate room by itself. The lime is mixed up in regular mixers and attended by about two men in possibly a mill of one hundred and fifty employees. The lime itself has a corrosive hazard. It can burn through clothes. If it gets in the eyes or on the skin it must be taken care of promptly, though there is no immediate effect unless the man actually stumbles into a vat or puts his foot in water or gets his clothes drenched by the lime liquid itself.

Before we leave this straw mill, to remind you that we are at the strawboard plant, I want to point out that the strawboard manufacturing is a single cylinder operation as compared to a multiple cylinder operation in the board mills. That is

an important factor in our operation, of course. That means that we have smaller machines. We have lighter weight rolls. It means that the caliper of a sheet going through is much lighter than what we are going to have to handle in our board mill plants.

One particular distinction in handling the sheet will be at the calenders, where because of its light caliper it can be put through the stacks by means of tools such as broom handles. This, of course, cannot be done at the board plants, where the sheets are so much heavier that they will bend and catch in the stacks.

(Slide) This is at a boxboard plant; of course just the typical and usual plant. We are in a city which is near the source of raw material. The raw material is primarily waste paper, waste paper that is picked up from office buildings and different sources, newspapers and the like. It is taken to the sorting plant where it is graded into eight or more grades of paper.

(Slide) Here is a typical newspaper bale as we have it stored in a storage shed. It is a one-man job, yet this particular bale weighed over twelve hundred pounds. The trucker is about five feet tall, yet the bale is about a couple of inches taller than he is. Those fellows get so expert with their trucking that it is just another job with them. He has his foot on the brake of the truck itself. They have found that is very helpful to them in preventing the truck from backing up over their shoes. This man has not safety shoes on, though the plant where this picture was taken is very well sold on that safety measure.

The picture shows, too, that he has a big hand hook. He takes a firm hold in the bale, gets his foot on the brake, topples it in and catches it with a spring when it comes down. That is an essential operation, something they have to be coached in just as in any trade. It is something that not every man we take on is able to handle. The size of the bales is in itself quite an accident hazard, unless the man is broken in very specifically on how he must handle his truck and tool.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): Do you have many men with sprained backs from lifting those heavy trucks?

MR. MURRAY: Very seldom. That comes up under the physical examinations.

MR. AUGUSTUS: We have them baled in the same way, but we have a truck designed so that instead of having one leg in the back it has two legs in the back, and we have put on a wheel, so the thing is really a four-wheel affair. The man does not have to carry the bale at all. All he has to do is push it off when it comes back.

ARTHUR E. WINSLOW (Hollingsworth & Whitney Co., Waterville, Me.): Are they ever piled more than one bale high?

MR. MURRAY: Sometimes they are. Some mills will pile them at least ten high. They will have a single storage shed.

MR. WINSLOW: How long a haul do they have?

MR. MURRAY: This would not be over seventy-five feet.

MR. WINSLOW: Do they use tractors? Have you ever used Ford tractors to handle them, or electric trucks?

MR. MURRAY: Once again, that depends upon the physical outlay of your plant. In this particular plant they could not use tractors. That would be such an additional hazard that there would not be room for them. It is a traffic problem. If there is room for a tractor and the haul is long enough you may justify it.

JOHN LUNDRIGAN (International Paper Co., New York, N. Y.): Suppose there was a wheel on a swivel on the brace so that would be a three-wheeled truck?

MR. MURRAY: In order for one man to handle it, you could not do that. It is a one man job and he would not be able to tip it if he did not have the leverage of that type of truck.

MR. LUNDRIGAN: Wherever we don't use power trucks for loading our paper up to sixteen hundred pound rolls it is a one man operation with a three-wheel truck with the third wheel on a swivel.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): Possibly you have never had this hazard occur in your industry, but we found that we had quite a number of injuries to the knuckles caused by the fellows scraping their knuckles as they came through the doorways. We put knuckle guards on all of our handles and that worked very nicely.

MR. MURRAY: That is a very happy suggestion, too. We have been quite fortunate that way. This material comes in from a city truck right onto a platform. This fellow is tipping it right off. He will convey it to a permanent storage place. He is just going through the process of tipping this from the temporary storage onto his truck.

(Slide) These men are in a beater room. This fellow has a pair of nippers in his hand and is going after the wire. Notice his left hand. He has the top of that wire firmly clamped down with his gloved hand. That wire hazard is one of the chief sources of injury to an untrained beater man or beater engineer, as you may call it. The wire, of course, has been tense. It has been tightly wrapped around that bale, and naturally, when the tension is relaxed when it is cut it is going to fly upwards, and the eye is a very favorite place for it to strike. He is showing a safe practice there in cutting the wire before he is going to tear down the bale and feed it to a beater.

Here are the wire hazards. Of course, there is a tremendous amount of wire taken off, and it must be promptly wrapped. If it is allowed to stay in anything but a round position, protruding out, it means that men passing by are exposing not only their bodies but particularly their faces to this hazard. In the old days eye injuries were prevalent, and I know of cases where they have lost their eyes due to that particular hazard.

It might be of interest to show you how the bale looks after the tension has been taken off. Of course, these sheets are going to be lifted up in layers, with three men right there on the side of that skid, to be lifted up and fed into the beater which is right in front of them. These men are going to lift this up and feed it into that beater.

(Slide) What we have tried to do is to keep this information constantly in the hands of our supervisors, so that their limited experience in one mill won't preclude them from prior knowledge of injuries in other but similar operations.

Lever weights fell off lever arm onto feet. In certain mills that did not have the proper supervision that has been a constant source of injury. It is a repetitive type.

Hand caught in wringer roll, adjusting felts. He lost his balance. That in itself is a potential loss of an arm.

Pounding rubber roll with a hammer. Nail flew out and struck him in the eye. An unusual case, but certainly repetitive.

Cleaning out sewer, glass puncture. Particularly in the boxboard industry, even though the paper is sorted, where you have eight different grades of paper, you do get glass and foreign matter, razor blades and that type of thing into the sewer.

Muriatic acid in eyes. He threw a bucket of acid on the felt in cleaning a new felt. That involves an unsafe practice.

Puncture wound and infection from needle in repairing felts. One of these infections, to my knowledge, in a neighboring mill resulted in a loss of an arm—just a little needle puncture. It seems so primitive in safety, but it has occurred and it can recur.

Puncture infection from cylinder wire at the screens. There is another one that resulted in specific loss of use to a man's arm. Those cylinder punctures don't show very often. They don't even bleed very often, but they carry enough dirt in at the screens to require immediate medical attention.

Removing nap fuzz by hand, caught hand between press rolls. This was another

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serious case, where a man, instead of using a tool, reached in with his hand and took a chance between two press rolls.

Burned by electric bulbs breaking at the felts at clean-up time, destroying the value of the felts. This has its own little story in the fact that this plant did not have the proper protection on their electric bulbs, did not have the well-known guards which should be used, and it cost them quite a bit of money in just repairing this particular felt.

Putting belt on fast-moving pulley to start up pump. He was thrown over the shafting. Some mills are still using the old-style transmission. They can't all be motorized. They can't all change their transmission equipment so they can have loose pulleys and felt shifters. It requires especial attention in these older mills where they are up against these special problems.

Bar slipped out of calender sockets, causing him to fall. Using the wrong bar in too much of a hurry. It threw him heavily to the floor.

Doctor weights falling on the feet is a common source of injury where they are not properly maintained.

Threading stacks without broom handles with fingers outstretched. This occurred in a straw mill where they are using nine point straw, and it not only is permissible to use broom handles, but it was the law of this particular mill.

Slipped and foot caught in the stacks. This fellow had poor shoes and the steps were what we thought were defective. I have found a number of cases where feet have been caught in stacks in boards mills. They have to work off the steps and it is very easy for them to swing around and swing into a step and have their feet drawn in from their lack of balance.

Cleaning stacks, when a scraper was pulled through the rolls, crushing fingers.

A piece of steel from scraper thrown into eye by calenders. This is not a common source of injury, but it is indicative of a scraper that is not in proper shape for use in the mill. Where little attention or supervision is given to scrapers it certainly is a repetitive type of injury.

Breaking down jammed paper in stacks feet were nipped. You know when they are "making hay" very fast, particularly in a board mill, it piles up. It is so strong and so heavy that it pushes the men, you might say, literally up into the air, and when they are trying to break that paper down so they can pull it out from under the stacks they find themselves more greatly exposed to the injury at the nip.

Here is a picture of a scraper. We tried to imitate the experiences of Mr. Faist whose company developed a scraper in their Ohio mills. We were not able to use the straight blade form. This one is a bronched form. It has a very sharp curve with a knife edge. It takes a wide bend and comes up with an extra protection for the heel of his hand. We find that a heavy scraper like this is necessary for getting the scabs or waste off the calender rolls.

ARTHUR E. WINSLOW (Hollingsworth and Whitney Co., Waterville, Me.): Where is that scraper kept when it is not in use?

MR. MURRAY: We have a simple hanger over on the side. The handle drops in there. It is not exposed to the passers-by, but it is ready for instantaneous use by the workmen when they run the machines.

In running through the dryers themselves, the burns are naturally the chief and that we have, chief source of injury, particularly in cleaning broke out of it. In some of the old mills where, unfortunately, we have low pits that they are close to the dryers. The way we have gotten around that is to upon suitable clothing, preventing the men from going around without sleeves about their shoulders covered.

Accidents from dryer hooks and falls getting in and out of pits are the only sources of injury which come to our attention. The dryers, in themselves, present really the easiest part of the machine room for us to handle. The rewinders our difficulties have been, of course, getting caught in the nip.

There is a case of a metal rule going through the nip, pulling the man's fingers in. That type of injury will be corrected by the use of the guards which we now use, the swinging gate guard which lets down while we mount the roll or unmount the roll, but which, while the machine is in motion, is protecting the nip. What it doesn't do is this: if a man wants to build up a roll, inserting wads to build up an uneven roll, that means he has to let the guard down or reach beyond the guard. This is something which interferes with our production in that they must have even rolls, even though there is some defect in the paper or somebody on the machine has made a mistake.

Another injury which could have had fatal possibilities: they were storing tools right at the rewinder. Underneath the tool box was a pedal which controlled the friction clutch. One of the tools dropped out of the box and clamped this pedal hard. The sudden swing on the friction clutch broke the top of the machine and it came flying down. Fortunately, nobody was hurt, but it had its possibilities.

A rewinder guard fell on a man's hand, fracturing his fingers. That seems sort of poetical justice when we have gone to the trouble to put a fancy rewinder guard on this particular machine. Due to the weight that is necessary on a wide trim machine when this guard fell over on an inattentive employee it resulted in a serious injury.

At the slitters and reels these are the injuries we have been having, particularly at the shafts, taking them out of the rolls, burrs at roll shaft cut or punctured hand, mashed fingers inserting shaft in shell, strained back or wrist handling roll shafts, either in the improper way or the shaft was not maintained in good condition. We find falls over shafts lying on the floor, splinter infections from a burrod shaft, roll shaft fallen out of a rack improperly placed. Those are typical injuries at the slitters in mills which have come under my observation.

One source of injury which we have had in the old mills, slackening the speed of a roll with body, throwing the man to the floor: putting end over upper reel, slipped and was thrown over reel to floor. The men use a pad on the body to break down the speed of the roll. That very often will catch them and hurl them to the floor or hurl them clear across the floor.

Here is a case, and we have had a number of them, of steel shavings off of slitters meaning a punctured hand or steel in the eyes, which is very serious.

Silicate in eye pasting roll tickets or splicing rolls. In picking up shaving cut eye-ball with paper. Catching sheets at slitters, hit by one in eye. When you are catching sheets, they come shooting out of the machine, and this heavy board has quite a velocity; they can put your eyes out if you are asleep on the job.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Are those all lost-time accidents?

MR. MURRAY: No, I would not say that all of them are, but every one of them could be. What we are trying to do is to get down not just whether we were lucky or unlucky on a case, but just what may happen the next time.

MR. ROSEBUSH: Have these accidents which you are showing occurred?

MR. MURRAY: These are actual occurrences. They happened over a series of years and a series of mills, but they all happened in the boxboard industry. It just goes to show that no one mill in one or two years could develop the experience which we are trying to develop in here, and yet every one of these cases could happen today or tomorrow or any time in any one of the mills where the supervision is not proper or the maintenance of the equipment is not right.

CHAIRMAN BRENNAN: Might I suggest that material be made available for the News Letter, in order that the boxboard people who are not here might have it? Would you give it to them for publication?

MR. MURRAY: Yes. We have touched, I think, very well on the paper machine hazards. I just want to touch for a second on the maintenance department.

(Slide) This picture shows one of our mill's storage room, showing the size of the rolls as they are built up. Of course, our maximum rolls in there will weigh about ten thousand pounds. A jute kraft roll with 121 or 122 inch trim will weigh anywhere from seven thousand to eleven thousand pounds. There are a number in there that weigh that much. The crane operates up here. This is all handled by crane in this particular room.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): What is the capacity of the crane?

MR. MURRAY: That crane was originally a five ton crane, but it is now a nine ton crane. There was no reason for taking the manufacturer's name down. There is not a permit or a license connected with it. These rolls are kept in storage here before going into the converting plant to be made into boxes.

We won't go through any more of these except to show you that we made up a long list of maintenance department injuries, and the list is surprising. They would fill a book, and the variety is surprising. I think there is a temptation in the average Safety Department to overlook the amount of educational work that must be done with the millwright, carpenter, and the various other hands who make up the maintenance department.

One thing that is particularly interesting here: using a small electric planer when a piece of wood kicked back and his left third finger came in contact with the planer knife. I find it is a temptation with the planer or carpenter to cut a small piece with the electric planer. They will get the electric planer out instead of using the hand planer. They don't seem to appreciate the fact that the planer is made for minimum length stock. With the small pieces there is not time for the automatic guard to function, and there is a tendency for it to throw that piece up and catch the man's finger. The guard does not have time to work.

This electrical injury is probably common in any plant. While inspecting the electric switch he did not pull the handle and lock it off. He assumed the current was off. On climbing in the crane he touched a live wire, which threw him to the ground.

We worked out a study for electricians on a form similar to this. I can't show it on the screen, but just to give you the headings on it, we have: Operations involved, the danger points of each operation, the hazards at each danger point. Then the specific safety instructions and rules prescribed, the tools and devices and guards prescribed, and the schedule of inspection and maintenance of machines or equipment.

In addition to that we have a separate column for the selection of the workmen, skill or experience required, size, skill, strength or vision required, and mental capacity required. We went into every occupation and had each mill submit their ideas on it. We consolidated that into one of these work sheets and we have built up what we think is a safe practice or standard for each important occupation.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): I would like to suggest one thing in regard to that crane hazard. We have a device so fixed on all of our cranes that whenever a man leaves from the operating booth of the crane to go on top of the crane he automatically opens a door, which automatically throws out the main switch. He can't get up there in any other way except by opening that door, which automatically opens a safety switch, and that line is closed.

MR. MURRAY (Container Corporation of America, Chicago, Ill.): There would not be any interlocking difficulties, would there?

MR. PLZAK: None whatever. It works with a regular electrical interlock. You can do it more elaborately by remote push button control and relay, but that is more expensive.

MR. MURRAY: We have touched only part of the hazards of the boxboard in-

dustry, but I think we have hit the high spots as well as we can in the limited time we have.

S. K. SMITH (International Paper & Paper Co., of Newfoundland, Corner Brook, Newfoundland): What has been your actual accident experience?

MR. MURRAY: In one of our paper mills where these pictures were taken they went nineteen months without a lost time injury. They finally succumbed to it when a new employee got caught in the mill room at the dry end at one of the rolls. He went between the calender and the drum roll, and he apparently had no reason for being in there whatsoever. There was no trim on the floor and there was no reason for him to be there, but in some way he got his hand caught between the roll and that resulted in a specific injury, specific loss on the hand. Outside of that, their nineteen months' record stood up to the last two months.

MR. ROSEBUSH: How many men are there in that mill?

MR. MURRAY: Four hundred. I have other mills, though, that won't live up to the standard which they have set. Our managers, after all, are wholly and clearly responsible for their safety record, and some managers have capabilities beyond others. In this particular mill that ran for this long time without an accident they naturally had wonderful supervision. They are a city unit. They have foreign labor. They have all the hazards that any other boxboard plant would have. They have mixed labor, colored labor, and in connection with that they have a box factory, which ran right along in tune with the paper mill. The box factory had female labor, too.

CHAIRMAN BRENNAN: We will turn to the next number on the program. I will ask the chairman of the Nominating Committee to submit his report of the nominations.

KENNETH L. FAIST (Champion Coated Paper Co., Hamilton, Ohio): Yes, Mr. Chairman, we are ready to report.

(After considerable discussion on form, Kenneth L. Faist read the report of the Nominating Committee, as follows.)

Report of the Nominating Committee

General Chairman—J. J. PLZAK, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis.

Vice-Chairmen—GEORGE ROLLER, Rhineland Paper Co., Rhineland, Wis. and

ARTHUR MURRAY, Container Corporation of America, Chicago, Ill.

Secretary—H. D. BANTA, Hoberg Paper & Fibre Company, Green Bay, Wis.

News-Letter Editor—D. C. HUNTER, Oxford Miami Paper Co., West Carrollton, Ohio.

Poster Committee Chairman—JAMES M. MCGIVNEY, Brown Company, Berlin, N. H.

Program Committee Chairman—H. G. GILSON, Oxford Paper Co., Rumford, Maine.

Membership Committee Chairman—N. F. BARTLETT, Hollingsworth & Vose Company, Boston, Mass.

Publicity Committee Chairman—JAMES J. HASTINGS, Port Huron Sulphite & Paper Co., Port Huron, Mich.

Statistics Committee Chairman—F. E. GRANT, The Crystal Tissue Company, Middletown, Ohio.

Engineering Committee Chairman—ERNEST AUGUSTUS, The Mead Corp., Chillicothe, Ohio.

Health Committee Chairman—DR. L. H. FRECHTLING, The Champion Coated Paper Co., Hamilton, Ohio.

Contest Committee Chairman—A. SCOTT DOWD, The Paper Industry, Chicago, Ill.

Executive Committee Members at large—

W. J. BRENNAN, State Department of Labor & Industry, Augusta, Maine.

KENNETH L. FAIST, The Champion Coated Paper Co., Hamilton, Ohio.

W. A. GLEASON, Hammermill Paper Co., Erie, Pa.

JOHN LUNDRIKAN, International Paper Co., New York City.
 W. J. PEACOCK, Northern Paper Mills, Green Bay, Wis.
 SAMUEL PRUYN, Finch-Pruyn and Co., Inc., Glens Falls, N. Y.
 BEN D. ROGERS, Bird and Son, East Walpole, Mass.
 F. H. ROSKUSH, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

CHAIRMAN BRENNAN: You have heard the report of the Nominating Committee. Is there any discussion of that report?

JOHN LUNDRIKAN (International Paper Co., New York, N. Y.): Mr. Chairman, I move that the original report of the Committee on Election of Officers be accepted.

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): I will second that motion.

CHAIRMAN BRENNAN: It has been moved and seconded that the original report as submitted be accepted. Is there any discussion? All those in favor of accepting the original report please manifest by saying aye. Those opposed. It is a vote.

(Motion was carried.)

CHAIRMAN BRENNAN: We will go into "The Question Box." These questions must necessarily be handled briefly, yet completely. We have got to eliminate the dead wood in our responses to these things and put the meat on the table quickly.

CHAIRMAN BRENNAN (Reading first question): "Is there not some way in which the efficient mill can be of assistance to the safety man at the mill where he is having difficulties through no fault of his own?"

E. R. BROWN (Oregon & Columbia Basin Div. National Safety Council, Portland, Ore.): We had that condition come up on the Coast, and we had the manager of a successful mill make up a tabulated sheet of the actual cost of accidents and the saving that had been made in his mill. They were passed on to the other mill, and that man just last month became a member of the National Safety Council and is contributing quite generously now.

FRANZ H. ROSKUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Some one made the statement in one of these meetings years ago that the Safety Director should be answerable to the highest official in the organization. That is, if the President took it upon himself to be active in plant management the safety man should be answerable to the President, and if the Vice-President were the highest executive that he should be answerable to him. With such a set-up the safety man cannot go wrong. If the connection has not been made, and if the safety man does not keep that connection between himself and the highest executive alive, he loses.

CHAIRMAN BRENNAN: Some of us don't fully avail ourselves of our opportunities. It is an easy matter to make an extra copy of that graph, that tabulation, that plant magazine that carries congratulations, that certificate can perhaps be reproduced by picture, in order that they may appreciate the accomplishments.

Then again, our representation of safety to the highest authority must be different than to the workmen. We must understand they have one thousand and one duties, mainly financial. Therefore, we must represent the thing in a financial way, whereas to the employee we represent it in an entirely different manner.

"Which is the more advisable, all things considered, for the men to treat minor cuts, scratches, bruises, etc., from supplies kept in a First Aid kit in the department, or have them spend fifteen or twenty minutes going to and from the plant's First Aid room, getting treatment from a doctor or nurse?"

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): You ask which is the more advisable. Personally, I'd say the fifteen or twenty minutes spent in going to the First Aid room is the more advisable method. We have had several men come into our organization to work from organizations which had been sold upon First Aid, one, in particular, who came from the American Rolling Mills Company. One of these men came to our First Aid Department with every small scratch. He'd highball right over to the First Aid room. The rest of the fellows thought

he was crazy and called him all kinds of names, such as a big baby. But that man never had an infection and that is something the rest of them could not boast of. I, personally, favor the First Aid room.

GEORGE J. ADAMS (International Paper Co., New York, N. Y.): One question that occurred to me is, what are you going to do at night? I think in most of our mills we don't have a First Aid room open at night. We have no First Aid boxes spread around through the mill. But we insist upon the men going to the First Aid room in the daytime, regardless of the few minutes spent in going and coming. There is, however, always the problem of First Aid treatment at night. One way we have gotten around that is to make some one, or several persons, responsible for the First Aid treatment at night. We train them in the rudiments. Of course, if there is anything that is beyond them we call a doctor.

CHAIRMAN BRENNAN: What is your reaction to this question? Which is better, treatment from the First Aid kit, or regardless of the time spent, to go to the First Aid room?

MR. ADAMS: Regardless of the time spent I should say, go to the First Aid room.

M. G. HOYMAN (Kimberly-Clark Corporation, Neeah, Wis.): That depends quite largely or is influenced largely by the size of the plant, as to having the First Aid room or having trained people who take care of First Aid kits. We have both. I believe where it is at all practicable there should be a First Aid room with a nurse or doctor. Where the crew is so small that that is impracticable, there should be some one trained and in charge to see they get proper First Aid treatment.

Where we have first aid rooms, in our own experience, it is the next thing to a criminal offense to refrain from going to the First Aid room for every scratch of any size, because it has cost folks some serious difficulties and some serious discipline from lost time and lost jobs for failure to go to the First Aid room for treatment. If a fellow develops from that afterwards they have a very poor excuse in that they did not think it was of sufficient importance, because we do maintain the equipment and First Aid room with somebody in charge at a much greater expense than the five minutes' time it would take them to go and have it taken care of, so wherever practical the First Aid room with some one in charge is the thing.

MR. GRANT (The Crystal Tissue Co., Middletown, Ohio): Our men don't like to go to the First Aid room for small scratches, neither do they like infections, but after they come they will take time off. Recently we took on a new mill manager, and I put the problem to him. He said, "Well, just have them sign a slip every time they come for First Aid, acknowledging that they have received First Aid treatment." On this slip he is advised to return to that First Aid room at the beginning of each shift until released by the attendant. After he is released the ticket comes to me. He gets a copy of the slip at the time of the First Aid treatment. He does not get it released until the last treatment by the First Aid attendant. We are going to whip this thing. We have a man in charge now who is good.

D. C. HUNTER (Oxford Miami Paper Co., West Carrollton, Ohio): I am a strong believer that every injury, no matter how slight, should be entered on a record card, for the simple reason that you never can tell when that particular injury is going to come up to cause you some trouble. For that reason I think it is essential that a man should go to the First Aid Room whenever possible for any minor injury.

Let me give this one illustration. Sometime ago a man had a minor injury to his left eye. Three or four weeks ago he came to the office and gave me a bill for a pair of glasses because of defective vision in his right eye. He said, "I got this when I had that eye injury sometime ago." But because he went to the First Aid Room and our record showed that the injury was to the left eye he paid for his own glasses. That is just another reason.

I. L. STONE (Globe Indemnity Co., Chicago, Ill.): What is the procedure in some

of these plants that operate nights with regard to the follow-up on night First Aid treatments, to see that the man returns?

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): We have the First Aid room system in our mills. We have eliminated the kit system, for three reasons; one that the layman becomes the man who gives the diagnosis of his own case, and second, that we found that the men were not taking that treatment. The third reason, which is a very small reason, was the fact that most of the equipment out of the First Aid cabinets disappeared over night, and there was none there for the man that was injured.

We solved it in this way, as far as the night crew are concerned in our mill. We have power house operators and electric turbine or steam turbine operators. They are trained First Aid men. They are on the shift at night attending to their departments and always in their departments. They never leave. The night superintendent is also trained. In addition to that we have laboratory men who take tests through the night. In that way we have throughout our mill three points very easily reached from the departments, and the men know, whether they are working the day shift or the night shift, that they must report to the First Aid room for medical treatment.

They report and the first thing the First Aid man does is to make out a First Aid report. He sends that to the foreman of the department. If it happens to occur at night the foreman gets the report in the morning. He investigates that injury, no matter how minor the injury.

We have a report on each and every injury, because it might interest you men to know that for every major injury in industry there are from twenty to fifty minor injuries, and any one of those minor injuries might the next time become a major injury.

CHAIRMAN BRENNAN: You transmit those cards through the foremen to the medical force, eventually?

Mr. PLZAK: The First Aid man, in case he has to send a man to the doctor, makes out an order on the medical department. He incorporates that on the First Aid report to the foreman. The First Aid report goes to the mill manager, who in turn turns it over to the employment manager and the safety director, and he keeps a report similar to the foreman's report for his file, one for the manager and one for the safety director.

Mr. STONE: In a plant running twenty-four hours a day, we found that they were trusting to memory reports. Some of the men failed to follow through on the minor injuries. As a result, infections developed. We inaugurated a system of putting a red card, a copy of which went to the foreman of the department, in the time clock notifying the man that before he went home he was supposed to report to the First Aid room for a check-up on his injuries. We found that eliminated our difficulties.

CHAIRMAN BRENNAN: "What has been found to be the best safeguard against splinters and slivers in the hand for men handling lumber, wooden boxes, packing crates, etc? Are leather hand pads or canvas gloves advisable?"

ARTHUR MURRAY (Container Corporation of America, Chicago, Ill.): In the lumber industry the hand pad is universal in place of the glove. We have had quite a bit of experience with gloves in handling waste paper, which means puncture wounds from glass and razor blades in the bales. Of course, those are not splinters from skids, to which I presume the question refers. Gloves which can be bought, I'd say, for about thirty cents a pair, of heavy canvas will retard a splinter, but they will not be one hundred per cent efficient. But they will prevent a splinter wound from becoming as deeply imbedded as when the man is working without gloves. Our experience has been much more favorable since we introduced gloves, but it has not reduced the cause of injury. It is a fact that the skids have not been in proper repair or we have had the wrong kind of skids or platforms to

handle them. The answer is not in the gloves. That is just a means toward the proper way of handling.

Mr. STONE: We had a case where we had a lot of splinters and hand punctures. We devised the use of discarded rubber inner tubes from automobile tires, by taking two tubes and strapping them together, having a strap over the back of the fingers and a strap over the palm of the hand. If the rubber is not too dead it is very hard for a sliver to penetrate the rubber because of its resiliency. We found after trying different kinds of gloves the men liked that. They were very light and they produced very good results.

CHAIRMAN BRENNAN: You did not attempt to do anything with the thumb?

Mr. STONE: These pads were so cut that they protected the entire surface of the hand.

CHAIRMAN BRENNAN: Men handling brick frequently abrade the ends of their fingers to the place where they bleed, and I have seen a canvas contrivance of that nature used by men setting brick. One of the frequent and painful things we had to contend with at the time of boiler construction was the abrading of the finger tips by brick. I notice that professional bricklayers invariably have a device like that.

"Should men be penalized by lay-offs, etc., for minor infraction of safety rules resulting in injury or near injury, if the man injured was to blame for the accident? Is it good policy to give this injured man a lay-off or some penalty after he has recovered and returned to work?"

JOHN LUNDKRIK (International Paper Co., New York, N. Y.): During some of our bad years we decided that was the next step to take. We did not want to write a letter about it because it might create a lot of misunderstanding and possibly have some effect on malingering, so we impressed on all of our plant managers at a general meeting, with no one present but the managers, that we were going to do that very thing. We instructed them that we were going to administer discipline according to our rules, which provide for three grades: reprimand, suspension without pay, or dismissal, at the option of the plant manager, depending on the offense and the man's record. We told them on account of feeling we had to resort to that particular measure that we must place ourselves in the same position that we would in discipline for any other offense, for which we have a very straight and formal method of procedure.

One of those rules is that the man concerned has his day in court. We advised that there would be a full and complete investigation, and that the penalty would only be inflicted after a full recovery or as full a recovery as was possible under the circumstances. I, personally, investigated three cases. I took some time away from my other duties to do it, and in each of the three cases, I regret to report that in each instance we decided to drop the thing without calling the man in to tell his story.

In each instance I was able to convince those gentlemen that the man himself had not had the benefit of the proper advice, instruction and cooperation in carrying on his part in our system. I say that where it can be established that the man has had all of the benefit of the proper instruction and advice, seeing that the man is properly taught the job that he is hired to do the way you want it done, efficiently, which means safely, then that discipline might work. But we had to admit in those three instances that the man had not had that instruction. Everybody had assumed that he had had it. So we dropped that.

You will understand we are only a kind of clearing house. We don't run these safety organizations in the plants. The plant managers run them, and we try to give them as nearly as possible a set of fundamentals which they can build on as far as they like.

However, we do advise the plant managers that where they are satisfied that all of those things have been complied with that the man not only ought to be disciplined,

possibly not with a reprimand but maybe to the degree of a lay-off without pay, and of course, for a flagrant continuous offense, dismissed. We think a penalty not only ought to be inflicted but it ought to be bulletined.

CHAIRMAN BRENNAN: "Have you noticed an increase in compensation cases since the mills are working on shorter hours?"

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): For the first eight months of 1931 we had eighteen accidents; in the month of September we had eight. Three of those cases, I feel, were the result of the mill shutting down for a period of ten days. We had slight injuries just previous to the mill shutting down in which we required that the man come back for treatment. During the period the mill was down, naturally, while we were treating his hand, we could not say he was able to resume work, because there was no work for him. Therefore, it resulted in compensation cases because the period of expiration, period of compensation, started upon the eighth day. As a result we had three more compensation cases than we would have had otherwise.

We find constantly as the mill force is being reduced and the operating day is being reduced that if the men are injured they cannot be put back to work because of the fact that we have a reduced force, and this reduced force has to produce during that period. In other words, a box-maker running a nailing machine is injured. A man must be put in his place. With a full force in five or six days he could go back to the nailing machine and fill in the rest of the time at something else, but if he is crippled and a short time force is working, the force is reduced to actual requirements for production. Therefore, he must be kept off at least a week or ten days until he is entirely recovered before he can be put back on the job. I think, therefore, it adds to your accidents and your compensation cost.

CHAIRMAN BRENNAN: The cons; now we will hear from the pros.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Since the depression our experience is entirely opposite. Since we shortened the hours somewhat, not very much, but business conditions are tight and we are not employing men, we find that our accident experience is very much better. In fact, the accidents we have had so far this year have been only one-third of our lowest record, and we have paid the least compensation and the smallest number of doctor bills we have ever paid.

MR. LUNDRIGAN: Our experience is the same as Mr. Gleason's. Three of our mills, in particular, are not averaging over three days a week as far as any operation is concerned, and a great many of them are on curtailed operation, especially in the State of New York, and you are just wasting your time there in talking about stopping a man's compensation until he has returned to work if he is going to return to work, unless he voluntarily comes in and says to stop it, which is not very likely. If he is fit to go to work on Thursday and your plant is not going to start up until next Monday the chances are you are going to have that much more compensation added. I agree with Mr. Rosebush, however. I believe our accidents, as far as frequency is concerned, show material reduction.

CHAIRMAN BRENNAN: That was the intent of the question, whether or not the depression had had an effect on safety morale, so to speak, safety consciousness.

CHAIRMAN BRENNAN: We have ten minutes left. I slipped rather badly in view of the fact that the gentleman present from the West Coast told me that our old friend, Mr. Scanlon, had telegraphed a greeting to this assembly. I promised him to inject it before we closed. I think that was the content of the message. We will accept it as such and be grateful.

"Will the Section do something? Will they accept as a major project the problem of guarding nips, rolls on presses, calenders, supercalenders and the like?" In other words, it appears that we want a review of existing guards and experience for consolidation into a Code particularly dealing with this subject. What are your wishes on that?

ARTHUR MURRAY (Container Corporation of America, Chicago, Ill.): Our Sectional Engineering Chairman is a member of the A. S. S. E.-Engineering Section, automatically. Why not clear through him?

CHAIRMAN BRENNAN: That is a good suggestion. They have a good many projects, some of which they are carrying over. I happen to know they are carrying over some projects. I feel, too, that we will have to take the lead here because we are concerned more deeply in the matter. It is vital to us. I came out of a mill recently where three very, very severe accidents resulted, and those people are trying to do all they can, and it is embarrassing, to say the least, that we can't offer them something specific, printed and positive, on the thing.

MR. LUNDRIGAN: We have in operation today, roughly, I'd say, probably ten different types of nip guards, and also what we consider very important on the older machines, the inrunning nip on felts at the carrying roll. We guard that wherever it is not guarded by location or construction with a simple scraper or wooden doctor that removes the temptation from the fellow to reach in there and pick out the piece of stock or something. We now have on the Three Rivers machines an added hazard of twelve hundred and fifty feet, and we have added a riding roll to the one we are now revamping. We have tried to work out a guard for that. I know that Mr. Adams has both the drawings and correspondence which I believe would be quite a contribution, although we are not satisfied that any of those guards are entirely safe. We have also undertaken to guard the supercalenders, which is very difficult. The thing we have to overcome is the disease, I call it, of the operator in that he just must feel of that roll.

I want to say at this time that with one or two minor exceptions we must give the plants themselves credit for having devised most of those guards. We slipped one on a supercalender after two men had received permanent and partial disability through very bad risks. We slipped the guard on the supercalender nip and fastened it on the riding roll so that, while the roll was small the feeling of it existed, it actually covered the nip, and I am pleased to say we have not since had a supercalender nip accident.

CHAIRMAN BRENNAN: That is fine. That is the kind of material we want to develop here.

MR. LUNDRIGAN: I know Mr. Adams can furnish the committee with sketches or drawings and can probably give them some pretty useful information as to our experience with several types of guards and nips.

CHAIRMAN BRENNAN: I had Mr. Adams in mind because of the material which he has furnished. I am using some of those guards and they are working very successfully. What is your pleasure on that subject?

H. G. GILSON (Oxford Paper Co., Rumford, Me.): Would it be advisable to have the Chairman appoint a committee to study that? If so, I'd make that motion.

CHAIRMAN BRENNAN: I want to call your attention to our objectives. Let us at the end of each year say we have done that, anyway, and when we get a few years together we will bind them in a book and call them a Code, if need be.

MR. LUNDRIGAN: We are up against worse than that in the state of New York. I happen to be on another committee, and while I don't get a salary I am on the state payroll as one of the Advisory Board on the Dangerous Machinery Code. Of course, those Codes have the effect of law by the enactment of the legislature. They have actually put into the Code, which has only been out about two months, that the product must not be fed into the calender stack by hand and that some mechanical device for doing that must be provided. After about two weeks of maneuvering and fighting and one thing or another I got them to add "except where compressed air or a suitable doctor is used."

J. J. PIZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): It would be my wish as your successor to the General Chairmanship of this Section that a committee be appointed to make a very exhaustive study of this matter of

nips from the various sources described and that as nearly as possible the work be completed in one year, and a full report brought to the next Congress.

CHAIRMAN BRENNAN: That is fine. You have heard that suggestion. That is in line with the motion. If there is no objection I will take it upon myself to appoint a committee to work on this particular subject, and I feel that this subject is so vast that it must necessarily have a Chairman of its own, subordinate to the Section Chairman, who must deal with generalities. In view of that George Adams, of the International Paper Company, will head the committee as Chairman. Kenneth Faist, representing the Middle West, will also serve, and Mr. Plzak, representing the Northwest.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): Would you want to include any one from the National Safety Council?

CHAIRMAN BRENNAN: The National Safety Council representative to be selected by W. Dean Keefer, making a committee of four.

ARTHUR MURRAY (Container Corporation of America, Chicago, Ill.): I want to ask if this is going to be limited to an engineering study, or is it going to develop the safe practices as a result of a study of the approximate causes of these injuries resulting at inrunning nips?

CHAIRMAN BRENNAN: In view of the urgency of this case I should think Mr. Adams—it is entirely within his jurisdiction—will hasten relief and incidentally, find out such material as you suggest and incorporate that for its historical value. Would that be your thought, Mr. Adams?

GEORGE T. ADAMS (International Paper Co., New York, N. Y.): Yes.

CHAIRMAN BRENNAN: In the urgency of the case we will have to forego lots of things we'd like to do, unless you can convince him of some better approach. Do you think of anything?

MR. MURRAY: Quoting from my experience in the few slides I showed today, a great number of nips were not only in the man's hands but also his feet, we must approach it not only from the point of view of the operator threading the machine, but due to the several other things he may be doing in or about the nips he may expose his body to the injuries or hazards of the nips.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Would it not be wise to give this committee enough latitude so that they would not have to stop with the nips on the calenders. I have another one in mind, the guard on rewinders where you are making counter-rolls, so that this committee could go farther and take upon itself the duty of getting in touch with paper mills and manufacturers of paper mill machinery. In a word, there is a big objective. There is a lot for them to do.

CHAIRMAN BRENNAN: Yes, that would probably be an outgrowth of their findings.

MR. LUNDRIGAN: The step we have tried to take in some of the things we have ordered through our purchasing department is to have them incorporate in all requisitions, no matter what state it might be installed in, that it must comply so far as safeguards are concerned to the requirements of the New York State law and Code, and that is the policy, and to some extent, the law in New York.

CHAIRMAN BRENNAN: Mr. Adams is so thoroughly conversant with these many, many ideas, and will be approaching you constantly just for this thought or idea before making a report, it comes back to a reiteration by you to the committee of your thoughts in this matter. The committee cannot do this alone.

MR. ROSEBUSH: Are Mr. Adams and his committee limited to nips or are they going to take over the big problem?

CHAIRMAN BRENNAN: They take anything which has that nip, winder, rewinder, calenders, supercalenders, and even press rolls, anything which has that crushing possibility.

MR. LUNDRIGAN: One of the most dangerous, outstanding hazards on an old paper machine is the installation of the so-called smoothing rolls. We have overcome that. A lot of people told us we could not do it. We shoot the paper over and shoot it back through.

CHAIRMAN BRENNAN: Mr. Adams, would you like any more information?

MR. ADAMS: No, Mr. Chairman, I believe I have the thought expressed here in mind.

CHAIRMAN BRENNAN: If there is nothing further to come up, and if there is no further discussion on this subject that Mr. Adams and his committee are to handle for the coming year, the meeting will stand adjourned until Thursday morning.

ADJOURNMENT

Thursday Afternoon Session
October 15, 1931

M. G. HOYMAN, Chairman
Kimberly-Clark Corporation, Neenah, Wis.

The third session of the Paper and Pulp Section convened with Vice-Chairman M. G. Hoyman presiding.

CHAIRMAN HOYMAN: Before we actually get into the program I believe there is something that we'd like to bring before this group. Mr. Plzak has a resolution that he'd like to put before this group.

J. J. PLZAK (Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.): Due to the fact that the national safety movement had its origin in Wisconsin, and due to the fact that we feel that we have not had a meeting there for several years, and because of the close relationship between Chicago and Milwaukee, as far as distance is concerned, we, the Paper and Pulp Section, would like to go on record as presenting a written resolution, endorsed by the Paper and Pulp Section, with your approval, that some point in Wisconsin, preferably Milwaukee, be chosen as the meeting place of the next Congress. Before we draft such a resolution I would like to hear some opinion, especially from the members who come from other states.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): Mr. Chairman, there is nothing official about this, but I understand that New York is being considered next year.

MR. PLZAK: How would our Paper and Pulp Section be benefitted by such a meeting? We have about sixty-seven paper mills in the state of Wisconsin alone. Then we must consider the adjoining states. I am quite confident that our Paper and Pulp Section would have a representation of close to five hundred, and possibly larger representation, of delegates if we had that meeting at Milwaukee, which I think would probably be one of the largest delegations we have ever had.

FRANZ H. ROEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): I have the same impression that Mr. Gilson has, that there is quite a strong feeling on the part of the National Safety Council to send this convention East next year. I do think that we have a very strong chance of getting it to Milwaukee in 1933, but whether it would be wise to urge Milwaukee as the next meeting place I am not sure. It might boost our hopes for the following year of 1933 to make this resolution at this time.

CHAIRMAN HOYMAN: Is there any more discussion on this resolution? Has any one else any opinion on that? Is there any good reason why it should not go to Milwaukee if it is possible to get it there next year? To get this out of the way, do you care to make that as a motion?

MR. PLZAK: I would like to make a motion that the Paper and Pulp Section adopt a resolution, which we can draft later, to the effect that we implore the National Safety Council's Executive Committee to try and make Milwaukee, Wisconsin, the next meeting place of the National Safety Council.

MR. GILSON: I will second that.

CHAIRMAN HOYMAN: Gentlemen, you have heard the motion and the second. Is there any further discussion? If not, all those in favor of the motion just offered please signify by showing your right hand. Opposed by the same sign. It is unanimously carried.

(Motion was unanimously carried.)

CHAIRMAN HOYMAN: Will you see that the resolution is drawn and placed in the hands of the Executive Committee, Mr. Plzak?

MR. PLZAK: Would it be a good plan to appoint another committeeman on that committee, possibly some one from another state?

CHAIRMAN HOYMAN: I think Mr. Gilson would be glad to act with you in preparing the resolution to submit to the Executive Committee. You want to do that before you leave here.

We will take up the first paper, which Mr. H. D. Banta will present.

H. D. BANTA (Hoberg Paper & Fibre Co., Green Bay, Wis.): Mr. Chairman, before I start this paper I would like to tell you of one little circumstance. In several places in my paper I have spoken of the necessity of perfect grounding of electric wires. I went out in the mill one day and noticed a transformer that had been recently moved did not have any ground wire. Instead of taking it up with the Electrical Department, I met one of the electricians, and said to him, "You fellows have not grounded this transformer," and went on.

After I had written this paper I called in the Distribution Manager of the Wisconsin Public Service Company. He read it over and commented on two things, one error that I had in there, and another was my mention of grounding. He said, "How do you know that your own equipment is properly grounded?"

I said, "Well, I discussed it with Bill several times and he claims that everything is all right, and he is a mighty good electrician."

He said, "Well, maybe Bill doesn't know. Has he ever tested them out?"

"I don't know whether he has or not."

Then he said, "You are going down to the National Safety Council to talk about grounding, and you don't know whether the grounding is done properly or not in your own plant."

"Well," I said, "You and Bill get together and find out whether it is grounded properly or not." He waited for Bill to call him, and Bill waited for him to call him. Saturday afternoon Mr. Pfeiffer of the Public Service Company came over and I said to him, "I have not heard anything from you or Bill about that grounding proposition."

"I have been waiting for Bill to call me."

Then I said to him, "Well, one thing is certain, and that is that I am not going down there and present that paper and talk about grounding until I know the condition in our own plant." I am going to read you his letter which I received yesterday morning. They did the work on Monday, and then they got together and sent this to me. It is very interesting. This is from Mr. Pfeiffer, of the Public Service Company.

Dear Friend "Bert":

Do not like to discourage you as a preacher but according to the attached test data you have a little sweeping to do on your own door step. No doubt if you or I inspected these same conditions visually we would give them our OK. This simply proves the fact that it is very necessary that they be tested before judgment is passed on them.

For the test we use a standard Biddle direct reading ground tester with a range of 0 to 300 ohms (approximate cost \$500.00) used in conjunction with two reference grounds.

The results of the test I would regard as follows:

Less than one ohm—OK.

one to three ohms—Check to be sure it is the best you can get. It is within code requirements if it does not exceed three ohms.

Over three ohms—poor.

Over ten ohms—regard as no ground at all.

You can readily figure out using the resistance shown with a single phase voltage of 220 on your lighting circuits and 440 on your motor circuits that in some of these cases current could flow to ground for quite a while without a chance that the fuse would blow and clear the ground.

I hope this information will help you "Bert" and I also hope that you will not let it start you worrying about conditions at home because you know things are never as bad as they seem and no doubt they have been this way for some time and if it wasn't for this test might go on for a long time before you knew about it. Anyway "Bill" will have them all fixed up when you get back. I do not think I will make the trip as the remodeling status of my house is such that I should not leave at this time.

C. H. Pfeiffer.

I won't take your time to read this data sheet, but practically every lighting transformer in our own plant was without a ground wire. Oh, yes, there were nice dry plates and all that—you know, the usual excuses and alibis, but as a matter of fact we probably have ten conditions in our plant that are not adequately grounded, and I want you to bear that in mind when I come to that part of my talk.

Electrical Hazards in the Paper and Pulp Industry

By H. D. BANTA

Hoberg Paper and Fibre Company, Green Bay, Wis.

The question may be asked, "In what way are electrical hazards different in the paper and pulp mills than they are in other industries?" Every industry has processes peculiar to itself, but we are not concerned at this time in matching hazards with any other group of industries, but rather in searching out the peculiar conditions in our own industry which tend to increase electrical hazards, and in finding means to combat them.

In reviewing the locations where it is sometimes necessary to operate electrical apparatus, I feel that it is necessary to equip every kilowatt that ventures into a paper mill with an asbestos suit to keep out the heat, a raincoat and rubber boots to keep out the water, a gas mask to keep out the sulphur and chlorine gases, and a suit of armor to protect them from misuse by the mill workers. This is not due to poor judgment in locating the equipment, but rather to the necessity of meeting the conditions as they exist.

I do not know how many paper machine tenders are present, but I want to compliment them on being able to use a hose with unusual dexterity. However, I wish they would miss the motors more often than they do. Motors are peculiar. They are never the same after a bath. Electrical equipment resents having its face washed. When texropes began to be used on beater drives, a very unsatisfactory drive was eliminated, but bringing the motor alongside of the beater tub seemed to be a challenge to the beatermen.

Chlorine has a very strong affinity for copper, and unless special insulation is used and the motors are often dipped and baked, the bleach plant will be a fruitful source of electrical breakdowns and accompanying hazards.

In treating this subject, it is necessary to discuss the causes of breakdowns of electrical equipment, because the same cause which terminates in breakdowns, introduces hazards. For example: assume a motor is not properly grounded in a moist place or near steel structures, and through the careless use of water, the insulation breaks down as a worker puts his hand on the motor frame. It would be possible to receive a shock which might prove fatal. This is true of all electrical apparatus. When we eliminate breakdowns, we also eliminate hazards.

The acid room is another place where special insulation is necessary because of the combination of sulphur, lime dust and moisture.

Many of the motors in a paper mill have a hard life, and any little service you render them in the way of special care, is reflected in the increased years of usefulness.

Where the mills furnish their electric power at the mill, the hazard of high voltage is eliminated; but when power is purchased, voltages of 4,400, 14,000 and higher are on the premises, and special care is necessary to protect employees from contact with it. A liberal use of danger signs, together with segregation under lock will help.

This calls to mind an incident where electricians from the public service company left a plank on the frame work in the sub-station. Later a maintenance man espied the plank, climbed the enclosure fence, walked out on the pipe supports, retrieved the plank and returned to safety through a net work of busbars carrying 4,400 volts. If ever a man got a "break", that man did!

Transformer banks, whether in a substation or in the mill, should not be accessible to any except qualified electricians. The shell should be adequately grounded and proper danger signs displayed. Switch boards should be enclosed by a fence or other barrier under lock, and only specially trained men allowed to enter the enclosure.

Old style circuit breaker handles should be properly guarded so they will not strike attendants when operating.

All electric circuits should be in conduit which is properly grounded. This work should be done under the supervision of a qualified man, and all joints inspected by him before being taped.

Overloading of circuits is a common fault of most paper mills. It is due primarily to failure to anticipate future requirements. This tendency should be discouraged, as overloaded circuits cause heating, breaking down of insulating material, blowouts and often a source of shock, burns, flashed-eyes and fire.

Control equipment receives the most abuse of any electrical apparatus in the mill, causing most of the delays charged to the department, and I believe is the source of greatest danger. It is the point of contact with the mill workers, and what they can do to a starter or a switch if left to their own devices is interesting.

Before citing some of these practices, I wish to state that if the electrical department is held strictly responsible for all delays and accidents caused by improper handling of the control, it will not be long before the poor practices will cease, if they are as energetic in giving instructions to the workers as they are in establishing an alibi, the situation is soon corrected. Mills recently electrified usually have to pass through this experience.

One machine man pulled the lever of a manual starter with his right hand, and opened the safety switch with his left, getting severely burned by the arc.

Another, in starting a motor generator set, the motor of which had the old style internal resistance, failed to cut in the resistance. When the motor started, he remembered his omission, pulled the switch, and the arc burned his arm to the elbow.

If a motor fails to start when the starter is thrown in, the worker should not keep trying, as it only causes overheating and usually burns out the starter or motor where the trouble is located.

Tying in starter handles is a bad practice and often causes blowouts and burns. Taking the cover from smoking starters and contactors to inspect them with the current on, should never be done. Many severe accidents have resulted from this practice.

Workers can be an aid in correcting poor practices, if they will report exactly what happened and not try to cover up. A beater room worker was badly burned and he laid the blame on a contactor on a beater circuit. Nothing was found burned on the contactor, but further investigation disclosed that he kept a can of soap in a switch cabinet, and when he reached for the can, he shoved it against the switch blades, causing a short circuit, the arc of which caused severe burns.

I am convinced that the sooner manually operated starters are replaced by the automatic type with remote control, the better it will be for the accident records. The equipment will have longer life because the time element in accelerating the motor is properly spaced and not at the caprice of the worker.

Where possible, all control equipment should be segregated and enclosed where it will be accessible only to qualified electricians. Emergency stop buttons should be provided where there is a possibility of anyone getting caught. Where direct current is used on winders, cutters or supercalenders, a dynamic brake should be provided in case an attendant gets caught.

Two boys were out on the roof of a paper mill. They saw two ends of electric cable hanging down, and one of them wanted to know what would happen if they came together. He was nearly killed, and I maintain that he was innocent as compared to the electricians who left that potential hazard there. WHEN WILL WE

BE ABLE TO SEE POSSIBLE ACCIDENTS IN TIME TO AVOID THEM?

Motors are subject to frequent inspection; methods are at hand to tell when insulation is breaking down. Let us remove the hazards by proper attention. Motors carrying continuous overload should be replaced by motors of the proper size.

All non-current carrying parts of all electrical apparatus should be adequately grounded. No other safety measure in the electrical department is as important as this—yet it is the one which is most often neglected. CHECK UP! When feeling of electrical equipment, use back of hand. In case of shock, the hand closes away from equipment.

Lighting circuits have the name of being harmless on account of the relatively low voltage. This is not true under all conditions, especially where AC three wire systems are in use, as a short between the two outside wires would give a voltage of 220 volts. A ground from either outside wire gives a voltage of 110 which is sufficient under ideal conditions to cause a severe shock. I witnessed a near serious accident where two men got tangled up in a defective brewery cord extension and were unable to help themselves. If it had not been for the presence of a third person, it might have proved fatal.

Most mills do not give lighting the attention it deserves. Much haphazard lighting still exists. Proper attention to illumination increases efficiency. Dark corners about electrical control should receive special attention. If the management wants to stimulate housecleaning, let them insist on plenty of light in the out-of-the-way places. Paint every corner white. Don't overload the lighting circuits.

All open knife switches should be replaced by safety switches, as there is always a hazard in operating them. Open or close a switch with precision—never do it timidly; burned blades and flashed eyes result.

Never use lamp or brewery cord for extension lights about a paper mill. The hazard is too great. Use super-service cord and weatherproof sockets, and insist on frequent inspection, especially where the men are going into boilers, tanks and the like. A defective cord in that case might prove fatal.

Electric drills are a frequent source of serious shocks, and should have careful attention. They should never be used without a ground wire attached to water pipe or other proper ground. This requires careful attention or serious accidents will attend their use.

It is interesting to call to mind some grounds made by men using electric drills. One man attached the ground wire to a six foot piece of pipe laying on a dry wood floor. Some steel workers from an outside shop had it attached to a nail in the scaffold. They were instructed to change it to a water pipe. Later when they were working in a new location, they attached it to a bolt in a pine timber. This illustrates that furnishing safety appliances, is only the first step in securing their intelligent use.

The manufacturers of electrical equipment have showed unusual energy in correcting any defective design which increased hazards, and today equipment is all but fool-proof and, with proper care, sane manipulation and thorough inspection, we do not need to have these re-occurring accidents.

So far I have touched primarily on the mechanical and electrical hazards. One aspect, however, that appears to me more important than these is the human element or mental hazard. If ever there was a department which should demand the highest type of intellect and physically fit person with steady nerves, it is the electrical department.

Men of nervous temperament and erratic disposition are out of place where the mental hazards are so great. There are many places in this department where men of this type show contempt for the forces with which they have to deal.

Too often we read in the press where men have been electrocuted or severely burned as a result of negligence on the part of the management or indifference to danger on the part of individuals dealing with electricity.

At the time of this writing (September 9), there is an item in the press where at Hudson, Wisconsin, two students (brothers) on the last day of work before returning to college were electrocuted, when a pole derrick they were pushing came in contact with a high line carrying 2,300 volts. Why did this happen? Because of neglect in instructing these young men in the hazards of their occupation, and they not being conscious of the hazards and dangers of this element.

Forward looking management can always be counted on to cooperate with the electrical department to the end that proper equipment and safeguards be provided. They will aid in every possible way in maintaining a high standard of operation.

Let us do our share in providing a safety-conscious group of workers.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.): What procedure do you have for inspecting and testing your rubber protection, rubber gloves, rubber blankets, etc.?

MR. BANTA: We take them down to the Public Service Company. They take care of that for us.

MR. PLZAK: How frequently?

MR. BANTA: We have a tickler system that is going into effect about every six months. We have only done it several times in the last three or four years. I thought I would ask the Public Service Company how often they think that ought to be done and then go ahead and follow their suggestions on that. We have just done it occasionally, when we felt they ought to be tested, and that is another thing that we have not whipped into shape.

MR. PLZAK: We have a method set up at the Wisconsin and Michigan Power and Light Company. We, of course, being in the paper industry, have not the means to provide a laboratory for that purpose. It is rather expensive. So the Wisconsin and Michigan Power and Light people test our equipment every thirty days, although we might only use it once or twice a year. We send it in twice a month. We send one-half of it in on the first of the month and the second part of the equipment is sent in the second half of the month. I wondered whether that was your procedure.

MR. BANTA: We have not sent it in that often. However, I think we should.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): I think Mr. Banta touched the secret of the whole thing when he said that we must have some one in charge of the Electrical Department who has this safety consciousness. We at Chillicothe have gone for over five years in our Electrical Department without an accident, and it is due to the fact that the man in charge of that department is continually on guard, looking out for these places, warning his men, and the men, too, have this same safety consciousness.

I believe Mr. Banta left out one of the hazards that is peculiar to some of the mills. That has to do with electric welding equipment. The invisible rays from that equipment, unless they are properly guarded against, can cause a very serious accident, either to the eyes of some watcher or to the man using the equipment.

Several years ago we discovered that, much to our sorrow, and since then we have constructed our own design of a portable shield that the welder carries out on the job, wherever he may be, which he uses when he is welding in the shop, also.

The men, by means of bulletin boards and instructions from their foremen, have gotten to the point now where they don't look at that operation when it is going on.

In connection with welding apparatus, also, there is a fire hazard. We learned that to our sorrow several years ago, when we had a several thousand dollar loss. The man was doing some welding and the sparks fell through a hole in the wall over into another department and set fire to some paper, which smoldered for several hours before it was discovered.

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): You said something about chlorine gas and what effect it has on copper. Do you do anything at all to eliminate that?

MR. BANTA: What we do in that case is to use a special insulation, recommended

by the Westinghouse people. Then we also take those motors out every thirty days and dip them and bake them, in order to keep that insulation from cracking, so that the chlorine can't get to the copper. Our control equipment, on that stuff is kept out in another room, to keep it away from the chlorine, but the motors have to be in there.

MR. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): What is your reply to a man who says, "All of our motors are grounded through their bases and we don't need any special grounding wires?"

MR. BANTA: It has been the experience of people in grounding equipment that a ground does not always stay. Your anchor bolts go down through the cement work and hit a steel beam or they don't hit a steel beam, so that is not a reliable ground. That is the objection to that. It is not reliable.

The Public Service Companies are now pestering the Code people to get them to permit them to join grounds together, the conduit and the neutral wires and such, in order to assure that they are grounded. They go out in the country and put in an installation, and they used to put them to the well casings, but they found they were not reliable, and so they had to change. I'd just as soon have a well casing ground as I would bolts in the framework of lots of these machines. It is not reliable. Go out and check these things. Don't rely too much on yourselves, as we did. I was amazed at the report I got, because visually they seemed to be all right, but when we tested them against the standard ground we found out that they were not.

M. G. LLOYD (Bureau of Standards, Washington, D. C.): With respect to this question of grounding, I want to supplement what Mr. Banta said about the desirability of actually testing out your grounds to make sure you have an adequate ground. He spoke of using an instrument for that purpose that costs several hundred dollars. It may be of interest to the men here to know that you can get a very cheap instrument that suffices for that work for very much less money than that, less than one hundred dollars. In measuring a ground you don't want an accurate measurement, necessarily. What you want to know is whether it is ten ohms resistance or one hundred ohms or one thousand ohms, and a very simple and inexpensive instrument will enable you to make that test and learn all that is necessary about that ground resistance.

I'd like to say a word about this question of extension cords which Mr. Banta mentioned. A year ago at Pittsburgh at the Congress I was Chairman of the committee which made a report on these low voltage electrical accidents. We have canvassed the reports on fatal accidents that have come from contact with low voltage circuits, and found a great many of them were due to using the extension cord and lamps which had either originally the wrong kind of insulation, not suited for that purpose, or which had been allowed to wear in service until the metal was exposed which made it possible to make a contact.

There were a great many of those that happened, especially with men going inside of boiler shells and such places where they get a very good connection to ground themselves. Then if they have a defective cord or one that is not suited to that purpose, or are using the wrong kind of socket, they are very likely to get a shock, and under those conditions it may be fatal. A lot of your electricians probably do not realize that you can get fatal shock on 110 volts on a lighting circuit, but there are dozens of cases of death under just those conditions, and when you get the fatal case is when there is a very good ground connection for the man, such as a wet floor inside a steel shell in a boiler or tank, and especially when a man's hands are wet. That is when you will get enough current to kill a man. When a man's skin is dry and he is on a dry floor there is not much danger. Under those circumstances you can take 110 volts and it won't bother you, but if you get low skin resistance by having your skin wet or are standing on a wet floor, you will get enough current to kill you. So it is very important that you use the right type of extension cord, the superservice or type "Z" cord that Mr. Banta spoke about, and don't use metal sockets on those extension cords. Get a weatherproof socket, and best of all, with a guard around it that protects the lamp itself and the socket, protecting the lamp so you can't break it.

CHAIRMAN HOYMAN: Thank you, Mr. Lloyd, I think that touches some very important points.

We have another paper this morning, and then we have a number of questions. Without any more preliminary on my part we will proceed with the meeting by having Mr. G. J. Adams give us his paper.

Unusual Accidents and Their Remedies

By G. J. ADAMS

General Supervisor, International Paper Company, New York City

It seems to me that prevention would have been a better word to use than remedies, because although we shall continue to remedy conditions that have caused an accident, our real job is to try to foresee these conditions, unusual or otherwise, before the accident occurs. At any rate, let us take that conception of our jobs to give ourselves something to shoot at. For that reason, I will say just a word about the remedies or prevention before enumerating several unusual accidents.

Whether an accident be surrounded by unusual circumstances or of the ordinary type, the remedy in almost every case is the same. Proper selection of employees, proper instruction of how to do the job and proper supervision of the job—in other words, efficient operation determines the degree of success whether it be safety, production or any other objective of any plant program. I shall not go into detail concerning any of these three points as they have all become quite an old story.

A good example of the need of proper selection of employees is illustrated in the following accident which was unusual, at least in its results:

A wood handler, who had been employed about two weeks, was helping unload pulp wood from a box car. He stooped over and lifted a stick of wood weighing about 55 pounds. As he did so, he lurched and twisted his leg. He did not fall or strike against anything, but the resulting injury was a broken hip. It was found that the bone structure was diseased and the man had been in very poor physical condition for some time, in fact he should not have been doing work of any kind. At the end of about two years of useless medical treatment he died.

Physical examinations of new employees was not a part of the policy of the plant at the time this man was employed.

When workmen neglect to take ordinary precautions in their work, certainly the foreman has failed to give proper supervision and this is responsible for the majority of our more serious accidents. For instance the following:

A carpenter did the old trick of using a loose plank across a couple of girders for a scaffold. He stepped on the end of the plank outside of its support, the plank tipped and he fell to the floor, a distance of about 12 feet. According to an eye witness, he landed upright on his feet apparently unhurt, but the plank followed him down and a second later struck him on the head, fracturing his skull and killing him instantly.

A cement pier was being erected outside of a primary station to support a lightning arrester. A workman was attempting to straighten one of the steel reinforcing rods. The workmen were being allowed to use a piece of iron pipe for this purpose, placing it over the end of the rod and using it for a lever. The upper end of the pipe came in contact with a 110,000 volt wire and while the current evidently passed through the pipe and the rod into the ground, the resulting flash caused serious burns from which the injured man died.

Occasionally we have an accident that possibly can be classed as being due to ignorance of some detail of a technical nature. On the other hand, the cause of the following, although quite unusual in our industry, is so common in some other lines of work that it probably should have been recognized as a hazard in this case:

A laborer was helping remove water from a manhole in the mill yard. He went into the manhole after water was pumped out and his foreman noticed that he fell

when he reached the foot of the ladder. The foreman, thinking he had fainted, went down to help him and he too collapsed. A third man went into the manhole to bring them out and he in turn was overcome. The remainder of the crew then removed the three men from the manhole with boat hooks. The first man to enter did not recover. A gas engine has been in use pumping water from the manhole and it was finally assumed that carbon monoxide from the exhaust, which was located adjacent to the hole, had settled to the bottom and was responsible for the asphyxiation.

Each of the accidents I have described was fatal. And in each case, particularly at the plant at which it occurred, steps have been taken to prevent similar accidents, but, after accidents of this nature, we wonder why they ever occurred at all.

Proper selection of employees may be attained to a fairly high degree of satisfaction without much difficulty, depending on supply and system of selection. The problem lies in giving proper instructions of how to do the job, and proper supervision of the job by the foreman. This problem is one for which the management is directly responsible and very probably justifies some sort of a training program for foremen. We have tried to deal with the human element in accident prevention by posters, signs, pep meetings, safety contests, etc., principally to stir up enthusiasm which at best gives only temporary results. Those of you who have training programs in your plants will agree that by this method results are slower in being obtained but become more permanent when obtained. The foreman develops the quality of clear thinking about his job.

I recently attended a conference on plant training at which the following statement was made: "At all stages of development (training) there is no satisfactory substitute for an intelligent man on the job who will use his head in accordance with the conditions which prevail at the time." Unfortunately many of our foremen are not of this type, but this condition can be corrected somewhat and it seems to me that some form of training is very probably at least a partial solution.

Very often the buck is passed to the injured person as being the cause of the accident by his own carelessness. This is not so in the majority of cases. But whether it be so or not, I think you will all agree that our accident experience will be more consistently better if the management takes the attitude that they are to blame for every accident that occurs.

A very recent fatal accident in one of our large plants probably illustrates this situation:

Three painters were engaged in painting the sprinkler system pipes over the paper machine. They had been using the overhead traveling crane as a platform. This crane was being operated by its regular operator who received the signal to start and stop from one of the painters who was designated to do this by striking his metal scraper against the power rail. The crane reached a position where it was impossible to proceed further. The operator came up onto the platform, spoke to two of the painters, and remarked that they were through. He apparently said the same thing to the other painter who was at the further end of the crane platform. He then went back to his position and immediately started the crane. The third painter at the further end of the platform meanwhile had evidently seen a spot that needed to be touched up. He leaned out to do this and when the crane started he was caught between the crane frame and one of the girders. His position was noticed by his fellow workmen but the distance the crane traveled to the girder was so short that by the time the signal was given to stop, the victim was crushed to death.

Should he have known better and be classified as careless, or should the management be considered responsible for having a crane operator who was not competent enough to wait for an established signal before starting the crane in motion, even though he knew everything was clear?

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): In our sulphite plant we have in the recovery department a tank about thirty feet long that stretches from the incinerator to the stack, and in this tank are three disk evaporators, which occupy the entire width of the tank. It was necessary to cut off with a torch some of the flanges on these disk evaporators so as to have them work more efficiently. One of the cover plates on this long tank was removed and the workman sat there with the torch, his feet inside in between the fins of the evaporator, cutting off the edges of the fins.

It was very hot in the room and there was a fan located at the back end of the room, in the wall, and the millwright in charge of the work said, "We ought to have some air in this room. It is getting pretty hot in here." That was agreed upon, so Mac, the foreman of the recovery plant was standing there, and he said to him, "Mac, let's have some air."

The sub-foreman stood down below on the floor, so Mac made a motion to turn on the fan. The signal was misinterpreted by the sub-foreman, who thought that he was telling him to rotate the disk evaporator to the next fan, so that it could be burned off. In order to rotate that they threw in the electric starter and started the disk evaporator and immediately threw it out, so the evaporator would only turn a small portion in circumference. So the sub-foreman threw in the switch and immediately threw it out again. The evaporator rolled over. The man sat with his legs inside the evaporator, and one of them was snapped.

We had an investigation of that accident. We had always had very rigid rules in regard to electrical equipment, and they were made more rigid after that accident. We have a system of tagging them. Any machine that is operated by electricity is tagged, and the man who orders that machine stopped or started for repairs puts his name on the card, and that machine cannot be started without the consent of the man who ordered it under repairs or ordered it stopped, whether that happens to be the chief operator or whoever it is.

W. J. PEACOCK (Northern Paper Mills, Green Bay, Wis.): Mr. Chairman, we have in this Section the presence of Mr. R. L. Eminger, Secretary-Treasurer of the American Pulp and Paper Mill Superintendents' Association. If you don't know Mr. Eminger, he has been here throughout the sessions. I think it was largely through him that this Section was represented on the program at Dayton. I would like to make Mr. Eminger feel he has the freedom of the floor, with your invitation.

CHAIRMAN HOYMAN: Mr. Eminger, we are glad to have you with us. ROBERT L. EMINGER (American Pulp & Paper Mill Superintendents' Association, Miamisburg, Ohio): Thank you, Mr. Peacock, and Mr. Chairman. I was invited to attend this Section meeting by Mr. Cameron, Managing Director of the National Safety Council, and I took it that I would not be called on but would come merely to listen to the discussions. I have enjoyed them very much, and I have it in mind right now to recommend Mr. Adams for the 1932 convention. That is my hope. Gentlemen, I thank you very much and I want to tell you that I am enjoying every minute.

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): I don't believe that outside of myself there are any members of our Paper and Pulp Section who heard Bill's very good talk on "Safety" at the Superintendents' meeting in Dayton. I believe that we made more foothold in the Paper Industry at large through getting Bill in on this opening meeting than ever before. I believe that Mr. Adams or whoever will be called on in the future should do all they can for our Section by appearing before this Superintendents' group.

MR. ROSEBUSH: I think that our Section should link up closely with the Superintendents' Association, both in their regional meetings and in the national meeting, that we ought to ask them if they would not do in their sectional meetings just what they are in their national meeting.

MR. EMINGER: It has been my desire to do that very particular thing. In our Miami Valley Division in Ohio we meet every month, just as regularly as the month comes around, as also does our Michigan Division at Kalamazoo. Their first meeting

of the season is tonight, and every third Thursday of the month you will always find them meeting in Kalamazoo, and if any of your men have a paper or talk that they would like to give to the Superintendents of the Miami Valley Division or the Michigan Division or any of our nine divisions, I would be very glad to see that they get on the program. I would be very glad to attempt that for you. Of course, I have no absolute control over the divisional meetings, but they very frequently ask me for suggestions and subjects, and I thinking now that Mr. Grant is going to be scheduled for sometime in the Miami Valley Division this winter.

CHAIRMAN HOYMAN: That is very fine of you, I am sure, and we want you to feel perfectly free to take part in this meeting here.

MR. ROSEBUSH: Mr. Chairman, as long as Mr. Eminger has been so kind as to make that offer why do we not reciprocate and say that we'd like to have some representative from the Superintendents' Association at these meetings, and have him suggest some name that we might use on our programs?

CHAIRMAN HOYMAN: That is a very good hint for the Program Committee for next year.

MR. PEACOCK: Mr. Adams told about the responsibility of the firm for all accidents. We had a most unusual accident just a couple of months ago, one of the saddest things that ever happened in our mill or on our property, a man being killed.

We were about to have a fire drill, and the question arose as to the treatment of a fire when it is necessary to climb to the roof. Those of you who have visited the Northern Paper Mills remember that we are across the river, a considerable distance away from the fire department. The best possible run they can make would not bring them to our premises under three minutes and so we have our men trained, as usual, all over the mill. We have our fire crew, and many times we have put a fire out before the fire department has even arrived on the premises. We know that those first three minutes are possibly the life or death of the whole situation as far as fire competition is concerned.

This question of fighting a fire from the roof came up. We had some new appliances, some new hooks that had been advised, and belts for the handling of fire hose and mounting a ladder, so we asked the Fire Chief to come over and instruct our men. He sent over a trained instructor, and with him a fireman, competent to instruct men. Under instruction our men climbed to the roof, and when they were all ready to turn the water on, after they had strung their hose from the ground up over the roof, some one below made a suggestion that they turn the force of the hose not on the roofs but out over the woodpile across the street.

Possibly that suggestion may have had to do with the fact that in the straightening out of the hose and the weight of the water as it came into the hose there was a pulling and dislodging of the hose, and one man who happened to be on the roof edge was first thrown off his feet and then in the straightening of the hose, which made it almost impossible for the other two men to hold on, the nozzle again struck him and he was knocked to the ground, and we picked him up practically dead.

CHAIRMAN HOYMAN: We will proceed now and give Mr. Plzak the opportunity of presenting his paper. If you are all set, Mr. Plzak, we will give you the floor.

Why Safety Must Be a Part of Our Daily Tasks

By J. J. PLZAK

Safety Director, Consolidated Water Power and Paper Co.,
Wisconsin Rapids, Wis.

A thought just occurs to me—I don't know whether you ladies and gentlemen have thought of it or not—but do you realize that we have paid more for our seats here than we would for a World's Series game or a Notre Dame-Northwestern Football game? With the number of meetings I am attending and the cost that I anticipate my total trip will come to, my company is paying at the rate of ten

dollars a seat per day for me. That is quite an expensive seat. Therefore, when we come to these meetings we should try and get as much from them as we possibly can, and not forget the things that have transpired, but try to take them back with us and use them.

The introductory part of my talk is rather psychological. I give it because it has some bearing on the concluding remarks that I will make.

I am comfortably seated in a chair of a transcontinental train. It is late afternoon. The crimson sun is sinking into a golden West. All about me is beauty. I am so delighted and so filled with this beauty that surrounds me that I look about me and notice that others are also enjoying themselves. Dusk falls and with it come the shadows of evening, and the outside soon becomes a yawning depth of darkness. With it comes that familiar "first call for dinner."

After eating I retire, and as I lie awake I think: What has made my trip so comfortable, so uninterrupted that I hardly know that I have been traveling at a rate of possibly sixty to seventy and even eighty miles an hour?

With one misstep, with one misgiven order, with possibly one misinterpreted command, this iron horse, pulling behind it twelve steel coaches, would be a mass of twisted iron, with precious human lives snuffed out forever.

Then my thoughts travel to the engineer who is guiding this iron horse to its destination, and behind rides this most precious cargo of human lives. I think of him as he has his hand upon the throttle, with his eyes ever on the track ahead, his eyes ever alert for any obstructions, any washouts in the roadbed, any possible broken rails; and I realize that he certainly is bent on safety, not on safety by the hour or safety by the day or safety by the week, but safety by every second of the minute.

Then I think of the fireman, whose duty it is to keep that big monster fed, whose duty it is to watch meters, to be on the alert for peculiar sounds, and I think of his responsibility, and how he, too, by possibly forgetting to watch the water gauge and getting below the safety level of water, could ruin that entire precious cargo.

I travel on down through the rest of the train crew, down to the brakeman, whose duty it is to see that the train is properly protected when it stops by red flares and flags. Then my thought, as we pass a busy intersection and I hear the tinkle of the bell, goes to that crossing watchman who is stopping the traffic so that our monster can flash by at a thundering speed. He certainly is bent on one hundred per cent safety.

I think further of that quaint little figure, the track walker, rain, snow or shine, ever on the job. He can't say, "Well, I will just let that go by today. Tomorrow is another day." He is ever on the job. Every day he walks and inspects every foot of the track.

I think of the man in the dispatch tower who, reaching for a wrong lever or possibly a premature throw of a lever, could throw us into the most horrible catastrophe.

Then my thought comes to one thing—that these men have made safety a part of their everyday tasks. They realize that safety is not something that should be done by the week or by the month or when the spirit moves them, but it is a part of their everyday tasks. Every second of every minute their thoughts are safe thoughts.

I picture our industry, moving our wood from the cutters in the woods on through the various processes of the mill, until the finished product is ready for shipment to be delivered to the customer's door, as also a train with its cargo moving from the woods to the various departments, and we, too, have our hazards, and it is, too, necessary for our men to think safety continually.

A glance of the axe off of a limb will result in a severe wound to the cutter. Improper piling of wood in the yard will cause a tumbled stack, possibly crushing to death some individual. Improper guiding of the logs as they come up the log haul to the slashers may cause some one to be severely injured, possibly fatally, due to being caught between a log and a runaway. Improper walkways past conveyers may cause and result in serious injury.

We pass the wood room with its din and its fatigue upon the men by the din of

the noise, its revolving drums, monstrous drums and their hazards. We pass on to the grinders with their hazards, the splashing of hot stock, the possibility of an exploding stone.

We go on to the innocent beaters with that little paddle that has resulted in many a fatal accident because it was improperly handled. We go through the sulphite mill with the possibility of opening the wrong digester or blowing a digester in a pit filled with water, which has not been drained prior to the blowing, or the possibility of a bursting exhaust line from the digester because of improper maintenance.

We travel on to the machine room with its ever toll of hazards, slippery floors, fast-moving gears, rips, and the many others; on to the cutters, and on, and on, and on, and on; the maintenance men, who are our track walkers, and the hazards that they are confronted with daily.

I grow quite tired and fall asleep. I am quite comfortable. I am not worried. My safety is in the hands of competent men.

Why should safety be made a part of our daily tasks? Let us see what we have accomplished. Many years ago we did not have any form of protection for employees. I am referring to the period before the Compensation Act. Employers believed that a man was just another thing in his industry, like a machine. When he became used up, or became disabled, he was thrown upon the scrap heap and some one else was put in his place.

However, such a condition in a civilized nation could not continue. Labor organized legislation which finally brought about the compensation act. It became a moral obligation for each and every employer to assure the safety of his men, and he felt that his instrument for discarding that responsibility was the insurance company. He carried liability and he had no more to worry about. However, such a condition could not continue. The employer soon began to realize that his rates increased according to the number of accidents that he had in his plants, and therefore, he realized that it was of utmost importance that he reduce those accidents so that his premium rates would be reduced. So with the cooperation of the Industrial Commission, with the inspectors of the insurance companies, and with his own organization he began to guard the dangerous equipment in his mills, and I believe today there is not a single industry in the nation that has not to some extent guarded the hazardous equipment in its industry.

However, when the balance sheet was made up at the end of the year, the industrialists still found fatal accidents. They still had men that were maimed and they still found that their costs were growing. While mechanical accidents were responsible for only one-fifth of the total number of men injured, four-fifths of the accidents that were caused were from some other source than the mechanical. It seemed that the source was mental. Four-fifths of all the accidents could have been prevented by some forethought given to the hazard involved.

So the country set out upon an educational campaign, and our bulletin boards were placed in the mills; our plant publications carried educational articles relative to safety. We used posters. We had meetings. We had movies. We did everything humanly possible, and yet, gentlemen, when we looked at our tally sheet at the end of the year, 1930, we found that we had made a very, very small dent in the reduction of accidents.

What is the cause? Why have we not done more in reducing those accidents after we have conscientiously made every effort to reduce them? We have guarded our mills mechanically. We have tried to put on an educational program.

I believe the answer to that is in this, that we have not conveyed to our people, each and every one of them, whether he be an employee, a foreman, or a manager, the thought that safety is a part of their everyday duty.

First, I shall try and tell you how I believe safety can be made a part of a man's everyday duty. In the first place, we are aware that the foreman of a department is the key man in that department. It is through him that the company conveys its

policies to the men, and likewise, it is through him that the product is conveyed back to the company. So he stands in the position of one who is responsible or largely responsible for his department.

First, I believe he should make a thorough study of the guarding in his department. He should make a systematic study of it. He should not simply be satisfied with a Code, regardless of whether it is a Pulp and Paper Code, a State Code, or whether it be the safety pamphlet gotten out by the National Safety Council relative to that particular industry.

He should go further than that, for this reason: there are no two departments alike. There are no two manufacturing companies who are making the same commodity, alike, in so far as their physical properties are concerned, so he must make a very intensive study of the necessary safeguards in his department.

Let us say that he has now completed his survey and has guarded his department, so far as he knows, one hundred per cent. His second thought should be bent toward the posting of interesting material upon those bulletin boards. He should not be satisfied with the material that is sent him by, let us say, the National Safety Council or his safety director, or whoever is sending the material to him. He should himself be on the lookout to clip from newspapers and from other sources interesting items relating directly to accidents which might occur in his department. He should take enough pride in his department to post those bulletins on the board. He may even sketch something or he may make up a memorandum of his own—it matters not how crude it may be, whether it is properly punctuated or whether the proper grammar is used—if he gets the idea across he has succeeded.

That thought among your foremen, gentlemen, should be stimulated.

Third, this foreman should take it upon himself to have some method of daily reminder to his men. Regardless of how he may do it, he should contact, if possible, each and every one of his men every day; possibly by some pleasant conversation he can draw some hazard to the attention of that man. Should he find that that man is following some practice which is unsafe it should be immediately stopped and he should instruct him in the proper procedure.

That brings about a fourth thought, the idea that this foreman should become what we know as a human engineer. If you gentlemen have not read a single thing about psychology, or if you know nothing about psychology, I would suggest that at your very first opportunity you avail yourself of your public library and find the simpler books on that subject. I happened to see two downstairs and picked them up. I have read both of them. They are "How's and Whys of Human Behavior," by Dorsey, and another "Why We Behave Like Human Beings" also by Dorsey, both excellent books on the subject of human psychology. I know they will be of interest to you. Then in some way impart that knowledge to your foremen.

You might do that by a clever bulletin. You might do it by a clever sketch, or you might do it by suggesting that the foreman read one of these books, especially this book, "Why We Behave Like Human Beings," which is written from the layman's standpoint.

Your foreman, as a human engineer, should be on the alert for the fellow that has a quarrel over the cup of coffee at the morning breakfast table. He is the fellow who, after he gets through his quarrel with his wife, throws his chair aside, puts his coat on, gets down to work and says, "I don't care. All I have is trouble." Gentlemen, he is in a very susceptible frame of mind when he enters your establishment to become an accident prone employee. Every condition is there.

I am going to try to show you why that is so. I sketched very roughly just what occurs in the human mind and just what happens when a man attempts to do something.

This man has asked some one his name and he wishes to write it. He has replied, "My name is John Jones." He has talked. First it has been necessary for him to ask this name. So a message through the nervous system of the body travels to these lips, moving certain muscles which ask this man his name. The man replies.

It is recorded in two ways, one by vision, by seeing that man, and second, by the ear. It is recorded by this brain or this central telephone exchange, if you wish to call it that, and thereby a process of coordination from the various sections of the brain, such as the section of vision, the section of hearing, and so forth, is set up, which sends a message down to this hand to write that name, John Jones, upon this paper.

Then again vision comes into play. A message comes down and examines that name and returns it, assuring this individual that he has written that name correctly.

Now, you can readily see if one of those centers is out of harmony. It is very apt to result in a serious accident when an individual is performing any given task. For example, in this instance he might not write John Jones. He might write Henry or he might write the wrong letters.

A similar thing happens when a man has an accident. Since we accept the fact that four-fifths of our injuries are caused by thoughtlessness, which would therefore come under the classification of non-mechanical, we can see why that is so. Something in that coordination has been lacking.

I wish there were more of the wives of our employees who availed themselves of the opportunity of attending safety meetings. I believe our own folks could prevent many of the accidents, fatal and otherwise, that occur in industries if they would only realize that friend husband also has his problems, and that when they send friend husband to work with a worried mind he is apt to have a serious accident.

The foreman should also be on the lookout for the chap who says "I have another headache today. It is the third day." This foreman has been listening to that story for probably six months, and maybe six years.

In order to be a safe man you must be an efficient man, and in order to be an efficient man you must be a physically fit man. Therefore, if your employee is not physically fit he is not efficient, and therefore is very likely to become injured.

The foreman must study his individuals in his department. He is not going to be able to treat them on the same basis. John has a certain personality. Frank has another type of personality. Joe is another type of chap. He has to become a so-called human engineer to find out the peculiarities of the behaviorism of these individuals, and then treat them accordingly.

Another thing that the foreman must do, which is of utmost importance, is to analyze the jobs in his department. If you were to tell your foreman in a large department that he should analyze all the jobs in his department he'd say, "It can't be done. It is an inhuman task. You don't realize how many jobs I have here."

If it will help you any please tell him this story. A farmer had a large field of stone, and it was necessary before plowing that this field be cleaned of the stone. He called his son, who was at the age when farm chores become almost unbearable, and said, "Son, we are going to clean this field of stone."

His son said, "Dad, that is going to be a terrible job. We will never get through with it."

The father picked up a stick from the ground, and marked a big circle around an area, and said, "We are going to clean that today. When we get that done we will stop."

"Do you really mean that?"

"Yes." And so they did the first day's piece, and they left when it was done. Before the son knew it the field of stone was all cleaned. In fact, after a bit he was cleaning more than his share each day, for he became enthused over the job. That farmer knew psychology.

You can approach your foreman in a similar way on this problem of job analysis. It is one of the most important things in your department for preventing accidents. He should make a thorough analysis of each and every job in his department. He should write down the procedures very carefully, and then set up safe standards for performing that task, and see that those safe standards are practiced.

One of the foreman's big jobs will require some ingenuity, and I believe a fore-

man, if he is at all conscientious about his department, does possess that thing called ingenuity: he should use it to the extent of studying the latent hazards in his department, those hazards which don't present themselves on the surface. That is, he must anticipate the accidents.

It is a very simple matter, gentlemen, as you all know, to pick up an accident report and analyze what has caused an accident. That is a very simple matter. It does not take much time to do it. But it takes some thought to analyze a job for the latent hazard which might cause an accident, and then correct it, and so avoid the occurrence of an accident.

How will he go about forming an ingenious mind, if you wish to call it that, to be able to find these latent hazards, gentlemen? Well, in several ways. First, this job analysis is going to be of utmost importance. Second, this human engineering campaign that he is going to put on is going to help. Third, he should make a very careful analysis of each and every accident in his department, not only of last month or last year, but for the past twenty years, or however long that company or that department has been operating, regardless of whether under his regime or some one else's.

He should see to it that material reported on the accident form is in such shape that he will be able to interpret from it what actually caused that accident, and then summing up the whole situation, draw conclusions of the possibility of future accidents, and then take steps to prevent them.

I mention that he should study all accidents. By that I mean minor accidents as well, whether it be a scratch or a foreign particle in the eye. Statistics show that for every major accident there are thirty to fifty minor accidents. Some insurance company in the United States has made a study of accident statistics, and found that for every three hundred occurrences one occurrence would result in an accident. Therefore, it is very likely with from thirty to fifty minor accidents happening for every major accident, that one of those minor accidents in every three hundred is going to become a major accident, and you don't know when that time is going to come.

Therefore, your foreman and you, as safety engineers, should be just as interested in the minor accidents as you are in the major accidents. From the dollars-and-cents standpoint, which I know is secondary in safety, because we are thinking first of relieving human suffering—but nevertheless from a standpoint of dollars and cents you will be amazed what your minor accidents are costing you. If it costs so much to send a man to a doctor when he is injured due to a major injury, think of what it is costing you when you send from thirty to fifty of your men who have suffered a minor injury either to the First Aid station or the doctor.

That covers the points that I wished to bring up on the matter of why safety should be made a part of our daily tasks.

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): Mr. Plzak, how often do you hold these foremen training classes?

MR. PLZAK: We are holding our foremen safety meetings once each month, where we give definite instruction relative to human engineering and other points.

MR. GRANT: Are those written instructions?

MR. PLZAK: I use this method: Besides the talk which is given from notes, I circulate to the foremen each month a written sheet relative to safety in their department, making that sheet, as much as possible, for that department. In other words, it requires the writing of several different notes on the subject. It might be that one month there might be twenty-five different letters sent out. In other words, it is not a general letter. It is a letter that refers to the human engineering of that particular department, a psychological attack upon the subject of safety in that department.

ROBERT L. EXINGER (American Pulp & Paper Mill Superintendents' Association, Miamisburg, Ohio): At our Philadelphia convention we had a sixty-five minute talk on human engineering by Dr. Manley P. Northam. Next Saturday night at a divisional meeting of the Pennsylvania-New Jersey Division, Dr. Northam will again talk on human engineering, because as Mr. Plzak has recommended, that type of talk is what

we try to give our superintendents. We don't tell them how to make paper. We try to give them the other side, the human side. It must be rather interesting when 612 men and women will listen to a man talk for sixty-five minutes on human engineering, and you know some parts of it are pretty dry. This was illustrated on the blackboard and it occupied just exactly sixty-five minutes.

Mr. PLZAK: In the January, 1931, issue of *National Safety News* an article appeared on the subject of human engineering, brief, but nevertheless interesting. I sincerely believe that our final solution of safety is going to lie in that psychological attack.

ADJOURNMENT

Thursday Luncheon Session
October 15, 1931

W. J. BRENNAN, Chairman
State Department of Labor and Industry, Augusta, Maine

The Luncheon session of the Paper and Pulp Section convened with General Chairman Brennan presiding.

CHAIRMAN BRENNAN: Another year has passed, and here we are gathered around for the high point of our annual session. Even though our friend, Nat Bartlett, is not here, we are happy to welcome back to us the man whom we might well call the Dean, the Guide of this industry. I am talking about Mr. Fritz, the owner of *The Paper Industry Magazine*. Practically all of us have been in the industry long enough to know the important place that magazine plays in our work, and not only in our work but in all paper work. Most of us have been here long enough to know that it has served as the tie which binds together our activities in that it carries our figures, it gives our activities mention, and performs a multitude of duties so essential to contest and allied activities.

Mr. Fritz did speak at the Awards on Monday, but that does not excuse him from being here, or did not excuse him from coming here, and I will touch on the subject of my leaving the Section in part by saying this: It is not at all pleasant to contemplate dropping the activities with which I have been connected, but it must be, and it won't matter to the Section at all; as long as you have men of that caliber and men of that interest affiliated with you things will go forward. So I want to impress upon the Section in my last official charge to them that they fully appreciate the place this magazine plays. I speak of Mr. Fritz and I include Mr. Dowd, the Editor, and Mr. Keenan of New York, those men with whom I have had very cordial, pleasant contact.

Although it is not on the program, this Section could not be complete without remarks by Mr. Fritz. Understanding the background in this great industry, we always gain something from his observations regarding our own work, and there is a healthy situation when some one not closely allied with our particular profession sees fit to comment upon our activities, and knowing the sincerity of the man from these pleasant contacts of years back, I will say an official adieu and turn the meeting over to the man whom I have considered an adviser, a friend and a guide. Mr. E. B. Fritz.

E. B. FRITZ (*Paper Industry Magazine*, Chicago, Ill.): I did not know I was going to be called on to say anything down here or I might not have come, because a publisher generally likes to write his observations so that no one can throw anything at him, instead of getting up and saying something.

When some one is called on to say something, to take the place of somebody else, because there is only one man's name on the program this noon, it always reminds me of something that happened when I was a little boy. I used to go to Sunday School. I suppose some of you used to go, too, at one time. This was in a little town down in Maryland, where there was not much to see or much to do, no place to go at night except to bed, quite different from some of the youngsters now. Of course, that was quite some time ago. The only times we really had any celebration were at Christmas, at the Sunday School.

We had one end of the church all filled up with a big platform with Christmas trees on it. We were sitting in the front row, a whole lot of kids not much larger than this fellow here, five or six years old. One nervous little fellow was next to me. The tree was filled with Christmas presents and underneath were baskets of little stockings filled with candy, oranges, apples, etc. Of course, all we were interested in was to get our hands on some of that.

Finally, the minister got up to give a talk, and he talked and talked, a long time. This little fellow got awfully nervous, and finally he jumped up, turned around and looked at the minister and said, "Mr. Beard, when are we going to get our Christmas presents?"

That is the way I feel about it. When are you fellows going to get the information that Mr. Dowd is giving? We have, as you know, for six years presented the Major Trophy, and we hope it has been a means of helping to eliminate accidents in paper mills. We intend to furnish that same trophy every year, and we hope it will get better each year. We hope it will be an incentive to the men under you, the people in the mills, to work a little harder, to strive a little harder, so that there will be fewer accidents. It has been very gratifying to us to note that the mills as an average that have been working with this Section have lessened their accidents each year, and if we have eliminated a few accidents, a few broken fingers or limbs or cut-off hands or something of that kind, we feel well repaid for what we have done. I want to just leave this thought with you, that we want to do anything that we can that will be helpful to this Section.

CHAIRMAN BRENNAN: As you know, the new officers have been elected and they are ready to begin the year's activities. It is fitting and appropriate that the incoming General Chairman should take over the meeting from this point on, not only fitting and appropriate, but it is highly within his capabilities to do so, and as an opening gun on what I am prone to believe is going to be an outstanding year in this Section I will turn the meeting over to our good friend, Jim Plzak.

(J. J. Plzak, Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis., took over the Chair.)

CHAIRMAN PLZAK: Thank you. This seems to be the opportunity to do what I believe is in the heart of each and every member of this Section, and that is that we give, by a rising vote, a vote of thanks to our outgoing Chairman and his officers. Will you please arise?

(Members arose and applauded.)

CHAIRMAN PLZAK: Each man has an inspiration and mine is to my right, Mrs. Plzak. Fifty per cent of the family is represented here, the other 50 had to stay back home—also an inspiration.

I don't believe that the gentleman who is going to make the presentation of the certificates and give us the data on the statistics relative to the contest requires any introduction. I have known him, as you have, for many, many years. He is a hard worker. I don't believe there is another person as vitally interested in the Paper and Pulp Section as the gentleman who is going to make the Awards and present the certificates. No matter where or when I see Mr. Dowd he always has either a slip of paper in his hand or an envelope upon which he is scribbling some notes, which you can rest assured will materialize into some interesting article which he is going to solicit from some one for *The Paper Industry*, or else is going to materialize in some good for us, whether it be relative to safety or production or something else. It is really a great pleasure to present to you Mr. A. Scott Dowd.

Awarding of Contest Certificates

By A. SCOTT DOWD

Editor, *The Paper Industry Magazine*, Chicago; Chairman of the Contest Committee

We are assembled again at this annual mid-session luncheon to learn of and consider the records which the mills and plants entered in the 1931 Paper Industry Safety Contest have made and to award certificates to those whose records have been outstanding.

It was a most gratifying compliment that was paid to this section in having a place designated to it on the program of the opening session of this Twentieth Annual Safety Congress, in the award there of all trophies to group winners in the four sectional contests that have been held this year, by their donor, the National Safety Council, and a special assignment to Mr. Edward B. Fritz, publisher of *The Paper Industry*, for the award of his major trophy to Mill No. 1 of The Champion Coated Paper Company, Hamilton, O. The perfect record of no accidents made by this mill for the six months ending June 30, 1931, was considered by the judges to be the most outstanding accomplishment of this year's paper industry contest.

It is difficult to talk of figures and make it interesting, but as this is my assignment, I shall make it brief and as much to the point as possible.

Your rules for this year's contest admitted a new group known as Division Two, comprising paper and board remanufacturing plants. There were eighteen plants registered in this division, belonging to ten companies. A total of 3,607 employees experienced 41 accidents covering 948 days of lost time, making a frequency rate of 9.319 and severity of .215. Four of these plants made perfect scores.

There were not enough plants registered in Division Two to divide them into groups big enough to sustain a contest, so the right to combine them into one group was exercised.

To make the competing paper and pulp mills more comparable in size as to number of employees, a change was made in the groups. Four groups were established as follows:

- Group A—751 or more workers
- Group B—401 to 750 workers
- Group C—101 to 400 workers
- Group D—30 to 100 workers

Eight mills were registered in Group A; 34 mills in Group B; 52 mills in Group C; and 13 mills entered in Group D.

Group A comprised a total of 7,347 employees, experiencing 110 lost time accidents, covering 1698 days lost time; a frequency rate of 12.770 and severity of .197. There were no perfect scores in this group.

Group B represented a total of 16,913 employees, experiencing 270 lost time accidents, covering 7,024 days lost time; a frequency rate of 13.335 and severity of .347. One perfect score was made in this group.

Group C registered a total of 11,237 employees, experiencing 331 lost time accidents, covering 7,217 days lost time; a frequency rate of 22.822 and severity of .498. There were three perfect scores in this group.

Group D consisted of a total of 692 employees, experiencing 15 lost time accidents, covering 376 days lost time; a frequency rate of 15.780 and severity of .396. Seven perfect scores were recorded in this group.

It is interesting to note that the lowest frequency and severity rates in the Division of pulp and paper mills were made by Group A, those mills employing more than 750 people, although there were no perfect scores. The highest frequency and severity rates were made by Group C, employing 101 to 400 workers, three of whose registrants suffered no lost time accidents.

The contest as a whole consisted of 125 mills or plants, employing 39,796 workers operating 48,715,543 man-hours. There were 787 lost time accidents, covering 17,263 days lost time. The average frequency rate for the contest was 15.744; severity, .354.

It has been said that we need practical objectives for the continued growth and success of our section. While this might be true, is it not also the truth that our one great objective is the reduction of accidents? The accomplishments toward this goal are registered in the results shown by a comparison of the last five contests in which more than 120 mills have participated.

Beginning with the six months contest of the year 1927, there has been an increase of employees registered in each year's contest with the exception of a slight downward curve in 1930. The number of lost-time accidents and the days lost show a sharp decline, so that frequency and severity rates for these past five periods are recorded as follows:

Frequency—		Severity—	
1927	33. plus	1927	.64 plus
1928	28. plus	1928	.55 plus
1929	26. plus	1929	.50 plus
1930	20. plus	1930	.47 plus
1931	15. plus	1931	.35 plus

An indication of the wider spread of influence that these contests are having on the mills engaged in efforts to reduce accidents is shown in the number of mills whose frequency and severity rates are below average:

Frequency rates below average—		Severity rates below average—	
1927	61 mills	1927	75 mills
1928	64 mills	1928	76 mills
1929	59 mills	1929	80 mills
1930	55 mills	1930	66 mills
1931	72 mills	1931	76 mills

The ratio of employees to accidents in 1931 was 52 to 1; in 1927, the ratio was 23 to 1.

The ratio of non-fatal accidents to fatal accidents in 1931 was 192 to 1; in 1927, the ratio was 147 to 1.

The days lost per injury in 1930 and 1931 were 23, while those lost in the years 1927, 1928 and 1929 were each 19.

The number of mills that made perfect records during the past five contests are as follows:

1927	6
1928	8
1929	6
1930	11
1931	15

It is now my pleasure to announce the names of those mills and plants that have made leading records in the 1931 Contest.

The winners of each group are as follows:

Division I

- Group A—Falls Mill, Kimberly-Clark Corp., Niagara Falls, N. Y.
846 employees; 998,444 man-hours
3 lost time accidents; 80 days lost time
Freq. rate 3.005; Sev. rate .08
- Group B—Mill No. 1, The Champion Coated Paper Co., Hamilton, O.
482 employees; 651,603 man-hours
Perfect score of no accidents
- Group C—Consolidated Water Power & Paper Co., Appleton, Wis.
202 employees; 205,458 man-hours
Perfect score of no accidents
- Group D—International Paper Co., Riley, Maine
49 employees; 62,014 man-hours
Perfect score of no accidents

Division II

- Bemis Bros. Bag Co., East Pepperell, Mass.
58 employees; 60,572 man-hours
Perfect score of no accidents

Trophies were awarded to the above mills at the annual meeting of the National Safety Council on Monday, October 12th.

The National Safety Council has prepared Certificates of Merit for all other mills whose records were perfect but whose rank has been determined by the length of time the record had been maintained, as defined in Rule 6 (a). The Council has also included those eligible to certificates whose ranks in each group run second and third.

The privilege has been given me to present these certificates to the following mills, whose representatives, if present, will please come to the front:

Division I

- Group A—
Rank 2—Spruce Falls Power & Paper Co., Ltd., Kapuskasing, Ontario, Canada.
Rank 3—Hollingsworth & Whitney Co., Waterville, Me.
- Group B—
Rank 2—Canada Power & Paper Co., Laurentide Division, Grand Mere, Quebec.
Rank 3—Mill No. 2, The Champion Coated Paper Co., Hamilton, Ohio.
- Group C—
Rank 2 (Perfect Score)—Cornell Wood Products Co., Cornell, Wis.
Rank 3 (Perfect Score)—Finch Pruyn & Co., Inc., Glens Falls, N. Y.
- Group D—
Rank 2 (Perfect Score)—United States Gypsum Co., Gypsum, O.
Rank 3 (Perfect Score)—United States Gypsum Co., North Kansas City, Mo.
Rank 4 (Perfect Score)—United States Gypsum Co., Oakfield, N. Y.
Rank 5 (Perfect Score)—Hollingsworth & Whitney Co., Madison, Me.
Rank 6 (Perfect Score)—Mill No. 3, The Gardner & Harvey Co., Middletown, Ohio.
Rank 7 (Perfect Score)—Continental Paper & Bag Corp., Ashland, N. H.

Division II

- Rank 2 (Perfect Score)—Container Corp. of America, Huntington, W. Va.
- Rank 3 (Perfect Score)—Container Corp. of America, Cleveland, Ohio.
- Rank 4 (Perfect Score)—Consolidated Water Power & Paper Co., Stevens Point, Wis.

On behalf of the National Safety Council, I take pleasure in presenting these awards with congratulations for the excellent records you have made and best wishes that if your aims are higher your achievements toward reducing accidents in your respective mills might also be greater.

CHAIRMAN PLEASE: I can't refrain from informing you that the Appleton mill of our company, which won the large beautiful bronze trophy, has completed, as of yesterday, 607 days without a lost-time injury, and this is certainly a proud moment. I sincerely hope that next year at this time I can add 365 more days to that record. The interesting part of it is that the Appleton mill is the oldest mill of all our mills, and is considered by everybody as one where people are most apt to get hurt, so it shows what can be done when men really begin to cooperate in the work of safety.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): I have a Coating Division in the paper mill which I have at the present time listed under one heading. My friend, Ken Faist, divides his. I'd like to find out if I can't divide mine. I think I can win a prize.

Mr. Downs: Here is a point I am going to read. I am going to read Division I of the Contest Rules.

"Division I. Pulp and Paper Mills. Those mills having in operation Fourdrinier; cylinder or pulp mill machinery and actually engaged in the manufacture of pulp, paper, container board, strawboard, plaster board, roofing paper, insulating or wall-

board. This is interpreted to mean that a paper or board re-manufacturing plant in connection with or in close proximity to a pulp mill, paper mill, etc., (as defined above) must be included and entered in the registration of the eligible mill.

"Division II. Paper and board re-manufacturing plants. Those plants having in operation equipment for the manufacture of set-up or solid boxes, corrugated and fibre boxes, folding boxes, coating of paper and board, tissue goods and specialties, paper bags and other paper and pulp goods manufacturing. This is interpreted to mean that plants solely engaged in printing paper or board are not eligible."

We have had an awful lot of discussion on the Coating Mill of the Champion Company, and that was the thing that brought it about. The Champion mill was never able to enter their Coating Division heretofore. It was not on the same lot. We found a similar condition in Marinette, Wis. The Victory Bag Company and the Marinette Pulp and Paper Company are in the town of Marinette, Wis. The Victory is in one end of the town and the Marinette is in the other, so widely separated they were not considered in close proximity, so they could not get in. It is sort of a delicate little line in there that we have to draw, but that rule is very specific: "Must be included and entered in the registration of the eligible mill."

Mr. GILSON: I will ask another question. I may not be correct in my recollection, but if I am Mr. Faist's No. 2 and 3 mills are adjacent, strictly adjacent, by a brick wall. Is that right?

KENNETH L. FAIST (Champion Coated Paper Co., Hamilton, Ohio): That is right.

Mr. GILSON: I have twenty feet between my buildings.

Mr. DOWD: You are certainly more entitled to enter them. I will tell you, Mr. Gilson, my belief is that you should have the privilege of entering them separately if you should want to. I should like, of course, the right to have this discussed and considered by the members of the National Safety Council. It is a very delicate situation. There has been a lot of discussion on that in past years.

Mr. FAIST: Before making our entry this year that question came up, and I wrote to George Burns before we entered. He suggested to me that I enter them separately. That is the reason I did. I told him exactly how our outlay was. He told me to enter them separately.

Mr. DOWD: I am sure, as I have said to Mr. Gilson in my original remarks, it is my belief that the spirit of the rule is that you can enter them separately, if you choose, now that we have such a division. I think that is the spirit of the rules.

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Who are the members of the Executive Committee on this contest?

Mr. DOWD: Mr. Murray, Mr. Burns and myself.

Mr. ROSEBUSH: I'd like to make a motion that, inasmuch as this will be the last meeting before another contest takes place, plans and rules for the next contest be considered by the Contest Committee and the question that Mr. Gilson has brought up, also.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): I will second that.

CHAIRMAN PLZAK: You have heard the motion. Is there any discussion? Those in favor signify by raising the right arm. Those opposed, the same.

(Motion was carried.)

W. J. BRENNAN (State Department of Labor and Industry, Augusta, Me.): For the benefit of you who are not familiar with the situation, up to now we have for purposes of record, month by month, listed the mills under key numbers, which seemed to be the most satisfactory way of doing it. The only way the Section knew the outcome was in the published report sometime after the contest expired, but for the six months of the contest period we could only know by key numbers. We could know very little unless we were statisticians, like our friend, Mr. Grant, who by a process of elimination found out.

EARL E. GRANT: Might I ask, Mr. Dowd, if we will receive printed copies of the standings just as we have received in years past?

Mr. DOWD: They are in the mail now. You will receive them at your place of business.

CHAIRMAN PLZAK: Are there any other matters to be presented before we adjourn for our regular afternoon session, which will be held in this room?

W. J. PEACOCK (Northern Paper Mills, Green Bay, Wis.): I'd like to move, Mr. Chairman, that the present Contest Committee with the addition of the Chairman of the Section be continued for next year.

D. C. HUNTER (Oxford Miami Paper Co., West Carrollton, Ohio): I will second that.

CHAIRMAN PLZAK: You have heard the motion. Is there any discussion? If not, all in favor signify by the usual sign. Those opposed, the same.

(Motion was carried.)

KENNETH L. FAIST (Champion Coated Paper Co., Hamilton, Ohio): The committee which was appointed regarding nips met the other morning. Mr. Adams had to leave, but he requests that all members answer promptly when the questionnaire comes to their desk. Mr. Plzak is going to get at this questionnaire, and we want to get some action on it immediately. The only way we can get the data is by answering the questionnaires which are sent to us and send them back as quickly as we can, so we can get the data together and be able to make a report at once.

Incidentally, we have added two members to the committee, Mr. Murray and Mr. Grant, in addition to those appointed by the Chair.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): I would like to offer a motion, inasmuch as our good friend, Mr. Brennan, is leaving the Section as a representative of the Pulp and Paper Industry, and in view of the interest which he has shown and the work he has done, that this Section extend to him an invitation to be present at our future sectional meetings each year.

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): I will second that.

CHAIRMAN PLZAK: A very worthy motion and I know that we will wish to give that approval by a rising vote.

(Motion was carried by a rising vote.)

CHAIRMAN PLZAK: If there are no other matters we will adjourn and immediately go into our afternoon session.

ADJOURNMENT

**Thursday Afternoon Session
October 15, 1931**

**J. J. PLZAK, Chairman
Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.**

The fourth session of the Paper and Pulp Section convened with General Chairman J. J. Plzak presiding.

CHAIRMAN PLZAK: I know that as far as the members of this Section are concerned the next speaker requires no introduction. Mr. Franz H. Rosebush is going to talk to us on sulphite hazards and their remedies.

**Hazards Peculiar to Sulphite Manufacture and
Their Remedies**

**By FRANZ H. ROSEBUSH
Manager, Industrial Relations, Nekoosa Edwards Paper Company,
Port Edwards, Wis.**

I am not going to try to cover all the accident hazards in the sulphite mill this afternoon. But there are a few hazards that we find quite prevalent and I am going to talk on those.

One of the first ones I'd like to discuss with you is in the wood room, caused in handling logs, the long sixteen foot hemlock logs or the short eight foot spruce wood, balsam logs, or whatever you have. There seems to be a tendency in all mills that I know anything about toward a large number of accidents from the falling of logs, dropping of blocks on the feet, etc., and aside from the educational work which you do with your foremen and your men on that, our experience is that one of the chief methods of relief from those accidents is to try to get the men to wear safety shoes. A lot of the men who have such accidents have them not because of any fault of their own, but because perhaps some fellow workman in loading blocks or logs has inadvertently dropped a log on the other fellow's foot.

I know of many paper mills that unload logs with a picaroon, pulling the logs from a car on the deck, where they are taken by conveyer into the wood room. A large number of foot injuries are a source of annoyance, and I think you will find they are injuries recurring at intervals. It seems as though you can get them all stamped out and everybody educated to the fact that they must not drop things on their feet, and then in a few weeks or months along comes another epidemic of foot injuries. There are a number of good safety shoes which will go a long way in preventing such accidents.

Then I think another remedy is to keep everlastingly at your foremen, so that they are out on that log deck, telling those fellows, "Now boys, watch out for your feet."

That picaroon is another dangerous implement. Occasionally, their points, through incautious handling, get into other fellows' heads or into their toes. That simply means that you have got to insist upon your educational program, so that the men will know how to handle a picaroon. It is not a plaything. It is used throughout the wood room in a good many operations, and I know of no other way than continually educating the men, posting notices, giving talks about handling the picaroon, etc.

The safety man can do some of that but it is mainly up to the foreman in insisting upon how the men shall use their tools.

There is one other operation in the wood room that is a rather dangerous one. That is the use of the hand splitter. My suggestion is that when you find good men to work on a hand splitter, keep them on that, because with experience men can do that work

without any serious dangers. Our wood room operated for over a year without any accidents at all to any of the men in that department.

Leaving the wood room, perhaps the most potential hazard we have in the sulphite mill is in the digester or cooking department. The use of brass pipe is recommended for steam lines entering the digester building, as brass gives warning by leaking rather than by blowing up.

The pop valves should be on all digesters and should be regularly tested. Right here the question comes up, are pop valves safe? Well, they are safe if they are safe. A pop valve is an instrument that has to be watched very carefully, because it is either inclined to leak or inclined to get stuck, and then it is no good at all.

I rather imagine, too, that some of you safety men go to your digesters and ask your cooks, "Are your pop valves in good condition?" and I also suspect that if you press them for an answer you will find that they are not in as good condition as you may think they are. In fact, I am rather inclined to think that the cooks themselves depend more upon their charts for protection than they do upon their pop valves.

The steam regulator, of course, should be in good shape.

Relief lines should be constantly watched from the acid tanks to the digesters. Leaks in lines laid in sewers often cause much disturbance, as men are subject to ill effects from an overdose of gas.

We had an experience where some of our lines went under or near the fire hole and were laid in the sewer through the floor. They started leaking and caused a big disturbance. In the power department a number of men were temporarily disabled due to the large escape of gas.

Attention should, of course, be given to blow-off pipes. The practice of drilling holes three-eighths of an inch deep in the base of the blow-off pipe is common. As the pipe wears due to friction these holes show up and give you some warning as to thickness or thinness of the shell of the pipe.

When the digester is under cook the doors of the packing valves should be left off. Sometimes water backs up from the blow pit and there will be bursting and blowing off.

Special care should always be used in packing this valve.

Before the digester is blown there are several very important things that ought to be taken care of. Some one should make a thorough inspection of the blow pit itself and see that conditions are right for the stock to be blown. It should have been properly drained, no water left in there, and the doors properly taken care of. All persons in or around the blow pit should be warned to be away.

The warnings in the digester room itself should be permanent and arbitrary. By that I mean that there should be no question as to their being in working order and working while the digester is being blown. It is a pretty good plan to have either a gong or red light or both in the digester room, in addition to warnings by the cook or his helper, whoever is down in the digester room, to see that every one is out of the building before the digester is blown, and that the gong preferably is ringing throughout the entire time of the blow of the digester. Some mills are so stringent in their orders that any one remaining in the digester room during a blow, that is, on the bottom floor or wherever there is danger, is subject to dismissal for such infringement of rules.

The best practice is to have the blow-off valve stems and wheels extended so that they are in another room, so the digesters can be blown from some other room than the digester room, because there is no telling when a packing will blow out and a man be injured.

A brass lining in the throat of the digester prevents blowing of the packing and also prevents leaking.

There should be plenty of gas masks in the digester building, and if there is an elevator in the building I think that the elevator itself should be equipped with a gas mask. These masks ought to be inspected regularly, as perhaps you well know. Sulphurous acid fumes are destructive to gas masks, whether made of rubber or rubber

and canvas, and they become stiff by remaining in contact with the fumes and dampness, and at times when they are called upon they don't always fit closely.

There should be plenty of exits from the filling floor of the digester.

Now, a word in regard to gas masks in and around the sulphite plant other than the digester room. In a case where it is necessary for some one to enter storage tanks a good deal of care should be observed in using gas masks. A gas mask is no good where there is no oxygen, and if any one enters the tank for purposes of inspection or repairs, a good deal of care should be taken to see that there is ventilation there, or that it has been open long enough so that the fumes have passed off, because there is a very great danger of a man going down into the bottom of the storage tank and starting to work, with a lack of oxygen.

Of course, it goes without saying that there should always be a helper around with a rope fastened to the man when he enters the storage tank for such purposes.

Another thing, the inside of a gas mask sometimes becomes so hot, not only in a storage tank but in other places, that they are absolutely no good. A man will tear it from his face to get oxygen, so even though you have gas masks you have to teach the men how to use those gas masks, otherwise, they are just as great a danger as though you had none.

I think the use of ropes and other protection is common in the chip bin. I will not go into that in detail.

The sulphur-burning room is not considered very dangerous. Perhaps the greatest danger in the sulphur-burning room comes from sulphur dust. There have been occasions when the dust has exploded, causing serious injury. That does not occur very often, but it is well to watch and see that your sulphur-burning rooms don't become overlaid with sulphur dust.

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): You made mention of the fact that you had a chipper you had kept on one job for over one year. You said if you found a good chipper to keep him on the job?

MR. ROSEBUSH: Hand splitter man, yes.

MR. GRANT: I just wondered about promotion on that job to the next one. Would you rather keep a man on that just to buck that?

MR. ROSEBUSH: Our hand splitter men are paid as high as any other jobs in the wood room. These jobs are on a parity with any other jobs in the wood room, so that advancement for that man would probably take him out of that department—those men and the men who feed the chippers.

MR. GRANT: It is a skilled job in that department?

MR. ROSEBUSH: Yes, and he is paid as much as the big splitter man.

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): I'd like to ask you about gas masks. Are you speaking about these canisters? They are marked for a certain percentage. I believe they will stand up to two and three per cent. Have you had any success or any trouble with the man as he goes in the digester room wearing this mask, with that canister?

MR. ROSEBUSH: No, we have not. We use the canisters entirely. The canisters are supposed to protect against smoke and sulphurous acid gas.

MR. HASTINGS: Is not that to a certain percentage? I believe they are marked, are they not?

MR. ROSEBUSH: Yes, they are all marked.

MR. HASTINGS: I had the experience of having a man go in the bleach department and he almost died with this mask on. It was marked to a certain percentage but we have no way of knowing or controlling it when there is a leak. So I found from experience this fellow was really taking a chance in wearing this canister in case of a leak or in sending him down into a tank if he did not know the percentage of the leak. So I had these canisters or gas masks removed from the mills. I have had more success using a fresh air device, pumping air with a one hundred foot hose. We would not let any man go in any leak or any tank without it. There is a man on this fresh air device pumping the air to the man in the tank, and any leak or any chlorine leak or

any digester room leak is very unsafe with the other mask. I know for a fact that these canisters, especially with chlorine gas entering in, mean taking a chance of gas leaking into the protector.

MR. ROSEBUSH: We don't use the mask around chlorine gas very much, and we are very careful about using the mask inside of tanks. You are referring to storage tanks. I think the pump is much better there and much safer. It would be very questionable policy to allow a man to go into a tank with a canister gas mask on unless you were quite sure of conditions there. In fact, I think the gas mask has to have a very careful inspection as to where it is used and as to what tests it is subjected.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): There may be some confusion as to what you mean by a hand splitter. You mean a man operates the log by hand but it is a power splitter, don't you?

MR. ROSEBUSH: It is a power splitter.

MR. GLEASON: That is the point I wanted to bring out. Another thing in connection with the digester, when we blow a digester we put on the outside of the blow pit doors, on both sides: "Danger—Blowing Digester," so that a man will not be tempted to open the door at that time. We don't prohibit the man from being in the room. We have seven digesters in one room and it is not possible to always have all the men out of that room, but we use that sign on the blow pit door of that digester that is being blown.

MR. ROSEBUSH: May I ask, Walter, are your men allowed around the base of the digester when it is being blown?

MR. GLEASON: No, but sometimes they pass through that room into the other room. Of course, it is away from the blow-off pipe. We have the remote control digester valve and, of course, open them from another room.

CHAIRMAN PLAZA: That matter of remote control is of interest, and I know that Franz can answer that question. Remote control of blowing the digester is very important. Let me tell you about our first fatality in my work five years ago in the digester room. We thought we had remote control. We did, but most unfortunately, we had the remote control wheel situated directly below the blow-off pipe of the digester that was being blown, and directly in front of the blow pit—we have the elevated type of blow pits. The man opened the wheel and the investigation of the accident showed that the digester stuck, as they do sometimes, and suddenly released and when it did the force was so tremendous that it blew off the top of the pipe off the last elbow just before it reached the blow pit. Of course, the hot stock fell and the man was scalded so severely that he later died.

We immediately corrected that condition and today all of our remote control wheels are controlled from another blow pit besides the one that the stock is being blown into. That is something that some of you may wish to look into.

We further did this: we constructed our blow pipes so that every elbow pipe has a thickness of three inches on all bearing surfaces, where the stock will impinge as it goes around the corner. The other thickness is two inches. We find it is far more economical that way because the pipe lasts three times as long.

We have also a system of ringing bells and lights. However, we carry it further. We make it necessary that everybody be out of the blow pit and digester room, the particular room where the blowing is going on, and any one caught in that room is subject to immediate dismissal.

E. D. KOPPELMYER (Illinois Manufacturers Mutual Casualty Assn., Chicago, Ill.): I should like to ask the speaker what means of inspection he uses to see that various items that he has referred to are carried out? How do you know that all of these conditions that you have asked for are being complied with?

MR. ROSEBUSH: My answer to that is that I check them up myself.

MR. KOPPELMYER: How frequently?

MR. ROSEBUSH: I make a regular inspection once a week. Aside from that I make a housekeeping inspection, and I try to do that every day, but sometimes office work interferes, but at least two or three times a week I try to make every department and

go over these things. That is, with me it is a daily task, but it is sometimes interfered with. It is, however, a part of my work to go through all of the departments all the time, and there is no set time on it because I try to be in there every day. Some days I will skip one department. The next day I make that department. When I go into the digester building I always ride in the elevator to take a look at that gas mask and see what shape it is in, and also in the digester rooms I look them over to see that they are in good shape. It is just a continuous regular job.

Mr. KOPPELMAYER: I wonder how you carry out the requirements that you have made, particularly with reference to instruction of employees, etc., how you get this out to the man who is actually liable to be hurt?

Mr. ROSENUSH: We have what every one else has in our organization. We have a monthly meeting of the heads of departments, superintendents, safety department, who gather together and go over all the accidents of the month, the causes of those accidents, reasons for those accidents, and suggestions are made by the Workmen's Committee and turned in at that time, and they are then discussed. Suggestions as to safe practices, guarding, and other things are gone over with our Central Safety Committee. Things that are considered impractical or that have to be put off are checked and the others are complied with.

Then we carry out the suggestions made by the Workmen's Committee as to guards, and also suggestions made by the Safety Inspector. There are men who do nothing else but guard work, and when the workmen's report comes in or the Safety Inspector's report comes in, a copy of that goes to the superintendent, to the general manager and to the millwright who is in charge of the safety work, and it is his duty to see that those instructions and those recommendations are carried out at once. In fact, he is supposed to get right at those and take care of them, so by the time the next meeting of the Central Safety Committee rolls around the Safety Inspector can report that all the recommendations of the last month have been complied with.

Now, of course, your superintendents and your heads of departments are all represented in your Central Safety meeting. They go back to the plant and carry out the suggestions made in that meeting. If minutes are kept and at the next meeting they have not been carried out they come up again, so in our plant it has gotten to be a matter of cooperation. They expect to do that just the same as they expect to carry out orders made by the production manager or mill manager. When the Safety Department says, "Here is something that we have discussed and agreed upon," it is done. The superintendent passes it on to the master mechanic, and it is understood that this safety man under the master mechanic is to take care of safety work first, so that the safety department has no chance for complaint on that score. We handle it in that manner.

Mr. KOPPELMAYER: I am very grateful to you for that. I will tell you why I asked it. I am looking for ammunition. We have a number of paper plants. They tell us the men work twelve hours a day and have to be in constant attendance at the machines, and that the foremen have to be in constant attendance. They cannot leave the machines during the day. When they do finish their work they are too tired to consider anything else, and in trying to get them together they say it can't be done. I am anxious to have information that other people are doing that. If there are concerns that are handling their safety work in view of those conditions I am anxious to know how they do it, and what they do, so I can go back to these people and tell them they are all wet, and it can be done.

Mr. ROSENUSH: There are a dozen safety men here doing exactly what I have outlined to you.

W. J. BRENNAN (State Department of Labor and Industry, Augusta, Me.): I might add that it is a customary thing in that event to insist on their presence, and to call the next shift an hour early and retain the old shift on pay, so that they come under pay, and therefore have to be present.

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): We made a ruling that our men were called in off the job. Our committee is made up entirely of the

workers. There are no foremen present at all. The men are allowed to smoke and the meeting lasts an hour or two hours. We find we get cooperation in that way.

CHAIRMAN PLZAK: "Should all men in the digester room and acid plant have their individual gas masks?"

Mr. ROSENUSH: I think, by all means, if the management will allow the expenditure for gas masks for every man, that should be done. It is just as essential for him to have an individual gas mask as it is for him to have an individual drinking cup.

CHAIRMAN PLZAK: I suppose the other alternative would be to have proper sterilization of the masks you use?

Mr. ROSENUSH: Yes.

CHAIRMAN PLZAK: The second question: "When a man is gassed enough to cause him to cough and vomit, is there anything that could be kept in the mill which would remove the tickling sensation from his throat and so stop the coughing?"

Mr. ROSENUSH: Mr. Chairman, I know of nothing. Sulphurous acid gas is simply an irritant and when the irritation is removed the coughing stops. I know of no specific cases where the gas has ever caused any permanent disability or injury. I have seen men retch because of the effects of the gas, but if the irritation is removed the coughing generally stops.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): In severe cases fresh milk is one of the best things you can give, especially on chlorine fumes.

CHAIRMAN PLZAK: We have a formula which was made up by a doctor at our Appleton mill, where we have quite a bit of sulphite gas, and if any of you gentlemen wish that formula I will be glad to send it to you. I will have to have the doctor send it to you. It is a regular prescription and I have no authority to write it out.

S. K. SMITH (International Paper and Paper Co. of Newfoundland, Corner Brook, Newfoundland): Thank you. I might say that Mr. Adams of New York also had a prescription to stop that coughing and tickling in the throat.

CHAIRMAN PLZAK: If any one else wants that I will be glad to send it out.

ARTHUR E. WINSLOW (Hollingsworth & Whitney Co., Waterville, Me.): In our digester building the common practice is the use of butter.

CHAIRMAN PLZAK: Just how do they use it? Please tell the Section.

Mr. WINSLOW: Just keep a small amount of butter in the mouth the way one would keep tobacco or snuff. Simply let it dissolve slowly.

CHAIRMAN PLZAK: Very good thoughts are being brought out on these questions, things that some of us were not familiar with. Has any one anything to add to that question?

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): On chlorine gas we have used bromo seltzer. That is a fact, bromo seltzer for chlorine gas.

CHAIRMAN PLZAK: The third question: "Should elevator and stairs in digester house be completely partitioned off from the rest of the building?"

Mr. ROSENUSH: Well, Mr. Chairman, I don't know that I am competent to answer that. Ours are not. The stairs are in one corner of the building and the elevator is in the other corner. The stairs are often used to inspect the digester. They pass close to the digester in some plants, and half way up there are bridges in many plants from which they inspect the outside of the shell and keep it painted. I can't think of any reason why the stairs should be separated if there is plenty of air in the digester building.

CHAIRMAN PLZAK: Does any one else wish to add to that?

Mr. SMITH: In case of the escape of gas, oftentimes the elevator will get stuck. I know that happened in our mill. The men get caught between the floors and they are in a pretty bad situation. I think it would be a good thing to have our elevators protected in that case.

Mr. GLEASON: The superintendent and I were caught in the building one time when the gas was escaping badly. We have all outside windows. It was necessary for us to kick out three or four panes of glass. Our elevators are not enclosed, and neither are our stairs.

MR. BRENNAN: I wonder how many use outside escapes, escapes on the outside of the building? One of the common things—not common, really, because there are not many sulphite accidents, anyway—is blowing out of a gasket in the head or rupturing of a blow valve. I know of one case where the men were trapped on the cooking floor and could not get down either exit because of the boiling stock, steam and hot water. The lower part of the building was cut off and they were slowly suffocating. In anticipation of that condition I think my old company did their most noble bit of preventive work when they put an outside escape on the building or something in lieu thereof, an escape to the roof of another building. We had to build an iron fire escape for fear our men would be trapped on the cooking floor.

MR. ROSEBUSH: I think I mentioned in my notes—I don't think I mentioned it in my talk—that at the filling floor there should be plenty of exits. If these exits are not built to reach the ground, at least there can be platforms built outside, so the men can get out and get the advantage of the outer air and be away from danger.

I think in answer to the question about inside stairs, if inside stairs were the only avenue of escape I'd say there certainly should be other means provided to give the men relief. I remember being trapped one time in an old digester building. I had to go from the filling floor to the basement and out the door holding my breath, and that was some run.

CHAIRMAN PLZAK: Our digester department with a battery of five digesters is so fixed that there is an exit in each direction, East, West, North and South, with two inside exits and three outside exits. We carry it a little further by putting a gas mask at each of the four exits, so when the men do get out one man can come back and take care of whatever calamity has occurred or take care of somebody that has fallen inside.

We have warned our men during the blowing of a digester they must not use the elevator, because it is very likely that the elevator current might be shut off and a man might be caught midway in the shaft and have no avenue of escape from the elevator shaft. We carry two gas masks on all of the elevators because very frequently you have two men riding the elevator.

MR. G. HOYMAN (Kimberly-Clark Corporation, Neenah, Wis.): I don't believe Mr. Rosebush said anything about the precautions they take in the chip bin. What precaution do you take in your chip bin?

MR. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): We have safety valves in all of our chip bins, and the men are instructed to use them. There are also ladders in the chip bins, but we have rather gotten away from the practice of sending men into the chip bins for disturbing the chips when they are filling the digesters. Of course, it is common to use blow pressure steam to start the chips out, but in case they do have to go in there we have both the ladder and the safety valve, and in some of the chip bins there are vertical rods, so that the men can get hold of them.

This article in the Code where it says that there should be an opening over the throat of the spout entering the digester is, perhaps, a little out of line, because it is almost impossible to put a guard over the throat of the digester which will allow the chips to fill the digester as fast as they ought to and still keep a man from going through there. We discussed that last year and rather threw that out.

MR. HOYMAN: Do you permit one man to go in alone?

MR. ROSEBUSH: Yes, we do.

MR. GLEASON: It also depends on the size of the opening. We have a brass bar across the middle of the opening, so that it would be practically an impossibility for a man to go down into the digester. We also have a standing order that our chip bin attendant must be on duty at the digester that is being filled, so that in case the man who is down there loosening chips should be in trouble, he can give warning and the attendant can get him out.

MR. ROSEBUSH: I think Mr. Gleason's point is all right. I will just read the item from the Safety Code, No. 410, Rule 500-C: "A grating with a mesh not larger in

size than eight by eight inches, too small to allow a man to fall through, should be installed at the outlet of the chip bin." When that was discussed a year ago the members of the Section found fault with it because they said it did not allow chips to pass through readily enough.

CHAIRMAN PLZAK: There is one more question on this subject. "When sluicing blow pits, what precautions should be taken to avoid a man slipping and falling through the open hatch?"

MR. ROSEBUSH: Our blow pits are built with the platforms outside and with the base of the opening probably twenty-eight to thirty-six inches above the floor, so that there is really no possibility of a man slipping in. Where they are washed out from the top and the hole is in the center I would recommend that either the sides be built up permanently, or that there should be railings placed there that they have to work through.

CHAIRMAN PLZAK: We have the form of blow pit where the opening is level with the top of the blow pit. We have a screen grating that fits over the blow pit opening. There is a rod across there and a special nozzle, swivel nozzle with a handle on it, has been built into which the hose can be attached. Then when the blow pit is ready to be washed or the stock is being washed down that grating is placed over the blow pit and the operator who is doing the washing merely takes his handle and revolves it any way he wants to. It is easier to control that big hose and he can get to every point of that blow pit without any trouble. If any one is interested in that I will be very glad to send out prints and specifications on that type of grating and cover. You can just change it to fit your own conditions.

The next speaker also requires no introduction in so far as this Section is concerned. I have known him for many years and have enjoyed his friendship and the assistance that he has given me in my work. Mr. M. G. Hoyman will now talk to us.

The Difference Between Carelessness and Unsafe Practices

By M. G. HOYMAN

Main Office Service Unit Director, Kimberly-Clark Corporation, Neenah, Wis.

To me there is a world of difference between "carelessness" and "unsafe practice," and it won't be long now until the word "carelessness" can be eliminated entirely from the vocabulary of most paper mill men.

Before I go any further, let me state most emphatically that the term "carelessness" has been applied altogether too frequently to mishaps of various kinds and in a great many instances has been used to cover up a lack of understanding of the real cause of accidents by those in authority.

What I am going to say in this brief talk will be based on observations covering a period of some twenty-five years; fourteen of which have been devoted almost exclusively to safety work, two years with the Bureau of Mines and twelve years with the paper company I now represent. I mention this only to show that my conclusions were not reached over night, but, on the contrary, are from experience on both the levels of workman and that of management, and over a considerable period of time.

In my experience as a workman doing various jobs, from that of shoveling to running and operating complicated machinery, I have seen death, through accidents, come and snatch away precious lives of comrades and friends. I have seen men carried away to hospitals, perhaps never to do a good day's work again, pretty much as you throw a discarded machine on the scrap pile; and of what were these men guilty that they and theirs should be punished so severely? Just this, my friends, doing what they were told to do as laid out by supervisors and the higher levels of management. If carelessness is the proper word to explain many accidents, then in heaven's name let's apply the term to the proper parties; it may not, and

probably does not, apply to the poor devil in the hospital who was doing what he was told to do and in the only way he was trained to do it.

Since the beginning of time so-called dumb animals have been endowed with a fairly well developed instinct of self preservation. They have no soul, no thinking brain, and yet very few animals die of drinking poisonous liquor, but perhaps this analogy has no bearing on the subject at hand.

Take our early settlers, with no one to depend upon but themselves, no safeguards, and no one to say "don't do this" or "be careful of that," surrounded by hostile Indians, doctors unheard of; is it not strange that any survived, that we have progressed and multiplied to the extent we have?

While the dictionary may not say so, to me the term "carelessness" implies a lack of interest in safety, even to the extent of ignoring safety rules and safeguards, and deliberately taking chances with full knowledge of the possible consequences. My association with thousands of men has convinced me that *men do not want to get hurt*, and that, given the proper training and supervision, they will get hurt infrequently.

You may well ask, if it is not carelessness that is responsible for accidents, what is wrong? Some say that they or he is unlucky, but, in spite of the fact I once had an auto accident just after a black cat had run in front of the machine, I am no believer in luck, good or bad. Somebody once said that bad luck is the excuse of the slothful and good luck the accrued interest of the diligent. Luck may determine the severity of the accident, but it's not luck that says whether or not we have one at all.

Another phrase frequently used to explain how some mishap occurred is, "it was an unavoidable or unpreventable accident, just could not be foreseen."

I recall visiting one of our mills not so long ago and an accident happened while I was there. I sat in and listened to our personnel superintendent and the maintenance superintendent discuss the accident and probable cause. Here was the situation in so far as relating to this particular incident.

The mill was to be down on a Saturday and the maintenance crew had some machinery to move that would require the help of some additional men. The maintenance superintendent asked the personnel superintendent to secure several men from among those who were to be off duty to aid his crew. This was done and while unloading a heavy casting weighing several hundred pounds from a hand truck by the use of a chain hoist, one of the helpers was severely injured by having the casting drop on his hand from a height of several inches. The casting was a jordan head and in lowering it to the floor after hoisting from the truck, the injured man attempted to guide the casting by taking hold of the edge. About that time the casting slipped on the cement floor, dropped about six inches and the sharp edge caught one hand, lacerating it very badly.

The personnel superintendent and the maintenance superintendent arrived at the conclusion that it was one of those unpreventable accidents, unfortunate but hard to prevent. They then asked me what I thought about it, and here is where I disagreed with their common conclusion.

I asked the personnel superintendent if, when requested to get these men, he knew what the work was they were expected to perform. He said he did. I then asked him if, as the responsible head for the safety movement in that mill, it would have been outside his common duty to have called the maintenance superintendent's attention to the fact that here were men green at moving machinery, and advise him to warn his experienced men to watch out for them. He agreed that he might well have done so.

I then asked the maintenance superintendent if he also, knowing the men and the work to be done, could not have warned his foreman and head millwright to watch the new men so they might work safely, and furthermore, if my suggestion was not the logical thing to do. He likewise agreed that my proposal was within the

bounds of reason and what might have been expected from a good, safety-thinking superintendent. That being true then, I asked them, "Do you still maintain that this was an unpreventable accident?" They had to admit that such was not the case.

In the case of this accident, it was brought out that an experienced millwright would not put his hands under a descending weight as described. Nevertheless, an experienced man was operating the chain hoist and if he had been cautioned to watch the green man he would and could have prevented the accident.

Although the cause of this accident was termed by some as "carelessness" on the part of the injured man, I do not agree. No one other than those familiar with the work would realize that a round plate being lowered with the chain fastened to one edge would, after reaching the floor, start tipping to one side, and when lowered to a certain angle, the point striking the floor first would slip to one side, suddenly dropping and bringing the other edge closer to the floor by several inches. The point I wish to make is that the accident described was neither carelessness on the part of the injured nor was it unpreventable, because reasonable forethought by those in authority should have prevented it.

I now come to what I have been campaigning against for some time, and what I hold responsible for the larger percentage of accidents, namely: "Unsafe Practices," brought about by habit, poor training, ignorance, reluctance to change or progress.

Take habit as one of the great stumbling blocks. It has been well said we are creatures of habit. We eat, sleep and live by habit, doing and repeating many operations without giving them a thought.

You, without a doubt, always put your coat on the same way each morning and always slip the same shoe on first. You disengage the clutch, apply the brakes, shift, in fact perform all the operations necessary to drive your car through dense traffic, and at the same time talk to a friend, view the scenery, answer the back seat driver, all without giving particular thought to driving. Now this is all very fine. Standard practice is most necessary in modern production always, providing it's the right and safe practice we are pursuing. What a fine thing habit is when we are faced with an emergency, such as a car darting out from a side road in front of us, if we don't find it necessary to ponder and scratch our head wondering what to do in such a case. Almost instantly we apply the brakes, even before we have time to think. Habits we have cultivated in times when no emergency existed come to our aid and we instinctively do something, as, in the case mentioned, apply the brakes. If our practice has been right we have, through cultivation of a safe practice, avoided a bad accident.

Take the other side of the picture, the driver of the car that darted in front of you, is he a careless driver? Not necessarily. If you could have watched this driver over a period of time you would have noticed a gradual slackening of the necessary precautions, so that in time it became a habit to disregard arterials and the rights of others to a fair share of the highways. A habit thus acquired because of negligence or indifference will, of course, eventually get one into difficulties. This gradual and more or less deliberate type of chance-taking might well be termed "carelessness." But safe habits are as easily cultivated as unsafe and much more profitable. It is my contention that the substituting of safe habits for unsafe practices not only constitutes our present big safety problem, but is the explanation for the success of most big safety runs achieved in the past.

Take the phenomenal record of the Remington-Rand Company, of Syracuse, New York. With many other industries this company entered a safety contest sponsored by Associated Industries of that State, back in 1929, and so far as I know is going yet with over 4,000,000 safe man-hours worked—a very remarkable record.

The point I wish to make is contained in the explanation for this splendid record by Gordon H. Sterling, superintendent of the record-breaking plant, when he said, "Safety has become a habit with Remington employees." In that statement he sums up not only the answer to accident prevention work, but the direction in which their

efforts have been applied, namely: the detection of unsafe practices, their elimination, and the substitution of safe methods, with follow-up and training until the new and safe way becomes a habit.

I believe we are pretty well agreed as to what constitutes carelessness, but are we so close in the matter of unsafe practices? First, let's dissect this term and see what we have.

"Unsafe" means dangerous, potential accident, the direct opposite of "safe," which means free from danger. Therefore, "unsafe" would seem to indicate that safety thinkers and boosters would not be caught doing anything unsafe. Before we agree to this latter proposition, let's take the word "practice" and see if it does not, when attached to unsafe, give the former a modified meaning at least.

We hear a great deal these days about standard practice, or the proper way of getting repeat actions by setting down in writing the best methods of operating. Now "practice" as we use it and the dictionary defines it, is the most commonly used method of doing certain things, repeating it over and over again.

The next question is, how do men acquire unsafe practices or methods of operating? Three avenues are open by which men may learn how to do the work assigned in a paper mill, as follows:

1. By a course of training and instruction given by experienced operators.
2. By observation of others doing the same or similar work.
3. By experimenting more or less with no help, until a certain degree of proficiency is acquired.

Obviously, then, the third or last named method is the only one that the new man might be held accountable for if his method or practice is unsafe. Likewise, it is obvious that few, if any, plants take the third, or trial and error method of training men in this day and age. Methods of taking the paper over the reels or through the driers or calender stacks are handed down from one generation of papermakers to another, and if the practice is unsafe can you say just who is at fault or that carelessness is the cause when an accident occurs?

I maintain that most men doing almost any part of the daily grind are unconscious of the hazard connected with it until something happens. How frequently have I heard somebody say, "we have always worked that way and nothing ever happened before." Yet, when you investigate in the light of an accident, we say he or they should have known better, or "anyone could see an accident was bound to happen sooner or later." But, my friends, it would have been far easier for an observer, who not only should have safety in mind but who is charged with that responsibility, to have discovered the unsafe practice before the accident happened than for the person actually performing the work. I am speaking of the responsibility for safety attaching to the position of foreman, superintendent, safety engineer and personnel man, who, being able to stand back and view the various operations from and with a different perspective than the operator, should discover and eliminate most unsafe practices before the inevitable accident occurs.

Here I come back to my original contention: most men do not want to get hurt; most men do their work in the only way they know how and have been trained to do it. Can you say it is carelessness when a man pinches his fingers in the calender stack if he saw his predecessor put it through by using his fingers instead of a paddle or doubled-up fist? Do you think it sufficient to attempt to break years of training and habit by telling a man once, or even twice, to change a habit and do his work differently, failing to realize that you cannot shift gears the opposite to what you have been accustomed to by one telling or six?

I tell you it takes more than good intentions to change a habit. It takes time and concentration by those who have plenty of one and the ability to do the other, and you should place the blame, if any, on those who failed to foresee, to anticipate, or to discover the unsafe practices before the accident occurred. If you are honest

about it, the word "carelessness" will soon become dim and tarnished for want of honest and intelligent application.

That you and many not represented here today have recognized the fundamental causes of accidents and have taken steps to correct them is evidenced by the steadily decreasing number of mishaps in the more progressive companies. Unsafe practices are being discovered, tagged and eliminated daily by substituting safe methods for unsafe, forethought for afterthought, and honest effort instead of passing the buck by accusing the injured of carelessness.

I believe these annual contests to be of considerable value in stimulating constructive thought, and in the final analysis thought, and still more thought, must be given to the elimination of unsafe practices if we are to progress beyond the point of simply reducing the larger proportion of our accidents.

Now then, as a concluding word, let me repeat, "carelessness" will always remain as the answer to a few accidents, but mark I said few. Most men do not want to get hurt; most men are doing their work just as they have been taught or trained to do it; most men have ordinary intelligence, therefore the conscientious endeavor of spirited men moved by a sincere desire to eliminate preventable accidents, to reduce the suffering and increase the productivity of fellow human beings, will bring us all closer together in a fellowship of common interest; and unsafe practices will be placed on the shelf, where carelessness has been for quite some time. Then you will have achieved that most desirable status of "NO ACCIDENTS THIS YEAR!"

Discussion

CHAIRMAN PLZAK: A very excellent paper. Are there any questions you would like to ask Mr. Hoyman relative to the subject presented?

FRANZ H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Mr. Chairman, I think that Mr. Hoyman has answered the question that the National Safety Council has been asking for quite some time, and others, too. They have said that the slogan "Safety First" has rather served its purpose, and we are looking for something else. His paper has given the answer to that, because what he has said in effect is "Safety Preparedness." It bears out what our Chairman said this morning. I thought it was a very specific and earnest way of putting the question when he said that it is not a difficult proposition to analyze an accident after it has happened, but it is a far more intricate and difficult proposition to make an analysis of an accident, a possible accident, so it won't happen.

E. D. KOPPELMYER (Illinois Manufacturers Mutual Casualty Assn., Chicago, Ill.): This subject of carelessness and unsafe practices is one that needs a great deal of attention. If the gentlemen could see the number of accident reports that we get where the reason or cause of the accident is carelessness, they would understand how much carelessness there is. But I believe, as the National Safety Council believes, that there is no such thing as carelessness, and I hope some day that we will all realize that and get at the real cause of these accidents.

I want to cite an example of an accident we had, not in the paper industry, but it illustrates the point; it does not make much difference which industry it is when you are taking in the various industries because the same idea carries out in all.

We had a mill where the men were having trouble hitting their fingers with the hammer while driving nails. Ordinarily, when a man hits his finger with a hammer while driving a nail we call it carelessness. After we had enough of those accidents we investigated as we knew something was wrong; we investigated and found that this packing department was on the first floor with windows on the side wall, and right across from the packing department was a doorway where a lot of young ladies went to work, and they passed this place where they could readily be seen by the packers. We found by frosting those windows we got away from a lot of these careless accidents.

CHAIRMAN PLZAK: A mighty good point.

H. C. HANSEN (Hummel & Downing, Milwaukee, Wis.): This paper that has just been read brought to my mind the meeting that I attended up in Wisconsin Rapids, the Regional Conference, sometime ago, where the man from an Insurance Company told me that there is no such thing as carelessness. He said you could not have that when you were dealing with insurance companies. At that time I very much disagreed with him, because we were having quite a few accidents at our plant, and every one of them looked like carelessness on the part of the employee.

Just recently we had an accident. A man cut off two fingers and a thumb on a Seybold cutter. He had been a foreman in that department for sixteen years, working around that same machine or others like it. The superintendent of that department and the head millwright, in fact, all the superintendents of the plant, were called together, and the answer given by these men was that it was just another case of carelessness or thoughtlessness on the man's part.

That answer stood for about a week, or even two weeks. Then the superintendent of that department came through with a statement that this foreman had taken it upon himself to help cut these sheets because it was a very much rushed order, and they were doing everything to rush it out, and the foreman of this department, being more capable of operating faster than the other men, due to the fact that he had been around those machines so long, was making moves that were not according to Hoyle, by holding the machine lever in with one hand and trying to pull the stock around for the other cut with the free hand.

After we got all through with that investigation, after two weeks or so, it was shown where the supervision was to blame for this accident and not the man or a careless habit.

CHAIRMAN PLZAK: Are there any other comments relative to Seybold cutters? Mr. Rosebush or anybody else making book papers could certainly enlighten you on the type of precaution that must be taken. They have the two manual cutters, where both hands are necessary to engage a switch before the knife falls. Were they using those at that time?

MR. HANSEN: Yes, but after they once start the knife downward one or both hands can be removed and the knife will go down or come up again without holding the hands in the same position.

CHAIRMAN PLZAK: Was it then he removed his hands?

How the Accident Happened

MR. HANSEN: It was after the first trip. He moved his hands but the two or three bottom sheets would not cut, due to the fact that the stick underneath was somewhat worn, and on the heavy paper we cut a new stick must be put in there or the stick turned around about every hour, in order to get a cutter edge. Rather than do that they will let the knife come down the second time and then it will cut the two or three bottom sheets. He cut forty-eight inch sheets into twenty-four inch sheets. The twenty-four inch sheets were still in front when he tried to pull them in front. He pulled them around and when he put his hand over them he got it too far and it came underneath the knife. You can stand there, after you have once pulled the lever over and tipped it forward, and hold it with one hand and it will go down fifty times or as long as you keep your hand on the lever. The other hand can be free to do as you see fit. I have never been able to see a better method.

CHAIRMAN PLZAK: I believe your machine safety guard is much different, is it not?

MR. ROSEBUSH: I am not sure about holding that lever. Our cutters are equipped for two operators and all four hands must be engaged when the operation starts. That is new to me. I did not suppose that by holding the lever, that rod lever, in place that a machine would repeat.

MR. HANSEN: It will keep on repeating as long as you hold it in position.

WALTER A. GLEASON (Hammermill Paper Co., Erie, Pa.): It should not. There is a lock that should apply on those.

MR. HANSEN: Just answering Mr. Gleason's question, we have been in touch with the Seybold Company ever since the accident. They have given us a blue print of the very same device that we have on their old machine, and it can be handled in this very same way, tripping it with both hands and removing one or both hands the minute you have thrown it into operation, so that it would not be any safer than the apparatus we now have on there, and that is the best that they can do for us, even on their new machine, unless it is a real small machine that cuts less than sixty-four inches. Then they have a device so that you have to hold one hand on the side and turn a lever partly around, and the other hand is over on the other side throwing in another lever. But that is on the small machine and we have no use for the small machine.

CHAIRMAN PLZAK: It seems to me—Mr. Gleason, you might be able to bear me out in this—that after you have operated manually with your hands, when the knife returns up it automatically brings back that lever to a starting position, so that man's hands would move back and he'd really have to start all over again.

MR. GLEASON: The interlock throws it back.

CHAIRMAN PLZAK: I am quite certain the interlock throws it back.

MR. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Mr. John Lundrigan has a locking device which they have put on their Seybold cutters that a man has to hold down until the operation is completed. There is no possibility of taking the hands off from it until the operation is completed. He has offered to send cuts of that to any one who wants them.

MR. HANSEN: I am sending tomorrow for one of those cuts.

Another Section Objective

CHAIRMAN PLZAK: That, by the way, is another opportunity for an objective, for a project. There has been considerable difficulty in finding proper guards for the various types of cutters on the market, and I wonder how it would appeal to this Section to ask that a committee also be appointed to make a study of the various guards for guillotine cutters. What would be the Section's wish on that, just getting away from the subject for a moment?

MR. ROSEBUSH: It would be a good idea.

CHAIRMAN PLZAK: I shall put it this way, in order to be sure that we obtain results on this—I'd be very glad to have these two gentlemen volunteer on the committee—Franz Rosebush and Walter Gleason. Who else would volunteer to work on this committee? I think we should have three.

M. G. HOYMAN (Kimberly-Clark Corporation, Neenah, Wis.): I will do anything I can.

CHAIRMAN PLZAK: All right, Mr. Rosebush, Mr. Gleason and Mr. Hoyman, with Mr. Rosebush as Chairman, to make a thorough investigation similar to the set-up we are going into on nips, finding all possible ways and methods of guarding guillotine cutters, that is, to prevent the operator from becoming injured, either by cutting himself or sustaining other injuries.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): This may be in line with the discussion on Mr. Hoyman's paper, but it just occurred to me that it might be interesting to some of those here.

About three weeks ago I had the pleasure of listening to the Editor of Factory and Industrial Management speak to our foremen. He just recently completed a three months', ten thousand mile tour of the industrial area of Russia, and without going into all the things he said about Russia, there was one thing that struck me very forcibly, and made quite an impression upon our foremen. He mentioned the fact that in Russia the supervisor or superintendent or manager, whatever the industry may happen to be, is held directly responsible by the Soviet government for every accident.

He cited several cases. One American engineer that he knew of met with an accident in a coal mine. The man had been killed and the superintendent of this mine was absent at the time of the accident, and in all probability could have done nothing had he been there. The Soviet officials arrested him and tried him and sentenced him to two years in jail and one-half of his salary, which amounted to three hundred rubles per month for two years, while he was in jail. Later they paroled him and gave him some minor job.

The Editor of Factory and Industrial Management asked this superintendent afterwards, "Were you responsible for the accident?"

The fellow replied, "Well, if I had been there it might not have happened, but I don't think so."

I just mention that. It certainly impressed our foremen, because we have been trying to get across the idea that superintendents and foremen are responsible, and it shows to what extremes they are going over there. I am not advocating Russian principles over here, but there is one thing they certainly have down to a fine point.

The "Question Box"

CHAIRMAN PLZAK: There are one or two questions in the Question Box:

"What is the opinion or the experience of members of this group regarding signs calling attention to a serious accident on a certain machine or other regular practices bearing the name of a man injured on same? For example, using both hands to trip this machine and keep both hands on liners until cut is completed. Remember John Jones' accident?"

MR. HOYMAN: That particular subject has received considerable attention in the past. I recall once that we had a very bad accident on a jointer and we took a picture of the man's hand at that time, a large picture of the mutilated hand, and put that above the jointer to scare the rest of them.

I really am not in favor of too horrible examples in pictures or embarrassing the man too much. I said a while ago that I don't believe the men want to get hurt. Secondly, they are punished sufficiently when they are injured. The injured man is already punished quite a bit, and calling his name to the attention of his fellow workmen is a sort of permanent record, by putting it up on a notice. I am not particularly impressed by that idea. I don't believe we should do that.

Just to digress a moment. We were speaking Tuesday about investigating accidents and disciplining people. We have an investigation committee that investigates all major accidents and a great many of the minor accidents and attempts to fix the responsibility for the accident, and also recommend a discipline, which very seldom affects the man who is injured. We have had foremen disciplined, laid off without pay for two weeks. That is probably not done very often in most plants, but we do maintain that there is responsibility.

The day that I took over the safety work some twelve years ago I told the foremen that starting that day it was their responsibility, that it was not mine. I was only there to advise and help them. If they had an accident they'd have to explain how it happened. If they had a good safety record it was their record, not mine. I could not do it. We revolutionized safety just on that theory in our company, that they did have more to do with it.

I don't believe much in exploiting the man. It is very well to tell about the accident, and we want to gain all we can by the accident itself, but not by embarrassing the injured man or calling too much attention to the injured man. If an accident of any moment happens everybody in the plant knows about it. We make something of that. That is a big event these days. If an accident happens everybody knows about it, unless they are all asleep at the switch. So it does not add to it to put the man's name up there as more or less of a permanent record of what happened to him.

CHAIRMAN PLZAK: Any one else?

D. E. McDOWELL (Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.): You have a question regarding bringing to employees the possibility of infections from minor accidents, and how to discipline employees to the necessity of taking care of minor accidents. I'd like to know what is the best plan of bringing that to the attention of the employees without actually discharging the men because they don't pay any attention to it.

CHAIRMAN PLZAK: Education and discipline probably offer the most complete method. Maybe somebody else has some comments. We have signs conspicuously posted, the permanent type of signs, made of the sheet steel metal, which state that injured employees must report all injuries, no matter how minor, to the foreman immediately. Then the men have been instructed to the effect that if they don't report them they are subject to dismissal. Education and discipline, I would say.

MR. ROSZARSKI: Mr. Chairman, I agree with Mr. Hoyman in what he says in regard to hideous pictures or posting names, but there are times when a picture tells a story much more sharply than any other method. I can recall a good many pictures regarding this very subject of infection. It is rather a loathsome thing to put up a picture of a man's arm torn open by infection, with the drainage tubes in it, showing the awful effects of infection, but it is sometimes an education that brings results, and sometimes such bulletins as that do get home where talks won't always, because if a man can actually see there one hand infected from just a very minor scratch, like a piece of steel in the machine shop getting into the hand, and showing the result of the lack of attention to that injury, and showing the other normal hand, you do actually get somewhere with that kind of bulletin.

It's Always "Somebody Else"

MR. HOYMAN: I don't want to take issue with Franz at all on that, but just let me give you the other side of that. You know how effective it is for you and how it frightens you to read in the headlines of the paper every day of automobile accidents. It is awfully hard for us to bring home to ourselves, through a picture or anything else, something that we are not cognizant of or closely familiar with or that we know actually happened, such as putting up the picture he spoke of, of something that happened to some one far off. We have a hard job realizing it. I look out the windows of my eyes and see all you folks, but I can't realize just how I look to you. If I could I'd probably sit down and shut up.

That is just the point. We can't visualize and bring the thing up and tie it up to ourselves. It is always happening to somebody else. Everything we read about always happens to somebody else, until it really gets right down to us. Either in reading about it or seeing a picture it is awfully hard to tie that up with us.

But I agree that it does a lot of good to inform them about minor injuries and see that they have them taken care of, through making that a positive, enforceable rule, positively insisting upon its being enforced, that they will jeopardize their jobs by not going and having that taken care of. A few examples of that kind of discipline will bring that far more forcibly to their attention than looking at pictures. That is just my opinion. We have a positive rule that a man must take care of all minor injuries, must go to the First Aid room.

We have at night a foreman who has the key and access to the First Aid room. He sees that they are taken care of. He writes out a card, stating just what happened. They are supposed to come to the First Aid room before they go home. On the night shift we don't have nurses in the plants, but we do something else. I don't know whether it is a good idea to mention it or not. Our nurses come to work at seven o'clock in the morning, so that they are on the job when the other men go home, in case there are those from the night shift who should see them before they go home.

EARL E. GRANT (The Crystal Tissue Co., Middletown, Ohio): I am not going to take issue with Mr. Hoyman in regard to carelessness because he is expecting it, but

I am going to side with Franz on the picture idea. We have not displayed these gruesome pictures, but we are running up against this infection problem at the present time, just the same as other accidents will crop out occasionally. This picture that Franz is talking about I believe will bring home the fact that infection is often a serious result of letting a minor accident go. Pictures do portray things to us. I am sure if any of you saw that Monoxide Gas picture the other night downstairs it brought home the fact that it was very unsafe to leave your garage door closed when starting an automobile.

I have definitely made up my mind I am going to change our practice and put up some of the ugly pictures once in a while and see what we can do towards eliminating accidents.

CHAIRMAN PLZAK: I think both of the gentlemen are correct in both of their suggestions and procedures. You have to analyze your group and the people you are dealing with somewhat, although I must say that the policy of my company is not to ballyhoo or point in sentimental ways to unsafe practices, or by the so-called gruesome ways.

We have had to conform to that in one or two instances, and in one case in particular we did. One of our men at one of our divisions from just a tiny little burn, not larger than a quarter of an inch in diameter, for which he failed to obtain proper First Aid, sustained a most horrible infection, which required the slitting of the arm and the placing in there of drainage tubes. The picture of that arm was taken at the hospital and it was posted on all of our bulletin boards, and believe me, it sold the idea of First Aid for the most minor injuries.

We resorted to that after we had tried everything else. I think that, after all, is one way of doing it. If you are able to do it otherwise, more power to you.

Always a Record Made

H. D. BANTA (Hoberg Paper & Fibre Co., Green Bay, Wis.): We have a system that we think is effective. If any man gets First Aid, which is administered in our engine room when the nurse is not there, there is a record made of that. If that man does not show up to the nurse to have this checked up and does not call in as often as she deems necessary, we take his card out of the rack and he can't go to work again until he sees the general superintendent, and he only needs one trip to that office.

ERNEST AUGUSTUS (The Mead Corporation, Chillicothe, Ohio): In case of a serious infection, where a man possibly loses a month or two months' time as a result of neglecting First Aid at the time of injury, do you think it always advisable that when that man returns to work to penalize him by a layoff or imposing some other penalty? Is it advisable to do that? The psychologist yesterday morning told us to get the man that comes back to work started right, give him something to do. That is an awful wallop after a man has been off for two months to tell him to go home for two weeks more. Are you making that man a safer man or engendering in him a feeling of revenge or resentment?

JAMES J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): Absolutely not. Wait for three or four years, if you know anything about your law.

MR. AUGUSTUS: I don't mean to fire him; I mean just lay him off for a week or a few days.

MR. HASTINGS: A good lawyer will take care of that. My experience has taught me that.

WALTER A. GLEASON (Hammermill Paper Co., Erie, Pa.): Are you penalizing him or penalizing his family?

MR. AUGUSTUS: That is the point.

CHAIRMAN PLZAK: It is a big problem because, after all, we have not corrected the condition when we discharge a man, regardless of the reason. We have merely added to the burden of society. It is a big problem. There are two sides to it, and it is a question that we could debate for a long, long time. I believe in dealing with

a man who has been careless by trying not so much to reprimand him except through drawing to his attention what he did, but trying to instruct him to become a better and more useful employee. You will find that often pays dividends.

MR. HOYMAN: May I say one more word? It won't necessarily answer his question, but you can put that up to somebody else. Our men don't go to the First Aid room directly when they receive an injury and by their own volition. Our instructions are that they must report every injury, no matter how small, to the foreman, and the foreman is the chap that sees that they go to the First Aid room, or he has to answer for that. If a man gets a small injury and an infection develops later and we find that he did not go to the First Aid room, the first question asked him is, "Did you report that to the foreman?" He would be lax if he did not report that to the foreman, not because he did not go to the First Aid room. It is the foreman's job to see that he goes to the First Aid room, and he will see that he does go.

MR. AUGUSTUS: How about the penalty? If you have that rule and the man does not report to the foreman, and develops an infection, how do you penalize him then, in case he is off for a long period of time?

MR. HOYMAN: I don't know as we ever had anything like that come up. Our infections are very infrequent. We had a lot of them in the past until we put in some trick rules regarding them, but the start of correcting that was in putting it up to the foreman to see that he does go. Just the same as we eliminated going barefoot. We never got anywhere as long as we left it to the discretion of the men. We put it up to the foreman with the distinct understanding that the foreman would lose his job if the men did not wear their shoes.

Weigh the Penalty Carefully

W. J. BRENNAN (State Department of Labor and Industry, Augusta, Me.): I can offer a sideline. Some of you remember my paper last year in which in building a mental condition which will tend to produce cooperation I mentioned the fact that we must not take discipline and earn resentment. We must realize that a man with us is better than a man against us. He has brothers and relations. He is going to remain in our community and create an undercurrent of antagonism. We must carefully weigh our penalties. I offer this because I am printing it this month in my state bulletin. The Lawrence Portland Cement plant, that operated with over two hundred men for nine months this year, has rather hit on a unique thing. They have set up a police force in their plant with the authority of the management. They have a Chief of Police and patrolmen. The patrolmen have regular badges in each department. A warrant is issued for a man's apprehension under a violation of that sort, and he is served with a formal warrant, and theoretically taken into custody and drawn before a jury made up of his fellow workmen. There is the key to the situation, made up of fellow workmen. If the management imposes a penalty there is a certain degree of resentment that goes with it, but if his fellow workmen, instilled with the proper enthusiasm for the subject, assign a penalty, you will get humiliation, which is a more powerful force.

That man continues to work but he must comply with their demands. They don't impose a financial penalty. They more likely assign a penalty which is extremely humiliating. I think of one case where a man would not wear goggles, until one day he was hit by a flying particle. If he was to continue working in that plant he must stand three shifts that day with a pair of glasses on and with a tin cup at the time rack, while the workmen passed in review. Naturally, he took their comments, and it was rather a trying situation.

He would not do it. He was sent to the manager, and there is also the key to the situation. The manager carefully explained to him the reasons and insisted that he do this thing for his family's sake, that very excellent point brought up by Mr. Gleason, and gave him his choice. If he were to inflict a financial penalty upon his family he must do so himself by a refusal to comply with the alternative. He chose

to do it. They gave him a long time to come to a decision. He did it, and he is sold on the subject, today.

That is the most powerful weapon for discipline we have in Maine today, the police court system of the Lawrence Portland Cement Company, the crier of the court proceeding as a comedian, serving to enlighten the seriousness of the occasion. That is a suggestion if you want to take it home.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): I have been using that particular thing, not on such an elaborate scale, but in a department having an investigating committee, who use the sort of system outlined by Mr. Brennan. They impose penalties very fairly because as they serve on that committee they realize that they might at some time be the offender, and they are going to treat fairly as they would want to be treated.

I was going to offer a suggestion on this question of infection that I have found quite effective. I have not had to use it very many times. Infections, ninety-nine times out of a hundred, are usually because of a delay in treatment and that hundredth case is usually caused by faulty technique on the part of the doctor, the nurse, or something else. In those cases I like to make a little private call on the man and his family, say just for thirty minutes, and talk over the entire situation, what he has done, what he is doing about it, what might have happened, ultimately painting rather a sympathetic, then tragic, then black picture. I have found that has done me a lot of good, because in so contacting the family I have left something with the boss, and she does her talking afterwards.

CHAIRMAN PLZAK: We have a situation similar to the one Mr. Brennan referred to, except our mills are all organized, and labor itself appoints what is known, or was known formerly as the Grievance Committee. Now they call it the Industrial Relations Committee. Before them are presented all cases which require dismissal due to breaking of rules or breaking of safety practices, etc. The committee is made up of workmen who probably are intimately acquainted with the worker that is being tried. They are very unbiased in their final decisions.

We have had one or two cases of absolute dismissal where repeatedly and repeatedly the worker was warned about certain company rules he was continuing to break, and finally the committee felt in all justice to the company and to his fellow workers this man should be discharged.

Community and School Safety

CHAIRMAN PLZAK: As one of the objectives of the Paper and Pulp Section, I hope that all of you gentlemen will take more keen interest in the subject of community and school safety. It is a very, very important matter and if we are going to combat the problem that is confronting us now in that there are more accidents occurring in the homes and on the streets than there are in industry, if we are to combat that problem we, as industrial leaders in the safety movement, must take it upon ourselves to introduce into our cities the work of safety in our schools, on our streets and elsewhere.

It can be done in several ways. I will just sum it up very quickly. First, the National Safety Council has a very splendid set-up of educational work for our schools. Write them and they will be more than glad to give you full information as to how to go about organizing the work.

Second, organize, either through the schools or through some civic organization in your town or your industry, a school boy patrol in your city. By that I mean, have the civic organization finance the buying of belts for that particular city.

Third, try and organize, if you possibly can, what is known as a *Safe Drivers' Club* in your city. The National Safety Council will be more than glad to give you information on that subject.

Fourth, try if you can to have a *Safety School* in your city during the winter months. In our state the Industrial Commission has a program of safety education

which they bring to the cities that desire it at a very nominal fee. The fee is only that which is charged by the speakers, their transportation, etc.

You are going to gain in dollars and cents and in the prevention of human suffering and in every other way if you take it upon yourself to introduce safety in the schools, in the community, in the city in which you live. Why? Because it is going to be reflected not only in your present workers but in the workers that are coming. It pays dividends.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Petroleum Section

Officers 1930-31

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General Chairman—R. E. DONOVAN, Standard Oil Co. of California, San Francisco, Calif.

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C. W. SMITH, Standard Oil Company (Indiana), Chicago, Ill.

Secretary—H. N. BLAKESLEE, American Petroleum Institute, Dallas, Texas.

**Tuesday Morning Session
October 13, 1931**

R. E. DONOVAN, Chairman

Standard Oil Company of California, San Francisco, Cal.

The first session of the Petroleum Section convened with General Chairman R. E. Donovan presiding.

CHAIRMAN DONOVAN: It is my pleasure to report to you concerning the activities of our various divisions for the past year.

Mr. Alden, chairman of the Atlantic Division, reports: "During the past year, we have concentrated on safety work throughout the Atlantic Division, and can report that the accident records of the major companies, to date, are far better than those in the same period of 1930, notwithstanding the smaller number of employees."

"In April, at the Eastern States Safety Conference, held in Newark, New Jersey, the Petroleum Section along the Atlantic Seaboard was well represented, some 20 delegates from various companies being present. This Eastern States Conference is the outstanding safety event held annually in this vicinity."

"Considerable material for posters was gathered and forwarded to Mr. Blakeslee during the year, as was News Letter material. I have kept in touch with many companies by correspondence, but nothing came to my attention during the year which I felt warranted a meeting."

C. P. Anderson, chairman of the Pacific Division, writes: "The Pacific Coast Division, with the aid of Mr. Blakeslee, produced the March and September issues of the News Letter. However, Blake should be fully credited with the September issue. A list of non-member oil companies and manufacturing companies were contacted for membership without success; therefore, we can report no additions from this Division."

"Referring to your letter of December 4, 1930, on Blake's transfer, it was shortly after receipt of this letter that committees were formed and requests began to arrive for information and data on A. P. I. Safe Practice Pamphlets, in addition to reviews of drafts of these pamphlets, which caused me to neglect, to a great extent, the activities of the N. S. C. Pacific Coast Division."

"No meetings were held or committees formed in the Pacific Coast Division during 1930, unless the A. P. I. activities are considered."

There is one committee on the Pacific Coast made up entirely of National Safety Council members. That committee did hold one meeting with the California Oil and Gas Association.

J. C. Bernd, chairman of the Great Lakes Division, reports that there are only four local oil companies in the Great Lakes Division, which makes a very small number from which to draw material for any meeting. However, I personally attended the meeting which Joe Bernd arranged here in Chicago last spring and was very much impressed with it. I thought it was one of the best gatherings I have seen for a long time, because there were no safety engineers on the program. They were all practical men who came in and gave talks, and they were very good.

Activities of the Mid-Continent Division

**By H. W. BOGGESS
Chairman**

1. Memberships. The depressed condition of the industry has guided this division's decision to refrain from an active membership campaign. While practically all major operators in this territory have been and are members of the National Safety Council, the only field left open to solicit was that of smaller independents and contractors,

most of whom have been forced to follow a policy of the strictest economy which forbids participation in outside organization work. Now members have come few and far between, our major effort being to hold the old ones. To date your chairman has been advised of but one resignation of a former member and while every pressure consistent with reason was brought to bear, this particular member was forced to sever connections with the Council. We feel that the loss of but one member in the Mid-Continent territory, in this year of trying times in the oil business, bespeaks the great importance all Mid-Continent operators attach to accident prevention work and the National Safety Council.

2. Field Work. Last year your division chairman assisted in arranging for and sponsoring several supervisors banquets which were held at various field points and attended by local field supervisors of all companies. In each instance these supervisors meetings resulted in intensive "no-accident" campaigns all of which bore much fruit. This year it was our desire to continue such sponsorship, but conditions have been such that the pursuance of this policy was not deemed advisable.

Field activities for the past twelve months have been carried on most wholly by the individual member companies, a great number of whom hold monthly meetings of their respective employees at all points of operation throughout the Mid-Continent territory.

3. General Activities. In the Mid-Continent territory we have an organization known as the Petroleum Safety Council, of which D. J. Wallace is the paid secretary and safety director. The Petroleum Safety Council has four organized chapters, each of which is self-supporting and is conducted by a local set of officers. The officers and personnel of the Petroleum Safety Council are largely engineers and others interested in the prevention of industrial accidents. Each of these four chapters has held monthly meetings and sponsored many activities which have tended to further the cause of accident prevention work in all petroleum communities. It is to be understood, of course, that the Petroleum Safety Council is affiliated with and operating according to and under the guidance and example of the National Safety Council.

There is one suggestion which your chairman has to make and that is that the Central States Safety Conference, which is yearly held at Kansas City or St. Louis, should include a more complete petroleum program. The last one held was in St. Louis and inasmuch as the program included only papers relating to the manufacture and distribution of petroleum products, there was no incentive for the large number of safety men in the Mid-Continent who are interested in accident prevention, but who work directly in the producing and pipe line divisions, to attend. It is recommended that this Central States Conference include in its program a well balanced petroleum agenda dealing with production and pipe line problems as well as manufacture and distribution problems.

4. First Aid. The Inter-National Petroleum Exposition, the Petroleum Safety Council and the Petroleum Section, National Safety Council, have yearly sponsored a first aid meet held during the Inter-National Petroleum Exposition in Tulsa. This contest last year followed close onto the Council's National Congress. Seventeen teams representing fourteen companies and seven states were entered in this first aid contest. The day the contest was held was known as "Safety Day" at the Exposition and all the exhibitors stressed safety factors, importance of design, proper installation of equipment and safe practices of operation. No oil executive nor employee who attended the Exposition on "Safety Day" could leave the grounds without feeling that accident prevention work was part of his job in the industry. We believe that this first aid contest and "Safety Day" played a great part in furthering the cause of safety in the petroleum industry.

5. Educational Activities. The mid-Continent division of the Petroleum Section, National Safety Council, has sponsored and presented at the University of Tulsa, in conjunction with the Petroleum Safety Council, a course in accident prevention in the petroleum industry which is now a prescribed and mandatory course of study in the University's College of Petroleum Engineering. This course covers twenty-three subjects as follows:

- No. 1—History of Modern Industry, including Accident Prevention Work, an Out-growth of Modern Industry.
- No. 2—Scope of Accident Prevention Work.
- No. 3—Employment Management, including The Proper Placement of Men and Foremanship.
- No. 4—Relationship of Accident Prevention Work to The Petroleum Industry.
- No. 5—Introduction to First Aid.
- No. 6—Arterial Bleeding and Artificial Respiration and Dressing of Open Wounds.
- No. 7—Fractures and Dislocations and Fractures and Splint Work.
- No. 8—Industrial Hygiene.
- No. 9—Fundamental Causes of Accidents.
- No. 10—Importance of Design, Construction and Installation, including Value of Inspection and Maintenance.
- No. 11—Drilling Problems.
- No. 12—Problems in Lease Operations.
- No. 13—Repressure and Air-Lift Problems.
- No. 14—Gasoline Construction and Gasoline Operation.
- No. 15—Pipe Line Construction and Operation—Welding.
- No. 16—Atmospheric Stills in the Refinery. High Pressure Equipment in the Refinery.
- No. 17—Treaters and Filter Houses and Misc. Equipment.
- No. 18—Bulk Stations. Filling Stations.
- No. 19—Motor Vehicular Problems.
- No. 20—Analyses of Accidents.
- No. 21—Importance of Accident Statistics. Statistical Compilations, Part One.
- No. 22—Statistical Compilations, Parts Two and Three.
- No. 23—The Safety Engineer.

The faculty of the University watched the progress of this course with the keenest interest and at the close of last semester paid high compliment to its practicability and effectiveness. Perhaps no higher compliment could have been paid than the request of the Chancellor and Dean to continue and enlarge this course of study. Your chairman at this moment is busily engaged in furthering this particular work.

In conclusion—The Mid-Continent division of the Petroleum Section, National Safety Council, while regretful that none of its members could place first in either Class "A" Production or Class "A" Natural Gasoline national contests, rejoices that it looks to but one peer and places second only to the company headed by our most worthy general chairman, R. E. Donovan.

CHAIRMAN DONOVAN: There were no general activities this year, such as the preparation of safe practice pamphlets in the Petroleum Section of the Council. That is one of the reasons why the Accident Prevention Department was set up in the American Petroleum Institute, so that we may take care of the technical phases of the accident prevention work in the industry. It has been considered that all the safe practice pamphlets are technical work in the industry, and those things are done by the A. P. I. now rather than the National Safety Council.

I omitted the activities of other divisions. If there have been other activities, we would like to hear about them.

H. N. BLAKESLEE (American Petroleum Institute, Dallas, Texas): There was a meeting held in Tyler, Texas, early this year, sponsored by the Mid-Continent Safety Division, N. S. C. and the Gulf Division of the Petroleum Safety Council. Other meetings were held down around the Gulf Coast, with which the Division Chairman helped.

CHAIRMAN DONOVAN: We have received the following telegram from Charles W. Coleman, Safety Director, Gulf Refining Company.

"Very sorry that press of other business prevents my being with you this year, but shall look forward eagerly to receipt of report of proceedings of your committee, which

I know will be invaluable to the oil industry. Extending you and other members of the committee expressions of my high esteem, I am

Yours sincerely,

Chas. W. Coleman."

I now want to introduce Mr. J. W. Myers, chairman of our Statistics Committee of the Standard Oil Company of New Jersey.

MR. MYERS: I wish to preface my remarks with an enumeration of four important facts. First, we believe that statistics are essential in accident prevention work: you cannot do intelligent accident prevention work without statistics. Second, accident statistics must be accurate to be of any value. Third, accident statistics must be uniform in order to make comparisons. Fourth, statistics must be understandable. If they are not understandable, they cannot be effective.

What Our Accident Records Show

By J. W. MYERS
Chairman, Statistics Committee

Since statistics are uninteresting to most people, I shall therefore give as few as possible and instead endeavor to bring out some of the interesting facts which our records disclose.

Experience Proves Soundness of Statistical Program

The present program of obtaining and exchanging industrial accident data with reference to the petroleum industry was formulated at the Congress of the National Safety Council held in Cleveland in 1926. In the light of our experience, I think the industry may congratulate itself on the following three fundamental decisions which were made at that Congress:

1. The definitions and fundamental rules of our program were co-ordinated with the statistical principles which had then already been established by other sections of the National Safety Council and generally accepted by industry. This has enabled the petroleum industry to speak on this subject in the same language as the other industries and to thus make it possible to compare our results with those of industry in general.
2. The decision to restrict our statistical data to the frequency and severity of lost-time accidents made our program essentially a simple one. Simplicity in statistics is always an advantage. This modest program avoided many complications and controversial questions which could easily have arisen had we undertaken to exchange such data, for example, as the cost and causes of accidents.
3. The classification of accidents in our industry by main departmental or operating divisions has proved of great benefit, due to the wide variations in the accident hazards of the different branches of our industry. To have compiled data for the industry as a whole would have largely nullified the practical value of our statistics. A producing executive, for example, is not interested in a refinery or sales department frequency rate and the effective use of statistics in enlisting and maintaining the support of executives in the work of accident prevention requires that the hazards which the statistics reflect be essentially similar. Further proof that the petroleum industry is proceeding on sound ground in this respect is found in an increasing use of the same plan in other Sections of the Council, notably the steel industry.

Growth of Statistical Program

The increasing interest and value of the accident statistical program of our industry is reflected in the steady growth in number of reporting establishments and in the total hours of exposure of the reporting units. In 1927, 22 establishments reported their

accident experience; in 1928 this number increased to 38; in 1929 to 79; and in 1930 to 87. The 22 establishments which furnished their experience for 1927 reported a total of about 221,500,000 man-hours worked, while in 1930 the 87 establishments reported the huge total of 577,000,000 man-hours worked. Thus, the reports for 1930 reflect the industrial accident experience of approximately 240,000 employees working full time. Only two other industries, namely, public utility and machinery, exceeded this total in their reports to the Council. These facts show that we now have accident data for the industry which we can use with assurance and with the knowledge that they increasingly reflect the actual accident situation in the industry.

Reduction in Accident Frequency Compared with Other Industries

We show below Chart No. 1 in which the frequency and severity rates of the reporting establishments of the petroleum industry are compared with similar rates for other industries for the years 1927 to 1930, inclusive.

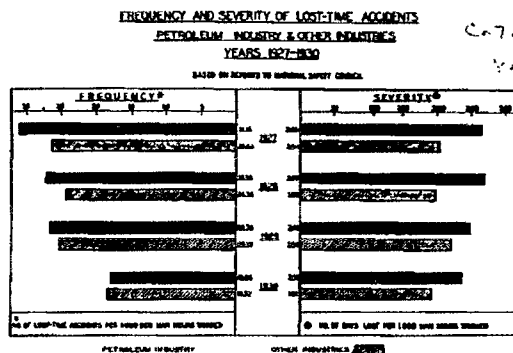


Chart No. 1

Assuming that the experience of the reporting members each year was a true reflection of actual conditions, it can be stated that in 1927 the petroleum industry had an accident rate of 31.15 cases per 1,000,000 man-hours worked as compared with 26.44 for all other industries, thus indicating that work in the petroleum industry was then, on the average, 18 per cent more hazardous. In the three succeeding years accident frequency rates have fallen both in the petroleum industry and in other industries but the decrease in the petroleum industry has been 42 per cent compared with only 30 per cent for other industries, with the result that during 1930 the frequency rate in the petroleum industry was only 18.05 as compared with 18.52 for other industries. Thus, we are now able to state that as a result of our accident prevention work we have made employment in the industry approximately 3 per cent less hazardous than work in other industries on the average.

With regard to the severity of accidents, in 1927 the severity rate in the petroleum industry was 2.65 days lost per 1,000 man-hours worked as against 2.04 for other industries. During the next three years the severity of accidents has also tended downward both in the petroleum industry and in other industries, the rate for 1930 having been 2.37 in the petroleum industry as compared with 1.92 for other industries.

We can conclude, therefore, that industrial accidents in the petroleum industry are, on the average, of a more serious nature than those occurring in other industries and that while the severity of our accidents has been reduced 11 per cent during the past four years they are still on the average 23 per cent more serious than those of other industries.

We can measure the progress made in accident prevention during the past four years in another way by stating that if the frequency rate for 1930 had been as high as it was in 1927, the reporting members would have incurred 17,963 lost-time accidents instead of only 10,410. Thus, the work of accident prevention saved 7,553 of our employees from injury in 1930. No statistics as to the cost of accidents in the petroleum industry are available, but assuming that compensation and medical costs alone may be conservatively placed at \$300 per case, we obtain here a money saving of \$2,250,000 in one year, exclusive of indirect costs. Most of this saving has come from the elimination of cases resulting in temporary total disability. If we had been

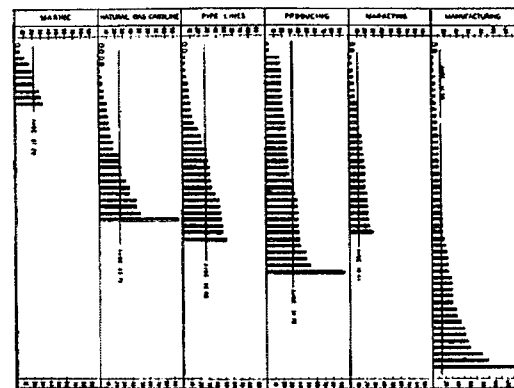


Chart No. 2

able to effect a corresponding reduction in the frequency of fatalities and permanent disabilities the saving in human suffering and money would have been very much larger.

Considering the changes which have occurred during the past four years in both frequency and severity, we can conclude that a very considerable measure of success has attended the educational campaign which our petroleum companies have been waging during this four-year period, but that we still are confronted with the more serious and difficult problem of reducing those inherent accident hazards of the petroleum industry which involve technical, engineering and chemical problems. These are the hazards which do not lend themselves readily to a mere educational campaign among the personnel and which account for many of the fatalities and permanent disabilities contributing to our severity rate.

Variations in Accident Frequency

In order to show the many opportunities for effecting a further reduction in accident frequency, we show in Chart No. 2 the lost-time accident frequency rates for 1930 for each of the reporting establishments in each operating division.

Each organization is represented by a black upright bar. A horizontal line has been drawn across the chart showing the average frequency rate for each division. The chart shows, therefore, at a glance that there are many organizations whose frequency rates were materially above the average departmental rate. You will note that in the Manufacturing Department the rates range from 0 to 141; in the Marine Department, from 0 to 32; in the Marketing Department, from 0 to 29; in the Natural Gas Gasoline Department, from 0 to 95; in the Pipe Line Department, from 0 to 51; and in the Producing Department from 3 to 95. Each reporting company can determine from the 1930 supplement the extent of its opportunities for a further reduction in its frequency rate. It is perhaps needless to add that so long as such wide

PERCENTAGE REDUCTION IN FREQUENCY OF LOST-TIME ACCIDENTS IN THE PETROLEUM INDUSTRY CLASSIFIED BY DEPARTMENTS
YEAR 1930 COMPARED WITH YEAR 1927
BASED ON REPORTS TO NATIONAL SAFETY COUNCIL

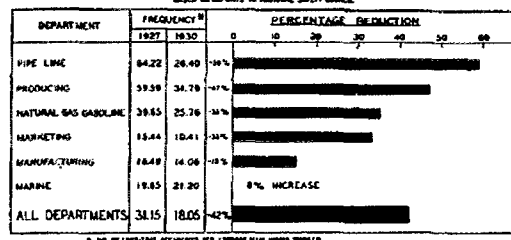


Chart No. 3

variations exist there are conditions which need to be corrected. Certainly the petroleum industry can never achieve the enviable ranking of some of the other industries, such as, the cement industry, which, in 1930, had a frequency rate of only 6, unless a substantial improvement in accident frequency can be effected by the reporting members whose rates are revealed by this chart as out of line.

Relative Degree of Hazard of Our Operating Departments

In order to show which departments of the petroleum industry are on the average the most hazardous, and hence, where the greatest opportunity for safety work exists, we have prepared a chart, designated as Chart No. 4, showing the average frequency and severity rates by departments for the four-year period from 1927 to 1930, inclusive.

Particular attention is called to the significant fact that with one exception the frequency and severity rates are in exact correlation, that is, departments which have a high frequency rate have a high severity rate, and departments which have a relatively low frequency rate have a relatively low severity rate. This greatly simplifies the problem of the safety engineer because a reduction in the accident frequency

rate of the hazardous departments should be very helpful in reducing the severity rate. It follows that the greatest opportunity for the saving of life, limb and money, at least in the case of the petroleum industry, lies in those departments having a high frequency rate. Ranking the departments in order of frequency, the highest first, we find the opportunities for service to be greatest in the following order: Producing, Pipe Line, Natural Gas Gasoline, Marine, Manufacturing and Marketing. If we assume, for example, that a safety engineer can, by one day's work, eliminate one accident in the Marketing Department, perhaps he can by the same amount of effort eliminate 3½ accidents in the Producing Department and Pipe Line Department. These two departments are the places where he should devote his main energies.

Reductions in Accident Frequency by Departments

In order to show in which operations the petroleum industry has achieved the greatest reductions, we show below a chart, designated as Chart No. 4, showing the frequency rates, by departments, for 1927 and 1930:

AVERAGE LOST-TIME ACCIDENT FREQUENCY AND SEVERITY RATES IN THE PETROLEUM INDUSTRY CLASSIFIED BY DEPARTMENTS
BASED ON REPORTS TO NATIONAL SAFETY COUNCIL FOR YEARS 1927-1930, INCLUSIVE

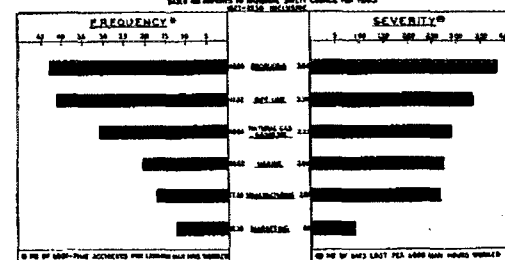


Chart No. 4

You will note that the Marine Department is the only department which failed to show a decrease and that the decreases in other departments ranged from 59 per cent in the Pipe Line Department and 47 per cent in the Producing Department to 15 per cent in the Manufacturing Department. It must be remembered, however, that, as already shown, the accident rates in the Producing and Pipe Line Departments have been relatively high. Naturally, departments which have a high frequency rate can more easily show a large percentage reduction in frequency. The chart shows very clearly that the rates for 1930 in the Producing, Pipe Line and Natural Gas Gasoline Departments are still relatively high and that it is entirely possible for these departments to duplicate, in the next four years, the reductions which they have effected in the past four years. Even if such a performance could be accomplished the rates in these three departments would still be in the neighborhood of the 1930 manufacturing rate. So far as the Marine Department is concerned, we understand the marine section is formulating plans at this Congress for an intensive campaign of accident prevention and the compilation of marine accident statistics. We have every confidence that when another occasion arises to analyze our record we will find that our tankers will have

produced a record of improvement more consistent with that of other branches of the petroleum industry.

Interpretation of Frequency and Severity Rates

No analysis of our industrial accident record would be complete without a brief comment on the significance of frequency and severity rates. Obviously, a company may find that it has a high frequency rate and a high severity rate, or a high frequency rate and a low severity rate, or a low frequency rate and a high severity rate, or both a low frequency rate and a low severity rate. Where you have both a high frequency and severity rate you have the greatest opportunity for service for you will find not only many accidents which cause merely temporary total disability and which can be easily prevented, but also those relatively infrequent types of accidents which involve difficult and painstaking technical studies of design, maintenance and operation and which, unfortunately, contribute only too often to serious permanent disability and loss of life. On the other hand, where you find a low frequency rate and a high severity rate, it is probable that the initial and relatively easy phase of accident prevention work has been accomplished through the elimination of the many relatively minor lost-time cases which are the result of man-failure and which are eliminated just as soon as the Management and the employees generally become safety conscious. You then have remaining the more serious and difficult phases of the problem which are involved in the reduction of a high severity rate and the further reduction of a frequency rate which already has been relatively low. It is in this latter stage that many of our companies, particularly the larger ones who have been conducting accident work for a number of years, find themselves. The third situation is one where you find a high frequency rate and a relatively low severity rate. This is a situation which, in the case of the petroleum industry, is more likely to be the result of accidental circumstances, particularly in smaller organizations. It indicates, first of all, that the operation is having relatively many accidents and that the hazard of serious injury either does not exist or that the element of luck has produced a low severity rate. Certainly, where this situation applies year after year, such operation would seem to present a situation which lends itself most easily to improvement. The fourth situation is one in which we have both a low accident frequency rate and a low severity rate. This is indeed a fortunate situation for it reveals a personnel which has been sold on safety and where slipping, tripping, stumbling, handling materials and all the other causes that flow out of man-failure have not only been controlled but also where the Management has under control those major hazards which lead to explosions, fires and the other hazards which inevitably produce a high severity rate. To go outside of our industry for a moment, I might cite the DuPont Company as one which, despite its wide diversity and seriousness of hazards, is able year after year to so control its operations that it can effect both a marvelously low frequency and severity rate.

Looking Into the Future

In conclusion, let me remind you that the record of our industry which we have analyzed this morning shows a reduction in accident frequency which has been effected to a considerable degree during a period of declining business activity. The test of our ability to reduce accidents not only in the petroleum industry but in industry in general will come in the future when business activity increases and when the watchfulness of Management may be relaxed with the return of prosperity. If we can maintain and further improve our work of accident prevention when business picks up, then we shall indeed have more than ample grounds for satisfaction.

A. S. REGULA (Industrial Relations Counsellors, New York City): Mr. Myers, I believe your comparison of '27 with '30 is on the basis of all reporting companies. Are such records better than the records of identical companies?

MR. MYERS: The Council has emphasized in its reports the comparative data of identical companies, but I believe we get a more nearly accurate picture of what has

happened by taking all reporting companies. I asked the Council to give me, for example, the number of man-hours worked per establishment, each year, for companies which reported that year and which did not report the preceding year, in order that I might obtain an idea of whether the new companies were, on the average, larger or smaller than the companies which had reported before. I was not able to get that information, but I believe my chart will show that the trend in our industry, is substantially the same as the trend for all industries. That fact, in itself, is fairly good proof that what is going on in the companies that reported is a sample of what is going on in the country.

In other words, if the eighty odd companies that reported in 1930 had, in back years, any substantially different experience, our trends would not have been so consistent with those of all other industries.

MR. REGULA: In connection with Chart Number 2, which shows the variation from zero frequency to a frequency of 195: was not the average materially distorted by the fact that new companies were coming in?

MR. MYERS: Chart Number 2 was based on that one year only, 1930, and shows therefore, that we have in this group a number of reporting establishments which are decidedly out of line, which, if brought down, would contribute materially to reducing our accident frequency rate.

MR. BLAKESLEE: That extreme rate comes from a plant where there was a great deal of construction work going on.

CHAIRMAN DONOVAN: I have prepared such charts as you ask for, Mr. Regula, every year since the Petroleum Section started this work. I don't know what the companies are, except by code number, but it is surprising to find that some companies have been consistently high ever since they have been reporting statistics. The general trend is down.

MR. MYERS: There is a further difficulty in getting a line on what identical industries have been doing. In our own group, we started reporting only one of our plants. By 1930, we had put in practically our United States experience, so that even using identical companies does not give you absolute continuous proof one way or the other.

C. W. SMITH (Standard Oil Company of Indiana, Chicago): I believe Mr. Myers' statistics include personal injury accidents to employees in the marketing department. Perhaps our greatest hazard, in the marketing department is in connection with the general public. It has been my own experience that the greatest value of accident prevention work in the marketing department is in the prevention of accidents to the general public. That might be personal injury to the public or it might be property damage. I, personally, have found the marketing department a very fine place to do a whole lot of safety work that can be very profitable.

MR. MYERS: The point you make, of course, is a very good one, because, when you add up the costs of all classes of accidents in the marketing department, you will find a staggering total. I didn't have any data, of course, as to property damage and non-employee injuries.

H. E. DISCHINGER (Shell Petroleum Corp., St. Louis): Our highest frequency and severity rates appear to be in our production department. Could it be that the compensation laws in the states in which we are doing our maximum amount of production have something to do with the increased severity rate?

Perhaps the laws of Texas, Oklahoma, Kansas, and California make our rates higher than in other states. The severity rate is, of course, influenced by the requirements of the law and the rigidity or liberality with which the law is enforced. In a state like Louisiana, for example, not all permanent disabilities are being compensated. In some states, you don't get compensation for permanent disability unless there is actual impairment of earning capacity. That influences the severity rate.

During the year or two, the depression tends to increase the severity rate. With the "lay-offs" that have occurred in our plants, the men who are severed from the company, naturally, try to capitalize on every injury that they have sustained. They

won't go at it gently but with a formal hearing and a lawyer, instead of through a friendly employer and employee proceeding.

On the other hand we all realize that many accidents in the producing field are more severe than similar accidents in other departments. Permanent total disabilities, such as general bodily injury and accidents to the head and spine, contribute heavily to a high severity rate. These are the very accidents which we all find are hard to prevent.

MR. SMITH: Practically every state is now asking for an increase in compensation rates. As I see it, the petroleum industry has one problem, reduction in frequency. If they are successful in the state of Oklahoma in getting the 57.9 increase they are asking for, we will have a lot higher severity rate than we have now. It resolves itself into one point. That is, for a reduction in frequency we have to stop accidents, minor and major.

MR. MYERS: They are asking for another increase in New Jersey. Thus, it becomes all the more important to reduce the frequency rate.

CHAIRMAN DONOVAN: We are very much pleased to have Mr. James H. Herbert, of the Standard Oil Company, of Cleveland, with us. He will now speak to you.

Preventing Accidents at Super-Service Stations

By JAMES H. HERBERT

Personnel Manager, Standard Oil Company (Ohio), Cleveland, O.

I think that it might be in order to define a super-service station. Our advertising agents have assigned the word "super" to so many items, from gasoline to sewing machine oil, that the term is slightly confusing. I believe, however, that most all of us term a super-service station as one which has the conventional station plus one or two or more lifts for greasing. Also the number of gasoline pumps is usually greater than at the ordinary station, and the space on which the station is located is usually from three to four times the size. There are generally three or four possible combination entrances and exits to the grounds. Gasoline seems to be a small sales item, because it is only one of seemingly hundreds of items and services sold. The most important of these are, of course, grease jobs, change of oil, tires, tire repairs, electric light bulbs for headlights and tail lights, rear-view mirrors, radiator caps, tire valves, various radiator anti-freeze solutions, car washing, spark plugs, ignition wires, fan belts, etc. In other words it is coming to the point where our super-service station men are required to be almost complete mechanics. The same trend is in the direction of our regular service stations. The day of the lone gasoline pump and the can of oil is gone.

In the past I have inspected quite a few of our super-service stations and it has been difficult for me to realize that many hazards lurk there. The attendants do not think about accidents because at any one station there are so few, if any, over the course of a year. Little sympathy if any is, therefore, found at any given station, because the ready reply to the question regarding the subject is "We don't have any accidents here", or "We haven't had an accident for over a year", etc.

As I tried to work out an excuse for a discussion on this subject and smiled at first about the seeming futility of it, it suddenly dawned upon me that the super-service stations have a great chance of being one of the greatest worries which the oil companies' safety directors have ever had. Instead of doubting the intelligence of the National Safety Council in choosing this subject, I congratulate them, because with some forethought on the subject and the exchange of ideas we shall now be able to avoid the great hazards super-service stations might have been, and we can take the necessary precautions to avert trouble as new types of equipment and new services are added.

Recently I inspected several super-service stations with a more critical eye than I

believe I have ever used in a search for accident hazards. I did not believe that I was going to find many, but I had been at the first station only a few minutes when I noticed a customer walking into the office with grease spattered over his clothing and face. An investigation showed that he was of the curious type who wanted to see just where all the greasing points on his car were located, and as he watched our attendant force grease into one fitting the gun slipped and a stream of grease shot out in his direction. Fortunately, he did not take advantage of the situation and ask us to buy him a new one-hundred-dollar suit, etc., and our manager soon had him completely dry cleaned with the use of a can of cleaning fluid.

This is one of many of the hazards to which our customers are exposed and I believe that we must care for their safety as well as that of our attendants at a super-service station. I would like to refer to a few other cases which indicate that the safety of our customers must be watched.

The manager at one of our stations informed me that he witnessed a case where the driver of a car remained in it while it was raised on a lift to be greased. The driver apparently became completely unaware of where he was because he suddenly opened the door and stepped out. It is needless to say that he was quite well shaken.

Women seem to be frequent stumblers as they leave a car after driving it onto a lift. Their French heels are apparently the cause.

I believe that our company has paid for the cleaning of several dresses and hats as a result of our customers brushing against greasy air lift hoses and pressure grease lines.

The greasing of a car takes several minutes and during this waiting period the apparent inherent curiosity of man leads him to all points where he may see wheels go around or where he may see action of some sort. Therefore we must anticipate his movements and make the entire station safe not only for our employees but for him also.

A great number of lifts in service stations do not have guides to insure that the lift will be straight when it reaches the floor. One time when I was having my own car greased I noticed a case where an attendant released the air pressure from a lift to lower it. Instead of remaining by it he went to his bench to obtain a tool of some sort, and during his absence the lift turned while lowering and brushed against a customer who was watching his car being greased. There was no damage except a grease mark on the coat of the customer, but such a condition might easily cause trouble.

The regular and systematic removal of all grease from lubrication floors decreases the slipping hazard for our customers as well as for our men.

I shall be willing to stand corrected in the following belief, but I think that a fire or explosion hazard is created at the time when greasing men spray the springs and undersurface of a car with air pressure atomizers which atomize a fairly light oil so that a fog of it appears around a car. I am wondering just what would happen if one of our customers should happen to light a match about that time in the immediate vicinity of that fog bank.

In the desire of the attendants to do a good greasing job they generally spring a car up and down while it is on a lift so that the oil will run into the springs, etc. Considerable effort is exerted in this operation and unless the attendants are careful they are liable to slip.

The grease hose which is liable to become oily on the outside and brush against customers' clothes is also a hazard for attendants. Two instances are known of where a grease hose burst during greasing operations and grease struck the attendants' eyes so strongly that several days were lost in each instance. A permanent eye injury might well be the result of such an accident. Aside from the humanitarian side of such a case, the dollars-and-cents cost to a company makes a thorough investigation toward the elimination of this hazard practical.

A common cause of accidents in our super-service stations arises from the loosening

of shackles by our attendants in order to force the grease in. A regular steel crow-bar is used for this and frequently the bar slips. The attendants have to exert considerable effort so when a bar slips they invariably jam their fingers. This often results in a lost-time accident.

It is impossible to drain thoroughly the crankcase on some cars unless the car is tipped. In order to do this attendants place blocks or jacks of some sort under the front axle so that when a lift is lowered the front end of a car will be higher than the rear. This slant permits the complete draining of the crankcase. However, this can create a hazard because the blocking is sometimes insecure and in certain cases it has been noted that the blocking rests on a castiron trap door for a drain pit which might crack under a sudden pressure.

Eye injuries are received when an attendant is standing under a car to grease it when acid drops from a battery into his eye. This is not a rare case.

The handling of tires in super-service stations creates a source of accident hazards. Tire tools are very clumsy and the entire operation of removing a tire from a rim, repairing it, and replacing it is not one for a temperamental individual. The result is that the attendant gets aggravated at the tire upon which he works and along with the probably justifiable cursing he works so tempestuously that his tools frequently slip so that there is danger of smashing fingers and hitting one's self with tools. A constant reminder of these hazards is necessary as well as the constant checking to see that the attendants are doing their work the proper way.

Tire racks have proven to be a hazard in many of our stations. There was little room for them so they frequently had to be hung from the ceiling. As a result, many of our attendants have bumped their heads on the sharp edges, and there is a good opportunity for men to stumble and fall when standing on weak chairs and ladders to reach a tire located perhaps eight feet above the floor level.

The inflating of tires on cars is a hazard common to all types of stations and the general conclusion that attendants should keep their faces away from the tires should be constantly brought to the attention of the attendants. Not long ago one of our men lost time because a pebble flew out of a tread due to the expansion of the tire, striking him in the eye.

Cuts, scratches and bruises arise when spark plugs are replaced. The same applies to the changing of fan belts.

I believe that quite a few super-service stations handle storage batteries today. This may become a regular service at all of our stations. Removing old batteries from cars is a difficult task because the nuts and bolts are often rusty, and only with the proper wrench and care can a battery be removed without a scratch or bruised finger.

I do not know how many companies insist that their attendants hold a cloth in their hand when replacing head-light bulbs. There is a splendid opportunity for a cut in this operation.

It appears that many super-service stations are selling new types of rear-view mirrors. In order to change the mirror a wrench is necessary and if one should slip there is a chance of an attendant running his hand through a windshield, which would result in both personal and property damage.

The winter months bring additional hazards. Alcohol and anti-freeze solution sales make it necessary for our attendants to thaw out radiators. This procedure is not free from burning hazards.

Recently I inspected a very modern super-service station, but although it is very attractive to the eye there are a few conditions which are not at all in accord with accident prevention campaigns. A brief review of new station plans in a search for accident hazards would assist in preventing hazards from arising.

Not long ago we experienced a rather serious explosion in one of our super-service stations. A tank wagon was filling one of our underground storage tanks. The vapors which were being displaced in the tank went out through the fill pipe and

apparently went into the basement of the station through a window located only a short distance from the fill pipe. A gas heating unit was in operation in the basement and when the proper percentage of air and vapor existed, an explosion took place which removed a part of the roof of the building. This is a hazard to which many stations are exposed. A more satisfactory location for this fill-pipe might have prevented this explosion.

The location of gas relief vents for our underground storage tanks is an important item, and tight fill-pipe covers are safety factors. A casual smoker might easily cause considerable damage when lighting a match near a fill-pipe which had not been closed tightly. This point should be considered because frequently our fill-pipes are practically next to sidewalks where everyone feels free to smoke.

It seems evident that our super-service stations are turning into almost general repair shops.

When safety engineers were called into refineries they found that their principal task was to try to break up unsafe practices which had been used for fifteen and twenty and even thirty years. The men had carried out their work in the same manner for so long that in spite of the fact that accidents were occurring now and then from such practices they did not see much sense in changing their methods; and even when they were ordered to do so it took almost constant supervision to make them do their work the safe way, until it finally dawned upon them that the safe way was invariably the best way.

Attacking the problems at the super-service stations should be infinitely easier, because although the super-service station is not a new idea, there is probably going to be a constant influx of them and as new stations are constructed the attendants in their original training may be instructed in the safe methods. Also when new services are added the safe method may be stressed.

It seems that there is no time more propitious than the present to attack the problem of accident prevention at super-service stations. It can be said that accidents can be easily prevented in refineries because there are hundreds and in some cases thousands of men on the same big lot where they can be constantly watched. Unsafe practices may be stopped as soon as they are noted. But this is a difficult step in super-service stations which are scattered all over counties and states in the case of some companies. One profitable step, however, can be taken and that is to train the men properly when they are first sent to a station, and to explain the operation of a new service in such a manner that the men will see the advantages of considering safety in its operation. From the construction and material standpoint, safe tools and equipment should be provided. It is easy to provide the safe type of wrench when the original wrenches are purchased for a new service, but it is mighty difficult and expensive to replace unsafe wrenches in dozens or hundreds of stations after these unsafe ones have been in use six days or even six years.

The purpose of this talk is to bring out a few points regarding super-service station hazards which will lead to a discussion of the subject. I appreciate that I have referred to only a few of the hazards and to those in only a general fashion. It is splendid to be able to talk over such a problem in a group because, although we may think that we have conditions which are peculiar to our own companies or to our own equipment, a discussion usually brings out the fact that they are pertinent to each one of us in some manner. As I have said previously, the present seems to be the propitious time to discuss these hazards because of the probability of the growth in numbers of super-service stations and I am sure that a good discussion and an exchange of ideas will assist us to prevent many accidents.

J. L. SWEETIN (Shell Eastern Petroleum Products Corp., New York City): I want to sympathize with Mr. Herbert. I have had plenty of the same troubles. One station in Baltimore paid out thirty dollars in five dollar bills to a lady. We also have had a lot of trouble on crankcase drain plugs. They are always in bad shape. I know of an instance where a curious customer got into a place where he should not be. A

wrench slipped off and hit him in the mouth and knocked out half his teeth. I think it cost in the neighborhood of \$1,000. Those are some of the things which we are going to have to endure.

CHAIRMAN DONOVAN: When Mr. Herbert was talking about the fellow getting covered with grease from the grease gun, I wondered how many of those accidents happened on purpose.

H. L. DISCHINGER (Shell Petroleum Corp., St. Louis): I have three questions to ask. First, on your lists, did you specify any toe clearance to avoid injuries?

MR. HERBERT: No, sir, we have not.

MR. DISCHINGER: We have established a standard in which seven of the eight leading hydraulic companies are giving one and one-half inches vertical toe clearance and six and one-half inches horizontally. Another thing is in connection with open grease pits. I wonder how many are putting hand rails around them.

H. N. BLAKESLEE (American Petroleum Institute, Dallas Texas): I didn't draw any conclusion along that line, but some are using rails around their pits. They drive the car over the pit and seat the customers in chairs to one side. It is not universal by any means. There are many open pits that are not protected.

MR. DISCHINGER: What is done in stations that are leased?

C. W. SMITH (Standard Oil Company of Indiana): We handle that by having it in the contract when the lease is made, that the contractor will, at all times, live up to the safety specifications of the Standard Oil Company of Indiana. At any time he does not do that, we pinch down upon him.

MR. DISCHINGER: In your spray gun and tank arrangements, do you have the grease container at the nozzle, or over near the air tank?

MR. HERBERT: The regulators sometimes don't work and I have found pressures up to 100 pounds and even up to 180.

MR. DISCHINGER: We had several sad experiences, which were not very costly, but they might have been. In a number of tanks constructed before the A. P. I. gave serious thought to pressure vessels and receivers, we had some tanks which were poorly welded. In one case, the bottom came out and we found it was just spot welded, and the slightest closing up of the relief valve or hose would give internal pressure enough to rupture. In one case the tank went to the top of the roof. Nobody was injured. We have gone into an extensive inspection campaign, bringing everything under hydraulic test, as a result of this explosion, which might have killed two attendants who were standing nearby a few seconds before this occurred.

J. W. MYERS (Standard Oil Company of New Jersey): I would like to ask Mr. Dischinger whether he corrected toe clearances on the lifts already in existence.

MR. DISCHINGER: We have corrected a great many, not all. As far as the ramp is concerned, that is flexible enough so that if it does come down and hit a man's foot there is enough flexibility to raise it. We had one corrected not long ago. After it had been in service and corrected for about a month and one-half, a fellow got under the only point that could touch him, the ribbon on the section where the side receptacle joins the runway. We just settled a case for \$285. He went up to see what his oiling guage showed and got his foot caught.

MR. HERBERT: How are the pressure tanks tested? Are they tested by the manufacturer?

MR. DISCHINGER: In each one of our divisions, we have a construction engineer with four or five assistants. They use high pressure hand pumps. Where we are running 150 pounds operating pressure, we are testing at 250 pounds. Where we are running super stations at 250, we are testing at 300. Our operators are instructed to open the meter valve at least once a week. Otherwise corrosion sets in and the tank may be reduced so rapidly you have nothing more nor less than a bomb in your service station after a certain point.

R. W. BLACK (Standard Oil Company New Jersey, Elizabeth, N. J.): We collected a few of the older vessels of questionable design and tested them hydrostatically. We found one corroded nearly through the bottom. We then tested some of recent design.

These were satisfactory. The lowest pressure in hydrostatic test was some 600 pounds. The second went to 1100 pounds hydrostatic.

MR. SMITH: I don't believe there is any great danger in spraying springs if you use a rather heavy oil. However, there is another problem. Not long ago we received a call at my office from one of our stations in Wisconsin, indicating that they were very much puzzled. Two men had been overcome with gas inside a super service station, and they were puzzled as to what had taken place. They believed those men, in spraying springs, had created so much gas vapor that they had been finally knocked out. Happily, the men came out of it in a short while, after they had been taken out of the super station.

Picture that station with six greasing pits in it. We found, upon visiting the station, that in flushing the cars, after draining the crankcase, they allowed for no ventilation. It so happened that on that particular day it was away below zero. All the doors had been closed, and they decided to flush all six cars at approximately the same time and run all six cars at approximately the same time inside the station. We found some other places where they were ventilating very badly.

We are experimenting with an air tube back of all the pits with loose connections to the exhaust pipes of the automobiles. They of course must work automatically in such a way that when an automobile pulls out it automatically shuts off that connection. The main air tube itself has an exhaust fan. I think it is workable, but whether or not it too expensive remains to be seen.

MR. DISCHINGER: We have tried that in our garages; each connecting tube is two and one-half inches in diameter. They run down to one common head. There is a natural stack draft with a pipe extending about twenty feet above the roof. In that way, we get sufficient suction to carry out any carbon monoxide fumes from the exhaust of the engine. We ventilate in the summer, but use this in our garages in the winter. We have tested garages with ten or twelve cars and have not found a trace of carbon monoxide.

MR. SMITH: With too many cars going at the same time, with one tube without a force draft, it seems to me you may get back pressure.

CHAIRMAN DONOVAN: I would like to advise that Mr. Curry is chairman of a subcommittee in the American Petroleum Institute which is preparing a safety pamphlet on service station operations. It is necessary to put out a new one, in addition to that of the Council. At that time, we had very few super service stations.

It has been thought wise that we have the rules for the 1932 contest presented to the Executive Committee of the Petroleum Section before we leave Chicago. The committee to do this will include Mr. Myers, chairman, Mr. Curry, and Mr. Roaper.

The personnel of the Nominating Committee are Mr. Smith, Mr. Prussing, and Mr. Curry.

The next subject is a round table discussion, to be led by H. N. Blakeslee, who as you know, was until the first of the year the Petroleum representative on the staff of the National Safety Council. He is still secretary of the Petroleum Section, but is safety engineer of the American Petroleum Institute, at Dallas.

Round Table Discussion

MR. BLAKESLEE: Mr. Chairman and Members of the Petroleum Section: It is, indeed, a pleasure to appear on a program where the audience is going to do all the talking. Before we call for questions from the floor, I have one more question to ask in regard to lifts. Ladies have been known to drive their cars into lifts, remain in the car while it goes up, later take a notion to get out of the car and forget they are several feet above the ground. What do you do to prevent such an occurrence?

MR. HERBERT: Prohibit any person to stay in the car when it goes up.

MR. BLACK: In our territory, a gentleman drove on to a lift and had a dog on the seat beside him. The gentleman, himself, got out but left the car in gear. After the car was up, the dog got down and laid down on the starter. The gentleman was injured in, thoughtlessly, trying to hold his car back on the lift.

CHAIRMAN DONOVAN: We require them to get out of the car altogether. The first thing when the car is on the lift, is to blow it out with a hose, and if they don't get out they get plenty of dirt.

WALTER B. MURPHY (The Atlantic Refining Co., Philadelphia): Do all companies use the same definition of lost time accidents?

MR. BLAKESLEE: I think so. The rules state if a man is injured and able to return to work at the beginning of the next regular shift it is not counted as a lost time accident. But he must go back to a regularly established job which he can perform with normal efficiency.

MR. PRUSSING: I must explain why we are not reporting our accidents to the Council. We feel a man should report back on his regular job and be able to do it satisfactorily; otherwise it is a lost time accident. I would like to see this organization definitely go on that basis.

CHAIRMAN DONOVAN: We have reported that way for two years; no more light duty in the company.

MR. HERBERT: I would like to ask Mr. Prussing about accidents in the yard for yard men who can do any one of a dozen or twenty different jobs. A man may be injured while swinging a pick or digging a ditch. The injury may not permit him to do ditch digging but may permit him to do any of the other twenty jobs in the yard.

MR. PRUSSING: Those cases come up, not frequently, but with a certain amount of regularity, and we have tried to lean backward. If a man is injured as a ditch digger, if you have to find a job on which he can work because of his injury, that is a lost time injury. You put them at light duty for reasons of morale or to increase their earnings or things of that sort, and it is a perfectly reasonable and proper thing. But it has no effect upon your statistics.

MR. BLAKESLEE: Is there any one who would like to take a position against the present rule of the Petroleum Section?

J. W. FREELAND (Standard Oil Company of New Jersey): I am wondering how that would affect our comparison with other companies outside the petroleum industry?

MR. BLAKESLEE: Other industries use the same one we are using. We would have the satisfaction of knowing.

JACK L. MANES (Sun Oil Co., Tulsa, Oklahoma): A few days ago, a man broke his finger while working on the floor of a rotary drill. He went to the doctor, had the injury taken care of, and came back to his regular job. He lost possibly two or three hours. Should that be counted as a lost time accident?

MR. PRUSSING: According to the present rule you do not count it. But I think the rule should be changed so it will be counted.

MR. MYERS: It seems to me we should not depart from the rules of the National Safety Council.

MR. SWEETIN: When a man is injured, if he can't come back to his own job, he lays off until he can, and the accident is counted.

MR. FREELAND: I favor light duty if such a job is available. It's better both for the man and the company.

MR. BLAKESLEE: Perhaps the answer to this whole question is to handle these cases just as stipulated in the present rules; if a man is able to return to a regular established position, don't count it. But when you return your men to work, be sure that you can attend church next Sunday morning and listen to the sermon instead of think about what you have done.

MR. PRUSSING: I would like to see the rule changed.

I don't think the actual effect on our statistics is of the slightest importance. There are not enough cases. You count them up and I doubt whether there are three or four in 500 that actually have to be ruled on in that way. But the moral effect is there, and that is important.

MR. DISCHINGER: Even though the percentage is very small, I think it is important. We had a record of 355 days in one refinery without a lost time accident. A fellow bumped his finger a short time ago, the only accident of any importance. Just before

I left St. Louis, I found this fellow had developed a permanent partial disability, through which our record of 355 days was broken. He has not actually lost a day's time.

I think the thing should resolve itself into one thing. So long as we don't create a job for a man and he does a useful piece of work in his particular department without interfering with the operation, I don't see why we should call it lost time.

W. J. UNQUHART (Colonial Beacon Oil Co.): How can you get men back to work who are able to return but won't come back?

CHAIRMAN DONOVAN: Take them off the payroll, if the medical department says they are able to work.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

R. E. DONOVAN, Chairman
Standard Oil Company of California, San Francisco, Cal.

The second session of the Petroleum Section convened with General Chairman R. E. Donovan presiding.

CHAIRMAN DONOVAN: It gives me great pleasure, at this time, to introduce Mr. H. J. Larsen, of the Willson Products Company, Reading, Pa.

Eye Protection in the Petroleum Industry

By H. J. LARSEN
Advertising Manager, Willson Products, Inc., Reading, Pa.

I am going to ask you to go back twenty years. We will call that the beginning of the industrial safety movement. At that time, if men wanted to wear goggles, it was thought to be weak and effeminate. Many hard-boiled men thought it was smart to confront all dangers with physical strength. That opinion has rapidly changed. Industry has spent thousands upon thousands of dollars, through you men, in doing educational work, both from a humanitarian as well as from an economic standpoint, to stop accidents. I think it has arrived today at a point where the labor of this country not only expects safety, but it seems to be a socialistic tendency to demand it; not ordinary safety, but the best safety that science and money can produce.

Just as scientific research and development have played a part in the petroleum industry and other industries, they have played a great part in the manufacture of safe appliances. For instance, in the early days, goggles were made with ordinary glass. The intensity of the hazard largely determined the thickness of the glass. The greater the hazard, the thicker the glass, and vice versa. Industrial operations, however, became so intense that ordinary glass wouldn't do. Finally a little optician up in the state of New Hampshire, in the year 1912 discovered a process for hardening glass, a process similar to that of case hardening steel. It seemed to be such a boon to the safety movement that it was accepted by all manufacturers and by all industries as a great thing. We and others went around the country with ball dropping machines, dropping little steel balls on the glass to show the great improvement in strength.

It seemed to be such a help at the time that no one ever questioned the character of a thing that could do so much good. In the goggle field, there were hundreds of thousands of dollars spent in buying goggles. The money has been spent largely by you men in doing educational work. Yet I think no one will deny that the results were hardly commensurate with all the money spent. Accidents kept increasing. The National Safety Council and the Society for the Prevention of Blindness estimated, that in the year 1929, there were more than 200,000 eye accidents. This is at the rate of two every three minutes, night and day for 365 days.

Getting back to glass, up to the year 1924-25, every industry had rather a bad eye accident experience. Probably the largest user of goggles in this country is the United States Navy, in ships and yards and docks throughout the world. Their eye accident experience had been so sad that it was finally called to the attention of the Secretary of the Navy. They had been buying hundreds of thousands of dollars worth of goggles in one year, and had about the worst eye accident experience you could imagine. They decided to make a survey and see whether they could find the reason for it. They sent questionnaires to yards and docks through-

out the world and asked why, in spite of the goggles they purchased, they continued to have so many injuries and lost eyes.

The answer was, as you have had it in every industry, "We cannot make our men wear goggles." Men complained of headaches, poor ventilation, ill fits, and everything that goes with the wearing of goggles. The major complaint was that of eye strain and headaches.

The Research Department of the United States Navy then decided to investigate all types of manufactured goggles in this country, particularly clear glass goggles. They found they were hard enough for all practical purposes but when they came to optical clarity and quality, they found this heat treating process had introduced a strain or poor quality in the glass that had not been there before heat treating. In heat treating of glass, we set up two strains, one in the exterior surface and one in the interior. The strain on the exterior is caused by the quick chilling of the glass after it is heated, and is known as strain of tension. The inside strain is known as the strain of compression. If those two strains don't balance, the glass becomes warpy and wavy causing eye strain and headache, and eventually leading to the need for correction spectacles.

The Government found this out in the year 1926. They called in leading manufacturers. In order to make sure we were on the right track, my own company consulted the leading men of this country and two of the leading men in Europe, all agreed.

The First Code Published

The Research Department of the Navy then laid down certain tolerances within which glass must come to be acceptable. I believe the first code was published in 1927. Later this was revised by the Federal Specifications Board, who on December 9, 1930, published a code on clear glass goggles, known as GGG-G501. It is mandatory for all government branches today to purchase in accordance with that code. Since that time, many large individual corporations have either accepted it in whole or in part, either as their own, or have embodied the essential parts of it in their own specifications.

Beside taking into account the quality and hardness of the glass, they also decided that the safety goggle should be somewhat larger. The old type of cup goggle had set inside the optical cavity, not resting on the bone but resting on the sensitive part of the eye. A man could be struck with a fast flying obstacle without breaking the glass or goggle, without hurting the eyeball, but seriously impairing the sensitive nerves around the eye. They specified that a fifty millimeter lens must be used (two inches in diameter) against the old one of forty-five or forty-seven. They also specified that cups must be molded right and left instead of made interchangeable.

I am now going to ask every one of you to imagine for a moment that you are an employer and the defendant in a civil court action, brought by a man whom you have hired who has been doing work which was eye-hazardous. You have provided the man with goggles. You have advised him of the danger in the work he is to do and the hazard to the eyes. The man has deliberately gone into the plant and has removed the goggles, and lost his eyes. Claiming negligence on your part, not his own, he brings suit in the civil court for \$25,000. He is represented by a shrewd lawyer.

The defendant, in court, states that he has hired this man to do work which is eye-hazardous, that he has provided him with goggles and the man failed to wear them. The counsel for the plaintiff admits all this freely but points out to the court that the goggles the man was wearing had bad lenses, and that no man could wear them without contracting a headache caused by eye strain. The cups were ill fitting and didn't provide as much ventilation as they should.

We will say you selected those goggles. All of the goggles from which you had to choose were the same price, one dollar and one-half apiece. The manufacturers all held them up to you as good goggles, all widely in use, and you used your own ordinary judgment, not knowing the technical side, in selecting the one you finally purchased.

When the counsel for the plaintiff points out to the court that you had selected those goggles and had entirely overlooked, either through ignorance or wilfully, specifications laid down by the highest authority we have in this country today, he immediately proves your negligence. Most of the juries are comprised of men who work with their hands, and there is not one out of a hundred, in a case of a poor plaintiff against a wealthy corporation, which would not render a good substantial verdict.

Take an actual case; a brilliant lawyer had as one of his clients a man who was said to have a cancer of the throat which again was said to be the beginning of silicosis. They couldn't prove, however, that he had silicosis. The case was tried in Newark, New Jersey. The employers spent nearly \$30,000 in defending the suit. They stated they purchased a respirator, one of a number held out to them by manufacturers as being in wide use and being a good respirator. It happened to be a few cents less in price than some others and they took it. They gave it to this man to wear.

In this court action, they were being sued for a large amount of money. They stated they had purchased what they thought to be a good respirator. They were fully aware of the hazards that existed in the industry, knowing the dangers of silicosis, that it was a progressive disease, and when once acquired could hardly be stopped. In view of this, the lawyer for the plaintiff brought to the jury the fact that this company knew a latent hazard existed in their plant, a serious one, yet they had not taken the time and trouble to find out how efficient the device was which they purchased for the protection of their men. This man, with a wife and family, was appearing in court in the most abject state of misery, suing for this amount of money. He was incapacitated, probably could not live more than two years. They had the ordinary jury and went through two or three weeks of testimony. The biggest point brought out was entirely apart from the merit of the case. I know of the safety appliance in question, personally, and think it good enough so if it had been worn the man would not have contracted the disease. Furthermore, they couldn't prove he had silicosis.

A Court Case

Let me read to you extracts from the judge's charge to a jury in a State Supreme Court: this related to another but similar case. "It was the duty of the defendant company to exercise reasonable care, that the place in which it set the deceased at work and the system or method adopted by it for doing the work should be reasonably safe for the plaintiff, and free from latent errors known to the defendant company, or discoverable by an ordinary prudent master under the circumstances. It was also the duty of the defendant company to exercise reasonable care and skill to provide safe machinery and appliances in which the deceased was employed, in keeping such machinery and appliance in a reasonably safe condition for such use, including the duty of making inspections and tests at proper intervals while he was so employed. If the defendant failed to perform this duty and the plaintiff contracted the disease from which he died, by reason of such neglect, the plaintiff can recover."

As I stated before, the counsel for the plaintiff proved that the company had been guilty of neglect. He proved that they had not taken reasonable care of the employee in seeing that the safety device given him was fit for the job. The jury came back with a verdict for that man for ten thousand dollars. This same com-

pany has pending against them in the state of New Jersey, between 190 and 200 cases of similar character.

If you are guilty of the same kind of neglect, you may suffer as this company did. Entirely aside from the merits of the specifications of the Government about which I told you, you have the duty of protecting your employees and saving their lives and limbs. You have to protect the pocket-book of your employer, to see that unfair advantage is not taken either way. You can do that without any additional cost to yourselves. It merely means becoming familiar with things as they are.

There may be peculiarities in your industry which may warrant a change from the specifications put out by the government. But there are certain basic principles involved which apply in all cases. No manufacturer has a monopoly on them and there are similar specifications for welding goggles, welding helmets, hand shields, and all kinds of head and eye protection devices, with the exception of respirators.

CHAIRMAN DONOVAN: I am sure we have all gained much from this paper. The members of our nominating committee include Mr. Smith, Mr. Prussing, and Mr. Currie, and we will ask the chairman to report at this time.

(Mr. Smith presented the report whereupon the following officers were elected:)

Section Officers for 1931-32

General Chairman—R. E. DONOVAN, Standard Oil Company of Calif., San Francisco, Calif.

Vice-Chairman—C. L. HACKETT, Texas Pacific Coal and Oil Co., Thurber, Texas.

Chairman, Atlantic Division—E. R. ALMER, Vacuum Oil Co., New York, N. Y.

Chairman, Great Lakes Division—J. C. BEARD, Sinclair Refining Co., East Chicago, Ind.

Chairman, Mid-Continent Division—LOUIS R. HOBBS, The Carter Oil Co., Tulsa, Okla.

Chairman, Gulf Division—A. W. BRIZZLAND, Lone Star Gas Co., Dallas, Texas.

Chairman, Rocky Mountain Division—T. N. SHAW, The Midwest Refining Co., Casper, Wyoming.

Chairman, Pacific Division—R. B. HECOX, Standard Oil Company of Calif., Bakersfield, Cal.

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Engineering Committee Chairman—H. E. DISCHINGER, Shell Petroleum Corp., St. Louis, Mo.

Publicity Committee Chairman—J. L. RISINGER, Magnolia Petroleum Co., Beaumont, Texas.

Program Committee Chairman—B. V. OSBORN, Standard Oil Co. (Ind.), Casper, Wyoming.

Statistics Committee Chairman—J. W. MYERS, Standard Oil Co. (N. J.), New York, N. Y.

Health Committee Chairman—DR. C. M. AYES, Humble Oil and Refining Co., Houston, Texas.

Past General Chairmen

R. S. BONSA, Standard Oil Co. (N. J.), New York, N. Y.

V. R. CURRIE, The Texas Co., New York, N. Y.

Geo. F. PRUSSING, Union Oil Company of Calif., Los Angeles, Calif.

E. J. SENNE, Vacuum Oil Co., New York, N. Y.

D. J. WALLACE, Mid-Continent Petroleum Safety Council, Tulsa, Okla.

C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.

Secretary—H. N. BLAKESLEE, American Petroleum Institute, Dallas, Texas.

CHAIRMAN DONOVAN: We will now hear from Mr. Walter B. Murphy, of the Atlantic Refining Company, Philadelphia.

Development and Use of Safety Codes in Refineries

By WALTER B. MURPHY

Director of Plant Personnel, The Atlantic Refining Company,
Philadelphia, Pa.

The safety code as used in our company is a development of what we called our plant regulations. In any particular line of work such as spray painting, cleaning tanks, docking boats, handling tetra-ethyl lead, boiler house operation, cracking still operation, we have written up plant regulations for the guidance of plant superintendents. These regulations are made up in mimeograph form issued by the plant manager under serial number and the year. They are reviewed, and revised if necessary, at regular times, usually annually. They are placed in binders held by each superintendent or department head.

In the form originally given out these instructions were for the use of supervisors. Our general safety committee felt that copies should be put into the hands of every worker affected by these regulations. We soon found, however, that the type of rule book required for the ordinary workman was very different from that required for the superintendent. In some cases we made the plant regulation in two parts; one containing all matters which pertained to the duties of the supervisors and a second part, called by us a safety code, of which we made enough copies not only to go in the superintendents' plant regulation binders along with the master regulation, but one for each worker in the department affected. The result has been the adoption of a series of safety codes for our workers which are written just for the workers. There is a considerable volume of data and instructions in the plant regulation on the same subject which applies only to executives or requires executive action.

We have hardly gone far enough in the introduction of safety codes in our refinery to warrant our telling you about this work in any authoritative way. It is only for the purpose of discussion and to bring out what other refineries have done that we think this paper can be of value in discussing the use of safety codes in a refinery.

Twenty Codes

At the present time in our refinery we have twenty codes in use in the following divisions of our work:

Boiler Shop	Leadburners
Boiler Makers—Field	Loading Racks—Loading Tank Cars
Blacksmiths	Machinists
Bricklayers	Painters and Pipe Coverers
Carpenters	Painters and Spraying
Case and Can Dept.	Pipe Fitters
Crane Operators	Pipe Shop
Electricians	Riggers and Rigging Equipment
Laborers	Steam Boiler Houses
Laboratory Workers	Welders

We contemplate adding the following to this list:

Acid Department	Filter House Operation
Asphalt Manufacture	Firemen
Batch Still Operation	Gas Department
Candle Works	Lubricating Oil Treating
Cleaning Department	Naphtha Treating
Cooperage Department	Paraffine Wax Manufacture
Cracking Code	Pipe Still Operation
Drainage Department	Pumping
Drum Shop	Stores Department

About a year and a half ago we made an attempt to revise our employees' hand book which contained information regarding hours and working conditions, also some few safety rules and regulations. We planned to make the safety section much more comprehensive than it had been and to cover all departments. After we had collected all the ideas to go into this type of hand book, it was found that the safety section was entirely too voluminous for any one man to read thoroughly. Only a small portion of the data and information in this rule book applied to any one man in our refinery. We therefore came to the conclusion that our employees' hand book should not contain any safety instructions or rules except those of a general character which would apply to our whole organization. It was decided to divide the safety section of the hand book so that a small leaflet could be issued to every man in the organization containing what he should know about safety.

At the time that we decided to make this change in our method of publishing safety rules, we inaugurated a new idea with regard to safety education. Our general safety committee was organized and made up of only six members. This committee started out with two definite ideas. First—in the list of contestants in the National Safety Council Petroleum Section Contest we were entirely too far removed from the top (or best or safest) company. If our method of reporting lost-time accidents was the same as other companies we should certainly improve our accident record. Second—after going over our 1929 accident record we found that 85 per cent of our accidents in that year were due to unsafe conduct of the injured man or some fellow worker and not due to any defect in the physical equipment of our plants.

A Foreman's Safety News Letter

In our refineries, for the previous eight or ten years, we had had a very thorough inspection of all departments by our safety department. Our permit system for the use of fire in gaseous places was very complete and every other phase of inspection work. We were still having an accident frequency rate of eight or ten for every million hours of exposure. We came to the conclusion that our safety department could do little or nothing toward reducing the number of unsafe conduct accidents by changing the type of equipment or any physical parts of the works. We decided we would educate every single one of our men for safe conduct in an entirely different manner from what we had done in the past. We therefore introduced the *Foreman's Safety News Letter* for educating the foremen, and a quarterly educational campaign going on for one week in which we would reach the individual workers in a number of different ways.

We proceeded to analyze the best method of teaching safety to 3,500 or 4,000 men in our principal refinery at Philadelphia, planning later to extend this work to our other refineries. We, of course, have been carrying on a considerable amount of educational work over the previous eight or ten years in all sorts of different ways, just as most other large businesses have done. We soon came to the conclusion, however, that we wanted our men to know certain things and we wanted to be sure that they did know them. The "being sure" part is, in our opinion, the most important part; that is, to know that every man has been reached with the information and that he has absorbed this information in such a way that he can make use of it. It was decided to use exactly the same methods that would be used in a school to teach the same sort of facts. We would give our men the information in one form or another, then give them oral and/or written examinations to find out whether they had absorbed at least a small amount of this information. The methods already used for giving out information consisted of posters, signs, safety magazines such as the *Atlantic S. O. S.* and the *Foreman's Safety News Letter*, contests which we have been carrying on among our various departments, campaigns of one kind or another, exhibitions and all of the other educational work which goes with the elimination of accidents, together with the one additional idea of issuing to all of

our men a safety code which should contain all the rules for safe conduct and a list of hazards surrounding the work.

We decided that handing out information and making sure that our men had a firm enough hold on this information to make use of it were two entirely different things. Numerous campaigns which had been held previously in the month of October for educational work along safety lines consisted chiefly of talks or lectures to groups of 400 or 500 men. We knew that lecturing was not a successful method of impressing upon a man's mind any particular information. We had felt, however, that if we could do a certain amount of talking to men in small groups, give them a pamphlet containing rules and regulations, and then give them a written examination on the subject as presented we would accomplish several things. We would, first, know that the man in question was reached by our safety message; second, that it had sunk in and third, that he knew enough about it to be able to answer four or five questions on the subject of safety in his trade or department.

So far we have only turned out from our safety department safety codes for about half the men in our refinery. We are still in the process of getting these together and issuing them to our men. The men keep these codes in their possession. They are checked out to them and a record card in the employment office is stamped to this effect. When the individual leaves the company this record is checked and booklet returned. These codes are so short that they are read by the worker in a very short time. The method used in our last five campaigns to check up on our men during the education week that these campaigns ran, was to give each man coming into the gate a questionnaire which required his answering three or four general questions. The worker is then required to sign his name, check number and department and turn the slip over to the foreman. The foreman checks the answers as to correctness and slips are then forwarded to the superintendent who checks up to see that all men have turned in the questionnaires. They are then sent on to the safety department where they are checked to see if all the men working on particular days have turned in questionnaires. Every man is supposed to answer this questionnaire in his own handwriting. In some cases where the worker cannot write the foreman has to assist him.

Foremen Hold Departmental Meetings

During these quarterly campaigns every foreman has a meeting with his men for a period of from fifteen minutes to half an hour in groups of not over twenty. At these meetings we distinctly instruct the foremen that they are not to lecture or preach to their men but to ask the men definite questions about accident hazards, safe conduct, etc. The bases for these questions are taken from the safety codes for the various trades.

It does not seem to us it is essential that these codes be absolutely thorough and comprehensive. We are using them as an excuse for a contract on the safety question between the supervisor, foreman or pusher as the case may be and his individual men. We feel that the safety code is a text book for the safety class just as any school text book would be for a school room.

As stated, we have always been fearful in the past, before this type of code and questionnaire campaign was inaugurated, that our safety work was going over the heads of our men—that it was not reaching them. One of the educational features of the use of safety codes that we find particularly valuable is the education it is giving to our foremen in getting these codes together, since we have asked the foremen in every case to submit the safety code and then, after the safety department has made any additions or corrections, to correct it. To get together a code and then ask questions regarding it from their men, requires considerable concentration on the part of our foremen on the subject of safety. If we did nothing more than educate

our foremen thoroughly in this matter, what to look for and how to prevent accidents in their departments, we feel it would be worth while. The safety code is the central point around which we expect to swing our educational work.

Although we have had five or six educational campaigns in which we have tried, as described, to reach our men through posters, codes, questionnaires, recitations, etc., and although some of our people feel this method has lost its novelty, the safety department still does not feel it has lost its effectiveness and we are sure it has reached all of our men in a fairly effective manner.

As a fundamental principal in our educational work in these campaigns and also through the intervening period, we have attempted to do all of our work through the line organization in the various departments, asking each foreman to organize his own safety committee and each foreman's safety committee within the various groups to consist of various supervisors and pushers.

Foremen Are the Teachers

It has been our purpose that the line organization foremen should be the teachers rather than any person from the safety department. Although this refinery has a fire and safety department of some 18 or 20, we have not attempted to use them alone in this work. Although they may know more about the technicalities of fire and accident prevention, they cannot constantly be present in all departments for carrying on safety work and instruction. We feel this is a detail of regular manufacturing operation and must therefore be taken care of in the long run by the group supervisor and foreman. We feel it is the safety department's job to see that a foreman is put into possession of all the facts with regard to hazards and prevention methods within his department and in general how to prevent accidents. The safety department is to give all detailed and technical assistance required in the planning of methods of attack in this educational process, to carry on certain investigations of physical equipment and supplying expert knowledge such as passing a tank as being gas free preparatory to carrying lights or doing welding in such tank.

We are strongly against the safety department questioning men at safety meetings or lecturing to them. We feel that the foreman's authority with his men is greatly strengthened when he is able to get up on his own feet and tell his men about what is wanted in the way of accident prevention and then to question them to see that they know the proper procedure in the presence of various accident hazards.

Although our safety codes do not carry any penalties for disobeying instructions, we are now beginning to stress the subject of the necessity of self-discipline as well as the maintenance of discipline by superiors. We are now also beginning to insist on foremen and superintendents penalizing their men when they deliberately disregard instructions laid out in safety codes. Where instructions are definitely laid down in a safety code and then disobeyed, we have a very good reason for either reducing the man's rate of pay or laying him off for a number of days. We have felt that penalizing men for having accidents in the past has done some harm to the safety movement where there was no direct prohibition against certain acts. In a good many instances this was more a case where the man had lost time due to the accident, since he had probably been penalized sufficiently by the loss of time and suffering.

Where men deliberately disobey rules as laid down in written safety codes we are giving them additional time off or demoting them to a lower paid job for a short period. This is all done, not with the idea of injuring the man, but having him serve as an example to all our employees that we do not stand for the breaking of these written rules.

Our accidents continue to be largely of the unsafe conduct type. Very few are due to defective physical equipment or to unsafe practices, either unknown or tolerated. We therefore propose to continue the educational method of questionnaires and recitations about instructions given in the safety codes.

CHAIRMAN DONOVAN: Our next speaker is Mr. R. W. Black, Chief Safety Engineer, Standard Oil Company, New Jersey.

Refinery Safety Standards

By R. W. BLACK

Chief Safety Engineer, Standard Oil Co., (N. J.), Elizabeth, N. J.

By our various safety standards we endeavor to make the experiences of many available to each one of our employees and to pass this accumulated experience along to our new workers.

In considering these various safety standards, codes, working procedures, specifications, etc. which influence refinery operation, it is apparent that the majority of these codes cover safety to a greater or less degree regardless of whether their principal consideration is safety or not. Considering those codes or standards which apply to safety in one way or another, it appears to me that they divide themselves into three general groups:

Group I Safety Standards applying to individual operation or the procedure followed by an individual in performing a specific job or in the operation of a major piece of refinery equipment. A set of operating rules of this type may cover in detail the duties of a complete crew of men.

Group II Standard Specifications Covering Refinery Material and Equipment.

Group III Maintenance and Inspection Standards.

These three groups of standards will cover the material that enters into your refinery equipment, the procedure followed in operating and maintaining it and a procedure of inspection to assure that the equipment has not deteriorated below safe limits.

Experience Has Dictated the Standards

Our experience has primarily dictated what these standards or operating codes contain. Many of their provisions are the direct result of previous sad experience, which we endeavor to prevent by careful instruction to our men giving them in many cases a thorough understanding of previous troubles, their cause and how they can be prevented. The particular standards in any of these groups, which are most applicable to your plant may not be those most valuable to another plant, since refinery operations will vary quite a bit from one plant to another or from one section to another because of numerous different conditions applying.

A few safety standards coming within each of these groups will be mentioned as an indication of their scope.

Group I Safety Standards applying primarily to individual operation. This group would include:

- a—Safe Practices in cleaning petroleum stills.
- b—Safe Practices in loading tank cars (Gasoline).
- c—Regulations pertaining to the operation of fuel burners.
- d—Regulations for welding, burning and hot work in refineries.
- e—Goggle Code.
- f—Handling material.

Several additional safety standards or refinery rules could be mentioned in this group that would apply to safety in refinery operation or the mechanical trades required for maintenance and construction work.

Many of you have contributed to the preparation of one or more of the Safe Practices Pamphlets of the National Safety Council. Certain of these Pamphlets,

which appear to have little or no connection to oil refinery problems, have been helpful to me.

Group II Standard Specifications.

Another most important group of standards influencing the safety in any refinery is the classification which would come under specifications for material. While we do not prepare this particular group of specifications, it is our duty to be sufficiently acquainted with them to be satisfied that the material selected for the equipment in question is safe. In this respect emergency conditions must be considered for certain classes of material may satisfactorily answer the requirements of operation but must be made to withstand fire conditions or other contingencies.

Much valuable assistance in this respect can be obtained from standards which have been prepared by the American Society of Testing Materials. The American Petroleum Institute have likewise adopted a considerable number of standards applying to various types of equipment used about refineries and more particularly throughout the producing sections. The American Standards Association have also a considerable number of various standards applying to materials and also safety codes, many of which would come within the first classification.

The Standards Grow in Importance

From a safety standpoint this group of safety standards is becoming more and more important since our refinery operations have changed radically in the last few years and are continuing to change in respects that require the use of materials best suited for the service in question.

The following general type of standard specifications are available.

A. S. T. M. Still Bottom Steel.

A. S. A. National Electric Code.

Group III Maintenance and Inspection Standards.

This third classification of refinery standards applies to our maintenance procedure and under this heading I refer particularly to the procedure followed in maintaining our various new types of refinery equipment which are so radically different in design and construction from the older refinery apparatus that the older methods of maintenance are not adequate to assure the proper maintenance of this new equipment. Under this classification, which may be difficult to outline in a code, I wish to emphasize the necessity of having each major piece of equipment completely surveyed at sufficiently frequent intervals to assure that the equipment is maintained at all times in safe condition. To attain this end, very complete records are necessary concerning the rates of corrosion which apply on various parts of the equipment and the ability of various materials which are used to withstand this corrosion.

Definite minimum limits should be established for the essential parts of the equipment so that replacements can be anticipated in advance. There are a considerable number of variables which will influence the life of various parts of the equipment. These records will soon indicate the influence of changed stocks and operating conditions on corrosion.

The standards that could be classed under this group would be:

1. Tables of Limiting Thickness for tubes and piping.
2. Allowable safety valve setting for drums according to their design and deteriorated thickness.

Two valuable aids in the establishment of these limits are the Boiler Construction Code and the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers.

It is impossible to state that any one of these three general classifications is more important from a safety standpoint than the others. A program of carefully balancing the three together so that we are assured that the best material known for the service anticipated is used and that the equipment is then operated carefully by

experienced men will give us a feeling that the best and safest equipment has been provided. This equipment will only remain safe if it is carefully and regularly inspected in sufficient detail to be sure that it has not deteriorated beyond certain definite safe limits.

By a safety program of this type, influenced by definite standards, our refinery accidents can be reduced.

CHAIRMAN DONOVAN: I want you to know I sincerely appreciate the honor of again being general chairman of this Section. I shall do my best to carry on as you wish me to carry on. We are all subject to criticism, and I hope no one will hesitate to offer constructive suggestions at any time.

ADJOURNMENT

Thursday Morning Session October 15, 1931

R. E. DONOVAN, Chairman

Standard Oil Company of California, San Francisco, Cal.

The third session of the Petroleum Section convened with General Chairman Donovan presiding.

CHAIRMAN DONOVAN: Our first speaker is one of our youngest members at these sessions every year. Mr. Sutton has always something good to talk about; he talks sense.

Operating a Pipe Line Without Accidents

By J. P. SUTTON

Manager, Department of Industrial Relations, The Ohio Oil Company,
Findlay, O.

Possibly some of you are not particularly interested in this subject, since not all oil companies own and operate pipe lines. But we are all, more or less generally, interested in accident prevention in every industry or branch of industry as well as in the home and on the highway. In pipe line work one finds hazards similar to every department of the oil business, such as fire, explosions, stumbling, falls, falling material, infection, etc.

Many excellent discussions have been printed in recent years about pipe line safety. I will refer to only two of them—the National Safety Bulletin No. 4 and Albert W. Breeland's fine paper delivered before this body last year and recorded on page 328 of the 1930 Safety Congress Proceedings.

Excellent rules of procedure have been laid down for the guidance of field men but I fear few of those who should read this literature ever see it. I mean, the ones who manage and work at pipe line operations are not usually privileged to attend such meetings as these nor are they furnished good discussions to read.

The mechanics of pipe lines and the machinery and tools have been greatly improved these last few years, but the knowledge about men has not made such progress as could be desired. I have no doubt but that men in charge of pipe line construction and operation know far better than safety men the proper practices (they may not do as well as they know) in securing right of way, surveying right of way, clearing right of way, digging ditch, blasting ditch, stringing pipe, laying pipe, testing pipe, filling in ditch, and finally operating the pipe lines and carrying out their company's policies, such as good housekeeping, and low cost of operation which includes accident prevention. In most cases their knowledge comes from the hard school of experience and it is usually a rich one, but because they have been around dangers all of their work life, they may have become hardened to them and really do not see hazards with the same eyes as a safety man. They are usually reasonable fellows and when the safety man or supervisor points out dangerous practices or conditions existing, they usually respond to a sensible suggestion. The safety man is essentially a suggestor, and there is great power in a suggestion when tactfully given.

It has been brought to our attention many times that the key to accident prevention, as well as profit returns to a company is the foreman. I agree that the foreman is a very essential cog in the wheels of industry, but I cannot blame him for everything that goes wrong. One scarcely ever hears of a foreman receiving much credit for the success of a company but one does hear of officials higher up getting such credit. I am therefore inclined to think that censure for accident failure should go

where credit usually goes for success. At least let us be fair enough to say, each individual who has been responsible should bear his just proportion of blame as well as success. People do not usually like to hear facts, especially if they be disagreeable. Therefore if some managers should happen to read these remarks, I will expect some of them to disagree with me.

Most people agree that the success or failure of industry is justly ascribed to management and if an analysis shows higher officials are lax in any of their duties they should receive censure as well as a foreman or worker. I am convinced that accident prevention is as much a duty of management as it is the duty of the foreman and workers. I believe it is the duty of management higher up, rather than the foreman, to build a capable organization, but since we agree a foreman is a very essential cog in carrying out the policies of management in an organization, why do not companies have more capable foremen? I can only blame management, because they select and appoint foremen, usually from the ranks and oftentimes without careful consideration as to whether they have the qualifications necessary.

A layman can judge of a foreman's ability as a supervisor after having looked over the jobs in his district. If conditions are dangerous, housekeeping poor, and a general run down appearance exists, you feel he is a poor foreman; you also know that the management higher up should know this, if they have inspected and supervised the foreman as he is supposed to supervise his workers. To illustrate the value of foreman supervision by management I quote from the report of a safety meeting held in Eastland, Texas, on July 24 of this year. Some of you may not have received this report. Surely management had not inspected these plants or else they were lax in discipline:—

Two Instructive Plant Visits

The first talk on the program was presented by Mr. L. H. Taylor, Construction Superintendent of the Lone Star Gas Company, on "Accident Prevention in Construction Work." Mr. Taylor dwelled strongly on the foreman's responsibility for the control of accidents in this type of work. He also emphasized the attitude of the foreman as being of vital importance in accident prevention. Mr. Taylor illustrated this point by relating a personal experience he had while he was chief engineer of a compressor station in Oklahoma.

He said he had an occasion to visit a compressor station of another company in the vicinity and found the entire plant in a very unkept condition. He approached the engineer on duty, made himself known and the man immediately began to knock his own company, saying that they did not appreciate anything their employees did for them and that they could not get the necessary tools and equipment. Mr. Taylor then inquired as to the whereabouts of his foreman and he replied, "Oh, out there in the office, I suppose, that's where he usually stays."

Mr. Taylor then went to the office and asked the man if he was the foreman and he replied in a gruff voice, "Yes, what do you want."

Mr. Taylor explained that his mission was simply to attempt to gain a few ideas from another company's plants and the foreman began a tirade of knocks against his company, complaining that they did not appreciate anything he did for them and that they did not give him anything to work with.

A few days later Mr. Taylor had an occasion to visit another plant in that vicinity. The plant and yards presented a very neat appearance, the machinery looked spick and span, and apparently was running very efficiently. When he made himself known to the engineer on duty, the man greeted him very courteously and showed him around the plant. In response to some questions from Mr. Taylor, the man let it be known definitely that he believed himself to be working for the best company in the world. Mr. Taylor inquired where his foreman was and the man said that he was out in the shop.

Mr. Taylor then went out to the shop to meet the foreman and was greeted by him in approximately the same manner as by the engineer. When questioned, he too, replied that he believed that his company was the best in the world and that they appreciated what their employees did for them and that they gave them any necessary material and equipment; also that they provided healthy and sanitary working quarters for their employees. The strange thing about this story was that both of these plants were owned and operated by the same company.

I have just recently finished an inspection of our company pipe lines and I know why our accident record is good. There is hearty interest in accident prevention from top to bottom in our pipe line organization. The few accidents we have had are from the casual and inexperienced worker but from this kind of worker I see no escape. From this class, also, we secure our permanent force. It is not always possible when a rush job occurs for the foreman to secure all good safety-minded men and I presume no man ever will be wise enough to select all safety-minded men at such times. He selects able bodied men but he cannot know about their mental condition until after observation, when the elimination process takes place. He should, of course, introduce the new man to his job and caution him regarding outstanding dangers but he cannot possibly think of all the ways in which a man may get hurt, neither can a foreman always be on guard to see that a man will not get injured.

A General Rule to Prevent Accidents

I asked one of our superintendents recently for a general rule to prevent accidents. His reply was, "Use your head." I presume that is good general advice since there is no mathematical formula for accident prevention. I have known men who have worked many years without an accident and after looking over their job and talking with them I must conclude they think first and then use their hands which is another way of saying "Use your head."

It was pointed out to us last year by our lecturer on psychology that a greater knowledge of Human Nature would provide the solution to many accident problems. Personally I will never look at accident prevention again like I did before Prof. Melrose gave us the formula "Stimulus—Organism—Response" (S. O. R.). We as safety men must study not only the laborer, but the foreman, district foreman, superintendents and even higher officials, so that we may be able to apply the best possible stimulus to get the proper response and arouse desire on the part of the entire organization to prevent accidents. It is a big job—too big for some of us because we cannot sell our entire organization and because we cannot the fault is likely ours.

We all know about mechanical devices (posters, guards, goggles, rules for do's and don'ts) and these are excellent. In fact any device or suggestion which can bring the safety thought to workers is good, but the thought I am trying to bring to you is, what can we as safety men do to secure a fine type of assistance from our management? I cannot even suggest how you must go about solving your problems—that is your job and must be done in your own way.

F. A. Lauerman, safety engineer of the Interstate Iron and Steel Company of Chicago, suggests eight ways in which the foreman can help eliminate accidents in his department. They are reasonable but the problem for you and me is to get these before our foremen and managers in such a manner that they will be accepted. I quote them—

1. "Start the new man right." (Good raw material can be spoiled by a poor teacher).
2. "Maintain Safety discipline." (A foreman cannot control others if he have poor control over himself).
3. "See that tools and machines are kept in repair and adjustment."
4. "Know the dangerous places and practices in your department."

5. "Investigate all accidents and recommend methods of prevention."
6. "Put safety on the same business basis as production."
7. "Good departmental housekeeping."
8. "Proper care of all slight injuries."

If the foreman be up to or near the standard we should expect, he will be effective in keeping down accidents. If not, management higher up should see that he improves his qualifications or replace him with the type of leader who can carry out company policies.

Again I say it is the business of management higher up to check foremen and see that company policies are being carried out. Interest shown by the management in accident prevention is a wonderful builder of morale all down the line and the men as well as foremen are quick to sense it and will respond to the company spirit.

Discussion

H. E. DISCHINGER (Shell Petroleum Corp., Houston, Texas): Our company has had considerable experience and we also conducted a lot of research on bonding tank cars. There has been a lot of propaganda about putting insulated joints in rails and bonding rails. That is not necessary. Very recently a tank car blew up in a plant we had just taken over. So, immediate investigation was started and we found that there were stray currents in the plant of sufficient intensity to cause a large flash which, after a number of times, caused this tank car to blow up. It charged the car entirely. There is a definite way of bonding and grounding tracks by which we can absolutely eliminate stray current and static. That is, by placing a joint and a ground connection at each end, standard insulating of the unloading spur, and placing jumpers at every joint in the spur. Another precaution is to ground the track. Otherwise, static may accumulate on either or both sections of insulated rail. Not long ago, I heard that a moving truck spanned both rails and caused a fire that resulted in considerable loss. You have got to ground the track and insulate it from any possible stray current, electric line or a possibility of a short circuit that might come through from the equipment on the outside and I think that you dig your ground down to moisture. I shall be glad to send you blue prints of our standard bonding, grounding, and insulating methods.

Several years ago, in January when the temperature was sixteen below zero, I was called out at one-thirty in the morning by the superintendent. The men had walked off the job on the light agitators because there was sufficient electricity on the agitators to knock them down. I asked if the lights were burning for if they were, it couldn't be a short. He said, "You had better come out." I went out and found the lights were burning and everything looked very fine on the agitators. They charged the agitator with gasoline and sulphur (approximately twenty-eight pounds) and anyone who touched the shell of the agitator got knocked down. I said it was static electricity. I went on top of the agitators and, of course, the batch had settled down considerably and there was no indication of static. I wasn't satisfied so we charged a second under the same conditions. Immediately after charging we went to the top and looked into the agitator and the top of the liquid was three feet below the top of the agitator or walkway. We introduced sulphur and agitated it with air. There was one of the most beautiful sights you ever looked at. If there was one, there were fifteen streaks of static electricity from four to five feet long playing over the top of this high test gasoline. It didn't explode for the concentration was too great. We now have good static eliminators in every agitator.

CHAIRMAN DONOVAN: A question has been submitted: How do you eliminate the spark on magnetos in gas plants?

R. S. BONSH (Standard Oil Company, New Jersey, New York, N. Y.): I don't think that a magneto should be used.

Geo. F. PRUSSING (Union Oil Company of California, Los Angeles, Calif.): I think you will find that pretty nearly every gas engine today is equipped with a magneto and I don't know how you are going to get away from it but there are devices on the market for shorting the magneto and stopping the engine, if you want to stop it that way. Most people stop it by shutting off the gas and letting the magneto run. The devices on the market for shorting magnetos are perfectly satisfactory and cheap.

Mr. BONSH: Your magneto is sparking all the time your engine is running. I can't see the practicability of a magneto.

Mr. PRUSSING: I have never seen one that sparked.

CHAIRMAN DONOVAN: I can't tell you off-hand what we do, but I know that we don't have any trouble. I shall be glad to dig into it and send the information to you.

It is time to pass onto the next paper. There is one man in the section this year who has contributed a whole lot in these discussions. I think the information he has given us is very valuable so we look forward to getting a lot more valuable information out of his paper which comes next. Mr. H. E. Dischinger.

Prevention of Oil Field Transportation Accidents

By HUGH E. DISCHINGER

Chief Safety Engineer, Shell Petroleum Corporation, St. Louis, Mo.

A short time ago I had occasion to talk to one of our superintendents of automotive equipment in the oil fields, who brought up the subject of penalties imposed on truck drivers for carelessness in handling their equipment. He told of advising a certain driver of a small penalty which had been imposed upon him for a minor accident caused through negligence and an infraction of a company safety rule. The truck driver accepted the penalty very graciously but later retorted, "If youse birds had to herd one of 'dese' cans twenty-four hours a day, with bad brakes, engine hitting on three, over rough roads, with twice the load the truck is made for, you'd think twice before you'd penalize a bird for a little accident that couldn't be prevented."

Although in this particular case, the driver's alibi was grossly exaggerated as regards the equipment he was driving at the time, he was no doubt giving a very comprehensive picture of a not unusual combination of circumstances confronting all of us in oil field transportation today.

Let us pause for a moment to analyze the statement of this common variety of individual upon whom we place a world of responsibility and yet regard as only a truck driver, scarcely one degree higher than the commonest laborer or roustabout.

You remember that he mentioned having to "herd one of those cans 24 hours a day." How true this statement is in many cases! All of you gentlemen know that emergencies often arise when 500 feet of 6½ inch casing, or a mud-hog, or coil of cable or a crown block sheave is wanted right away, if not sooner. If it is not available at the particular field where it is needed, the truck driver may be sent 60 or 70 or even 100 miles away to get the material. What happens? Truck driver and truck light out in a cloud of dust, forgetting his lantern, binders, or something else of importance, with no regard for life or property and with only one thought in mind, "Make Haste."

Should he tear down a fence, scrape a fender, back into another object or momentarily fall asleep through driving long hours, it is considered only a matter of minor importance. "Drilling must go on at any cost." I would hazard a guess that 85 per cent of all this rush transportation is the result of lack of forethought, and this lack of forethought is the basic cause of most accidents.

Next, the driver said his truck had "bad brakes." Bad brakes on oil field trucks

are like the leaking roof. When it's raining we can't fix the roof, and when it's not raining we don't need it fixed. So it is with bad brakes in many cases. As long as it can operate, it's important that the truck is kept in service and when the brakes fail and an accident results, we usually frame the most plausible alibi "it was an emergency case."

Let me say here and now, that any truck driver who drives a truck with poor brakes, knowingly, is a definite risk and a distinct liability to his company.

Our driver also mentioned driving with "twice the load the truck was made for." Overloading of trucks as well as overloading other equipment beyond their specified capacity has been responsible for the loss of many lives and much damage to equipment. Because we can conveniently load 10,000 pounds on a two-ton truck does not mean that the truck can conveniently or safely carry that load. It means, rather, that we are trying to do two men's work with a boy, and more than that, we are introducing many additional hazards such as skidding, overturning the truck, overloading the brakes, making the truck harder to handle. There is also the item of wearing out equipment at a rapid rate, thereby increasing transportation costs.

About two years ago I saw some evidence of this very thing, when a 300 horsepower motor, weighing 4,400 pounds, was loaded onto a 3½-ton truck. The truck went into a skid on a slight incline shifting its load and crushing the driver to death.

This accident was analyzed and numerous errors were charged against the unfortunate driver who could offer no defense in his own behalf. Among the things he did wrong in the minds of those who were called upon to place the responsibility in this case were "overloading a truck, removing chains when there was a thin film of ice on the road, driving too fast on a slippery road and especially down a slight grade, and failure to properly block the load to prevent shifting."

The real cause of this accident was determined later in a complete investigation conducted by unbiased persons who found the true cause immediately. Orders were given to transport the motor to another location approximately one hundred miles away. The 3½-ton truck was the only one available at the moment and it was pressed into service by the superintendent in charge. The alibi again was "emergency." The driver protested that the truck was too small, especially since the roads were quite muddy and slippery. Orders are orders, and a truck driver must live, so no further comment and he obeyed orders. The motor was moved at the cost of a life and a 3½-ton truck. The emergency was NOT met and a certain superintendent was left with his thoughts.

The Supervisor's Responsibility

Gentlemen, in considering steps for improving such conditions as I have just cited and which are prevalent throughout the oil fields today, bring the supervisor in for a full quota of attention. His responsibility should be brought forcibly before him because the responsibility is his.

The work of a truck driver is one of the most important cogs in the great wheel of accomplishment in the oil field. He is entrusted with seven or eight thousand dollars worth of equipment to ramble over rough oil field country with and a load of materials often exceeding the value of the truck he is driving. Delays in oil field work are costly and it is the truck driver who must "deliver the goods" with all the dispatch possible. Often the truck driver is entrusted with a cargo of men who must be safely transported to and from camps.

How often do we stop to consider that delays occasioned by trucks being mired in, breakdowns, poor loading of equipment, making impossible the handling of the largest load for which the truck is designed, or unnecessary trips and back-tracking are costly items? In the main, these things can nearly always be prevented by a good truck driver who knows his equipment and can handle it, loads it properly, makes his trips and all pick-ups without back-tracking and thinks safely.

With such important work to do we still are prone to hire some man "to drive a truck" and if he can turn on the ignition, crank the bus, shift gears and pull out of sight without tearing down a few telephone poles, he's a truck driver and fully qualified.

This is an attitude that superintendents must throw into the discard. Too much stress cannot be placed upon the importance of employing truck drivers according to a rigid code of qualifications standardized for all units of operation.

In the matter of arriving at a proper code of qualifications, I would offer the following points as indispensable:

First he must be physically fit for the heavy duties common to this class of oil field work. Above all things he should have 20-20 vision in both eyes.

He should be alert and possess better than average intelligence and should be the type of man whose mind and body co-ordinate at all times.

He should have at least three years experience as a truck driver, with at least one of these years as a helper or part time driver.

A thorough knowledge of the use of skids, slings and binders should be had, as well as a knowledge of the best methods of loading and unloading pumps, casing, drilling tools and other heavy oil field equipment.

Some knowledge should be had of the equipment he is employed to handle.

A thorough knowledge of State Traffic Laws, and local traffic ordinances are imperative.

Last but not least he should realize and appreciate the responsibility which is his when transporting men and equipment, and in general that he is an important cog in the wheel.

Then, having chosen a man who conforms with the code of qualifications, has the Superintendent fulfilled his responsibility completely? Can he safely point to a truck and say, "Climb on boy and get to work?" If he did, his job would only be half done.

Important Procedure

Immediately after this individual is placed on the payroll, the superintendent or other duly authorized person should cover carefully in private the following points:

(1) Outline specifically company policies regarding working hours, drinking on the job, smoking while transporting inflammable liquids, or any other standard company rules promulgated by the employer.

(2) Instructions should be given as to maintenance of equipment. These instructions should be definite and to the point, especially regarding inspections of equipment before the truck leaves the lease or garage each morning.

(3) He should have explained to him in no uncertain terms that although the work must be done, it can and shall be done, without accident either personal or otherwise.

If accident costs are shown him, with complete explanations of the economic waste incurred, in addition to the suffering, loss of wages, disrupted organization and retarded progress, he will then see his job from his employer's viewpoint rather than that of a truck driver's.

(4) Proper conduct at the time of an accident should be stressed and particular emphasis placed upon honest and complete reporting of all personal injuries and automobile accidents.

(5) No question should be left in his mind that accidents are preventable, that safe handling of equipment is of primary importance and should not be considered secondary.

(6) He should be instructed in the use of first aid and fire fighting equipment on his truck.

(7) When transporting men it should be understood that he and he alone is responsible for the most valuable cargo he will be called upon to transport. Authority

must be vested in him to refuse to move his truck until all men are properly seated and in a safe position for transportation.

To select a truck driver properly and educate him may appear to require considerable time, however four or five hours spent with this new employee will pay big dividends and help to enhance safety in other branches of the industry.

Having brought the new man to this point of understanding our supervisors still cannot desert the field and hope to receive the best efforts the new employee has to offer. Human nature has endowed us all with the disease of "Chronic Forgetfulness." When a driver is new on a job his thoughts are likely to be consumed with his routing, names of new locations and men, etc. If Safety is to be formed into his working habits it must be kept before him constantly during this period.

There should be posted in conspicuous locations in garages, in truck cabs and at gasoline pumps, definite instructions which should be short and concise, emphasizing the following points:

1. Maintain brakes and lights in good condition at all times.
2. Test pneumatic tires daily. Keep them properly inflated.
3. Keep your vehicle under control at all times.
4. The proper driving speed can best be judged by road and traffic conditions but local traffic regulations should govern.
5. Do not pass vehicles on curves or on hills.
6. If lights of another car blind you, stop until you can see the road ahead.
7. All trucks must come to a complete stop before crossing railroad or inter-urban grade crossings. When you start across keep your gears in low until your vehicle is entirely across the track.
8. When parking your truck conform with local traffic regulations.
9. Always drive on the right side of the road.
10. Always give standard hand signals before turning, stopping or coming out into traffic from parking and before turning out to pass the vehicle ahead of you.
11. Picking up hitch-hikers is dangerous and must not be practiced.
12. Inspect fire extinguisher and if not completely charged, have it done immediately.
13. Inspect binders and chains for faulty links, etc.
14. Keep windshield clean. It is hazardous to drive with vision obstructed.

These points can always be vividly impressed on the minds of the men by use of specialized posters, slogans, etc.

It is also important that men be thoroughly instructed as to proper procedure in case of an accident. Taking the wrong step at such a time often is costly to the employer. In this connection the following instructions are considered basic:

Never argue with the other party to an accident. Merely take his name, address, license number, make and model of his car, and estimate in your own mind the amount of damage done to his vehicle. Also obtain names and addresses of all witnesses. Refer the other party to proper authority where the situation will be handled.

In case anyone is injured report same to headquarters by telephone and then make regular written report. False reports will be sufficient cause for dismissal.

Loading and Unloading Materials

Handling of materials has caused more accidents than any other phase of oil field work and it is, therefore, obvious that much time and thought should be given this subject. Briefly the following suggestions will minimize hazards in these operations.

1. Block wheels of truck when heavy equipment is being loaded either by gin-pole, crane or skids. The engine should always be turned off and in no case should the engine be put in gear as failure to shift gears may result seriously when cranking.
2. Timbers and skids should be of good timber, long leaf yellow pine, oak or maple and free from knots.

3. Skids should be fastened so they cannot slip when load is applied.
4. Binders of approved types with annealed chains should be used to secure the load.
5. When making the binder chain taught, leverage should be applied with man or men standing on the ground, so that on releasing the binder the lever cannot strike a workman.
6. After driving several miles with a load, the binder should again be tightened where loads such as casing, sucker rods, etc., are being transported.
7. Loads should be blocked to prevent their shifting and especially forward.
8. When large loads are to be hauled, rear vision should not be obstructed.
9. Trucks must not be loaded beyond their capacity under any circumstances.
10. When loading or unloading pipes or casing exceptional care should be exercised not only from the hazard of mashed toes and fingers, but principally from the hazard of pipe hooks flying. A pipe hook so designed that it must be removed manually is the best safeguard. Hooks with wide open throats are a definite hazard when both cables are not in equal tension. It is safe in no place when a hook slips and, therefore, utmost precaution should be taken to lay the pipe down so that the tension on both lifting slings are released at the same time.
11. Men handling pipe hooks should always wear "gloves", preferably with leather palms, to prevent wires from cable strands piercing their hands.
12. Blocking loads of casing or pipe is good practice and prevents excessive strains on chains through loads settling.
13. Lanterns should be hung on loads extending more than 3'0" beyond the end of the bed for night transportation and red rag in the daytime.
14. Red lanterns or rags should be hung on all loads when trailers are used.

Transporting Men

The transportation of men on trucks over rough oil field country has resulted in many lives being lost. Too much cannot be said of this common and yet dangerous means of transportation. The following few suggestions although simple will do much toward the reducing of accidents from this form of transportation.

1. The truck driver must have authority and be instructed not to move a load until he is satisfied the men can be transported safely. He must be impressed with the fact that he is solely responsible for safe transportation of his human cargo.
2. Not more than two men (the driver and helper) shall be allowed in the cab at any time.
3. No workman should be allowed to ride on the fenders, engine hood or running board under any consideration.
4. Standing up in any type of truck should be prohibited.
5. All feet and legs of workmen should be inside of truck bed. If seats or cross boards are not provided, the employer should provide them at once.
6. Materials that can shift, such as valves, pumps, elevators, etc., should not be transported with a load of men, only in extreme emergency cases, when precautions should be taken to secure the material to avoid its shifting or turning over.
7. At no time should workmen be permitted to ride on top of casing, or any load that might tip over or roll.
8. Riding on trailer should not be permitted unless equipped with truck bed or platform.
9. When letting a workman off the truck, be sure he is in the clear before pulling away.

First Aid Kits and Fire Extinguishers

Because of the fact the truck driver is often in some remote section of the field or on the road far from any assistance, a good portion of the time, his truck should be equipped with a standard first aid kit and a carbon-tetrachloride extinguisher.

He should be taught the use of first aid and instructed to apply treatments to the slightest injury as failure to do so often results in infections and a minor case becomes a serious one. The average truck driver often finds himself in a position to render first aid to other employees during his travels through the field.

An approved fire extinguisher is not only a good investment for protection of the truck but is often valuable in extinguishing incipient fires about the leas.

Would you send an employee to the bank with \$5,000.00 in cash without providing protection not only for the cash but for the messenger as well? No, of course you wouldn't! Yet we hesitate to spend a few hours time to equip a truck driver through education with the wherewithal to safely transport a human cargo of inestimable value or a truck and a load worth \$20,000.

These inconsistencies are usually costly and the operator who is to stay in business must necessarily be far-sighted enough to realize that accidents in oil field transportation are absolutely avoidable and if they are not minimized, will draw his now narrow margin of profit down to the loss column and boom the business of the red ink salesman.

Discussion

R. S. BONSB (Standard Oil Co. of New Jersey): Mr. Chairman, I would like to congratulate Mr. Dischinger. That is one of the finest contributions on that subject ever presented in this section. Personally, I want to use it. There is one point I would like to raise. I know that there is a law that is rapidly becoming general, to have trucks come to a full stop at railroad crossings. Sometimes there is difficulty in getting the equipment started and there might be stalling at critical moments. I am wondering if it isn't safer to throw it into first gear, the low, and not stop but proceed slowly.

MR. DISCHINGER: I think Mr. Bonsb's point is well taken. On an open crossing where you have absolute vision I would say that that policy is very fine, but in cities where your vision is obstructed most of the time, I think the best and the safest thing to do is to stop.

T. N. SHAW (Midwest Refining Co., Casper, Wyo.): If you permit the driver to cross without stopping, that is telling the truck driver to use his own judgment. I believe that experience has taught us that the full stop will prevent more accidents than any other means of handling it. I would like to emphasize one other point and that is the transportation of employees on trucks. That is the thing that we have had a hard battle over. We have made some progress on it in getting our trucks equipped with seats for men. We have had some very sad accidents, personal injuries, one fatal accident and so forth, from that source and I want to emphasize as strongly as possible the importance of caring for the men you are transporting in trucks by providing means whereby they can ride in at least some degree of safety. The large three or four ton trucks go out with twenty or thirty men on them and I have seen them go by with legs hanging over the edge and it made my heart come into my mouth. When I took it up with the superintendents they said, "What can we do about it?" When I told them to provide seats for them on the truck they said, "Well what are we going to do with the seats when the truck hauls pipe?" It wasn't until we had a truck loaded that way and another truck crashed into it and crushed a man's leg so badly that it had to be amputated, that we began to get results and now all of our trucks are equipped with seats. In our smaller outfits that do the connection work around the field, that have to carry tools, we have made combination seats and tool boxes with a hand rail. The tools are better cared for than ever before, and further, the men have very good seats. One injury alone would pay several times over for the equipping of all trucks with seats. That is looking at it from the dollars and cents standpoint.

D. J. GRIFFIN (The Ohio Oil Co., Casper, Wyo.): Sometime ago, one of our

truck drivers came up to a railroad crossing and stopped for a long fast freight train. He was loaded very heavily with pipe. The grade was a little downhill. As the end of train came in view, he pulled his lever back into low and held it there. A good-looking girl passed by and he looked out through the cab to see where she was going and his foot slipped off the clutch with his engine running and as a result, he ran into the train. Put the truck into neutral when you stop; that is an important thing.

C. W. SMITH (Standard Oil Company of Indiana, Chicago, Ill.): I agree with Tracy Shaw. A few years ago we had many railroad crossing accidents. We averaged about 12,000 trucks in operation, all of which were supposed to stop at all railroad crossings. After putting the "stop at railroad crossing" rule into effect, we went a two-year period without having a single railroad crossing accident. I do not think that you can get men under certain conditions to put their cars in second gear and under other conditions to stop. The rule must be flat and clear. "Stop at ALL railroad crossings."

CHAIRMAN DONOVAN: I now want to introduce Louis R. Hodel, safety engineer, Carter Oil Company, Tulsa, Oklahoma who will talk to us.

Lessons Learned from Unusual Accidents

By L. R. HODELL

Safety Director, The Carter Oil Company, Tulsa, Okla.

An employee who had sustained a very serious accident, resulting in the fracture of his leg in five places, had been flat on his back in the hospital for eight months and was pronounced convalescent. He was allowed to sit in a wheel-chair, and as he had been in the hospital for so long and was fairly well known, he wheeled himself about the floor on which he was quartered. On the same floor it happened that there was another man who had been in a serious automobile wreck and among other things had sustained a broken jaw. This man was also convalescent and allowed to wheel himself about in a wheel-chair. They struck up an acquaintance and it is probably only natural that both of them were feeling in fine spirits because they were at last pulling through. The result of this high spiritedness was a wheel-chair race down a corridor which turned out to be a very close affair—so close in fact that they locked wheels when one tried to pass the other, upset both chairs, broke our man's leg over again and the other's jaw.

The discussion of the subject of "What We Learn from Unusual Accidents" would have been infinitely simpler had the one who asked me to discuss this subject told me just what constituted an unusual accident. What is an unusual accident anyway? Or, to put it another way, what accident is unusual?

From the National Safety Council's "News Letter" I learn that a young man was seated on a piazza with a charming young lady in his lap. It seems that in the course of time her weight was sufficient to cut off the circulation in his legs so that when he arose his legs were numb or asleep and gave under him with the result that he fell and sprained his ankle.

From the same source I have also learned that a man with a glass eye had this glass eye explode while at work, rendering him unconscious.

What—I ask you—is an unusual accident?

In a California refinery a tank which was mounted on a 36-inch concrete base had been opened, steamed out, cleaned, and was still being steamed out. The foreman in charge approached the tank, put his head in the manhole at the bottom to inspect it. A violent explosion followed, killing the foreman and badly burning another man standing directly behind him. It was later decided

in the absence of any other possible explanation that the concrete base had insulated the tank from ground. That the steam entering the tank through a pipe at the top had charged the tank with static electricity and that the foreman standing on the ground and touching the tank as he looked in, had grounded this charge, causing the explosion.

But still, what is an unusual accident?

The National Safety Council also tells of a man standing in a bathtub who took hold of some of the piping, experienced an electric shock and fell out the window. And again I ask you, what is an unusual accident?

A storm cellar in which there were no gas fixtures or pipe of any kind had been sought as shelter by employees in a storm. A violent explosion occurred, killing seven. Investigation showed that the explosion occurred when a match was struck to light a lantern. While there was no line of any kind in the cellar, there was a two inch gas line within 12 feet on top of the ground. There were no leaks in this line, however. There was also an oil line some fifteen feet away at its nearest point. Previous to the accident there had been a leak in this oil line. The only explanation that was ever arrived at for this accident was that either the oil from this leak had penetrated the sandy formation surrounding the storm cellar and penetrated to the storm cellar, or that the gas from the oil on top of the ground had settled into the storm cellar.

Another similar accident was sustained by the same company in which two were severely burned. In this case there was an oil leak on top of the ground several feet from the entrance of the cellar.

Nevertheless, what is an unusual accident? The National Safety Council tells of a gentleman who waked in the night choking but was not in time to prevent his false teeth from going down his throat. But be that as it may—what would you term an unusual accident?

What Is an "Unusual" Accident?

Another company had decided to transfer some battery tanks from one lease to another. The tanks had been cleaned in the usual manner. That is to say, the B. S. had been scraped out, but the tanks had not been steamed as the oil was sweet and there seemed to be no occasion for it. To save the expense of cutting these tanks down and then erecting them again it was decided to load them whole onto a truck and trailer. While in transit the truck's motor back-fired, causing the vapor in the tank to explode, destroying the tank, damaging the truck and throwing it into the ditch, but not injuring the men in the cab. But I am still bound to ask you: What is an unusual accident?

Are any of the accidents I have mentioned unusual? If so, what is there about them that renders them unusual and entitles them to be classified as different from other accidents?

As you no doubt see, by now, what I am driving at is this: I don't know what an unusual accident is and what I want is to get you to share with me the responsibility for the definition that I am going to give it.

To me an unusual accident is one which occurs when supposedly good equipment, handled by supposedly competent people with ordinary care and attention, fails.

An unusual accident shows no preference in its victims. Men who ordinarily are the most careful may be caught as quickly as the most reckless. This is due to the fact that no matter how careful a man may be on an obviously hazardous job, the most careful will relax their vigilance under palpably safe circumstances. What safety director, I ask you, might not have sprained his ankle under exactly the same circumstances I have recounted to you of the gentleman who suddenly found his legs numb?

It has been suggested to me, when I asked what I should cover on this subject, that one would expect to hear a resumé of the more spectacular fatal accidents—but I cannot agree with this. In the first place some of the most spectacular fatal accidents are due to some of the most readily recognizable commonplace causes.

The company which I represent some time ago put five men in the hospital because one of them lit a cigaret while the crew was taking a bull-plug out of the end of a 6-inch gas line. If there had been no explosion I should certainly have considered the occurrence unusual.

I do not think that we should interpret unusual accidents as being necessarily serious accidents. They may be serious or otherwise, but to be unusual, they should occur to careful men with good equipment which has been checked by reasonable inspection. In fact, I don't hesitate to say that they must be accidents which would just as readily happen to myself or anyone else now present. I can see nothing to be gained if we consider under the heading of unusual accidents, accidents which—no matter how serious or spectacular their results are—have simply been caused by a blunder. We should only learn that blunders cause accidents—and that we already know. My hope is that in reviewing the accidents which I have chosen as unusual, we shall not only learn something about the prevention of the accidents mentioned but more particularly that we may perceive some general truths regarding unusual accidents, the observance of which may enable us to prevent such accidents in the future.

Another example of an unusual accident, but one from which I do not feel we could learn anything, is as follows:

The electricians were constructing an under-build on a high-line. On these poles at the top there were three lines carrying 4,000 volts. Overhead, but much closer to the ground on the same pole, there was a telephone line. The top lines were hot. One of the lines of the under-build was up but was cold. An electrician carried the wire partly up the pole while another stood on the ground holding the slack. Using the poorest kind of judgment the man on the pole endeavored to flip the wire he was carrying over the dead line that had already been constructed on the under-build. However, his throw was too strong and he flipped it over the hot line. As he was holding this line without rubber gloves and as the man on the ground was also holding the line without rubber gloves, it would be natural to expect that both would have been electrocuted; however, the slack in this line was touching the telephone line which was on the same poles and the result was the high-line grounded through the telephone system, burning out several telephones and the switchboard, not injuring either of the two men holding the line at all.

This, of course, is in one sense unusual, one might almost say unbelievable, but it does not fit into the category of accidents which we may gain by investigating. This occurrence was a blunder and we already know that such blunders will cause accidents.

I give this example to make clear the reason why many spectacular accidents which may be in some way unusual are omitted here altogether. It was my intention to give the circumstances of the Times Square Subway accident in New York as being an unusual accident and which might parallel our findings in these cases; however, after studying the report on the investigation of this accident I found that it, too, was attributable to failure to obey set rules and for that reason has no place in this consideration.

So much, then, for the definition and the aim of this paper.

Now, what do we learn by these so-called unusual accidents?

I shall continue the case method, and give you quite a number of unusual accidents, but rather than carry you through a prohibitive amount of inductive reasoning, I am going to acquaint you first with my conclusions and

then go through some of the more striking cases which have led to the conclusions.

I don't pretend to know all that we should learn from unusual accidents. I am simply going to point out some of the more prominent things that I have learned by studying quite a large number of them.

First: We should learn not to accept the obvious. That is to say, because equipment is new and of a standard make, or because a practice is common and accepted, we should not necessarily accept it as free from all danger. My first wish is to demonstrate the danger of the usual, the accepted and the commonplace.

A Case of Particular Interest

One case which I particularly wish to bring to your attention in this respect is as follows:

Inspection had shown an old rod and tubing board not to be in the best of condition so the farm foreman decided that they should have a new one. He ordered new lumber for it from a lumber yard and the board was made. It was made according to our specifications which require "J" bolts at each end with which to fasten to the derrick. The board was raised into the derrick and about half an hour after it was put into use, it broke in two with the rod board man on it. Inspection later showed this board to be absolutely rotten inside, although from its exterior it appeared to be new and good lumber. When the board broke (it was two boards wide and both boards broke) the rod board man was held from injury by his belt and each half of the rod board pivoted around the girt, to which it was held by a "J" bolt, and slapped against the side of the derrick, remaining there and thus preventing a serious accident.

Before this accident happened they had seen that all normal precautions had been taken, but we know now that in constructing any board to be used at a height, it is necessary before raising it to place it across a couple of sawhorses, or the equivalent on the ground, and test it out.

It would seem that in this category of taking the usual too much for granted, we should also recall to you the cases already mentioned of the refinery tank that blew up, the tank that was being transported and blew up by the truck's back-fire and the explosion in the storm cellar.

Another accident which I have along the same line; i.e., failure of supposedly good equipment, and by that I mean failure of equipment which we have every right to expect to be good and free from hazard, is as follows:

Employees were testing out new winch equipment in the presence of foreman and superintendent on tubular derrick, and starting to pick up pipe. Before any considerable weight had been thrown on the derrick, the derrick buckled and fell. As it happened, no one was more than scratched, but investigation of the accident led to the finding of a curious cause. It was found that in the bottom leg section of one of the corners, the pipe on the inside of the leg had rusted and fallen to the bottom of the leg, where it had settled sufficiently to make the leg water tight at the base. Rain and moisture had gotten into the leg and being held there until cold weather, had frozen and split the leg, very greatly weakening it so that it buckled before any great weight had been placed upon it.

Let me point out to you again the usual circumstances, supposedly good equipment, average care in handling. You can see that while that derrick may have been inspected twenty times, this meant nothing if it had not been inspected after the last freeze. I maintain that those men had some reason to suppose that their equipment was in good order.

As an example that some of the most serious and unusual accidents can

occur with little or no personal injury. I would like for you to consider the following:

An electrician, who had as his helpers two roustabouts with no electrical experience whatever but who were transferred to him to avoid their lay-off as they were good men in their line, was instructed to drain the oil out of a transformer. The electrician had a short job of trouble shooting at a Lift Station before he could go to the gasoline plant where the transformer bank was. He instructed his two helpers for that reason to get the oil for the transformer and take it to the gasoline plant and wait until he got there, when he would change the oil. These two men followed instructions and got to the gasoline plant sometime ahead of the electrician. At the plant they were told by one of the other employees that the transformer bank was dead. The man who told them, however, was not in any position to know and as a matter of fact the transformer bank was not dead and he had merely supposed that it was because the power plant at the station was shut down. This bank, however, is on a distribution circuit served by five separate power stations and while the power plant at this particular gasoline plant was shut down, the field circuit was nevertheless maintained by these other power plants and the bank was just as hot as at any other time.

The two roustabouts, who, in their short experience as electrician's helpers, had acquired considerably more interest than knowledge, decided that since the bank was dead they would go ahead with the job themselves. Now, had these men been electricians or had any electrical knowledge at all, they would have appreciated the situation and as a matter of fact, they had had some experience in changing transformer oil while working directly under an electrician. It is customary to change the oil in these transformers while hot under ordinary circumstances; i.e., when the oil is clean and there is no shorting across going on inside the transformer. However, it is the habit of the electrician to take out the inspection plug at the bottom of the transformer and drain some of the oil to see whether or not there is any water or foreign substance in the oil. Also it is possible to know whether a transformer is functioning properly by listening to it. There should be a steady, even hum, whereas if there is any water or other substance in the oil, there will be an occasional popping or cracking in the hum. This, however, was beyond the knowledge of these two men. In the case of this transformer the oil had been changed on the previous day and it was because this oil had some water in it and the transformer was not functioning properly that the oil was again to be changed. The electrician knew this and knew the significance of it. In such cases he always cut the bank out, but to the two roustabouts it was just another case of pumping out a transformer. Also it should be mentioned that when working on this transformer, hot or cold, the electrician used 10,000 volt gloves which the roustabouts did not have. In sending the men for this oil the electrician did not instruct them not to drain the transformer, as he took it for granted that they would not even think of such a thing, and he made no mention of the fact that this was a different job than the others. His instructions to them were simply to get the oil and wait until he came. However, with the usual confidence of complete ignorance these men decided that they had handled enough such jobs to take care of it without any difficulties, particularly as the bank was dead so far as they knew. Accordingly they went inside the iron fence around the transformer bank and took the top off the transformer, put a rubber hose into the transformer and proceeded to pump the oil out. When the oil was all pumped out down to water level, the current arched across from the primary winding to the transformer case, setting fire to the oil in the transformer. The high-line in question carried 4,000 volts. This is not so much an unusual accident because of what occurred, but be-

cause of what did not occur. You would certainly expect both of these men to have been electrocuted as they were working without any particular precaution around a hot bank. The most unusual feature of the occurrence was that neither of them was hurt.

These circumstances, however, did lead up to what I consider a really unusual accident. The electrician arrived shortly after the transformer oil caught fire, and as I had instructed all employees that we had carbon dioxide fire extinguishers to be used on electrical fires and that these were safe to use, inasmuch as carbon dioxide was an absolute nonconductor, the electrician sent these roustabouts after some of them. In the meantime he took the plugs out of all three cut-out boxes. This killed the lines from the cut-out boxes down to the transformer. When the roustabouts returned with the carbon dioxide extinguishers, he hung one of them on the iron fence and climbed onto the platform above the transformer, taking the hose and nozzle with him. He then sprayed the extinguisher into the transformer. Whether or not it was due to reckless or unskilled handling of the extinguisher, or whether the heat from the vapors in the transformer carried the carbon dioxide vapors upward, the fact remains the leg leading from the cut-out box to the transformer, the cut-out box, and the leg from the vertical bus to the cut-out box all became encrusted with carbon dioxide snow. At a time when the extinguisher was nearly emptied, the electrician brought the nozzle of the hose into contact with the insulated line from the cut-out box to the transformer and received a violent shock, forcing him to let go of the hose and nearly fall off the platform. One of his helpers who was watching him and leaning against the iron fence on the outside was also subjected to a shock.

The investigation of this accident revealed that the electrician absolutely did not touch in any way any of the hot parts of the bank, and as his helpers were on the outside of the fence, they also could not have made any such contacts. Also the facts indicate this conclusively, as a contact with any 4,000 volt stuff would instantly have resulted fatally. The men who received the shock were badly shaken up but the electrician states that it felt about like a 440 volt shock, and neither of the men suffered any permanent ill effects.

The only possible conclusion left as to the cause is that the carbon dioxide snow, settling on these fixtures, had condensed moisture out of the air sufficient to carry some current from the hot side of the cut-out box down to the transformer where the electrician was, according to his own statement, holding the nozzle of the hose in contact with the wire leading from the cold side of the cut-out box to the transformer.

The possibility that there might have been an internal leakage in the cut-out box was obviated by a test of the cut-out box which proved that this was not the case. Observation of carbon dioxide snow, when exposed to the air, has shown that quite a little moisture settles on this snow, which is at a temperature of 60-110 degrees below 0 degrees.

This is just one more case of men working with good equipment in a way which they believed to be perfectly safe and which they had some reason to believe was perfectly safe, being subjected to the unforeseen circumstances; that is, the fact that the carbon dioxide snow had condensed enough moisture from the air that it became a conductor itself. The obvious conclusion is that these extinguishers should never be brought into contact with any of the electrical fixtures, (hot or cold), upon which they are being played.

I personally accept the responsibility for this accident as I recommended this equipment as absolutely safe for use in electrical fires, and while I had instructed the men that they must take care not to bring the nozzle into contact with any hot connections, I made no mention of the necessity of keeping it away from connections which were supposed to be killed.

Still another accident which demonstrates the danger of accepting the usual as being free from hazards is the following:

A Lift Station was to kick off two wells. A third well, which was an off-set to both of these two wells, was shut down on proration and the line from this well, which was supposed to be shut down, was open to the battery tanks through the small well trap and closed to the large lease trap. Either due to the fact that the sand below these wells had channeled out considerably, or to the possibility that these holes had been crooked and were close together at the bottom, this well which was supposed to be shut down was re-pressured by the high kick off pressure on the other two wells and as a result, flowed. Since the oil flow to the battery tanks could not be taken care of through the small well trap, it filled up the well trap and then overflowed through the top of the trap into the re-cycle line leading to the gasoline plant and also to the standpipe. This being a vacuum line, the oil was drawn into the compressors, sticking some of the valves in them and blowing a pop valve out of the main header, filling the air with gas and oil.

By great good luck there was no fire and no one was hurt, but the hazardous possibilities of such an accident are obvious and the prevention of it very simple when its possibility is recognized, as all that was necessary was to leave the flow lines of the off-set wells to those which are to be kicked off open to the battery tanks, through the lease trap which is sufficiently large to accommodate the heaviest flow. This I believe should be another lesson in not accepting a common practice which has proven safe elsewhere as being necessarily universally safe.

Some Trends Toward Truth

Now before going further, let me say that I am not going to try to prove anything. To begin with, there is not time to prove anything; and in the second place I am afraid that our definition of unusual accidents will not stand logical analysis. The most that I can hope to do is to point out some trends toward truth. Certainly I have not proven by the meager examples I have given that we place too much confidence in the ordinary; that we rely on good equipment to happen to be safe equipment; that common and accepted practices sometimes disclose surprising fallacies. You can find examples to prove anything. I have, however, illustrated what I believe to be a truth. Its validity can only be established in your own minds in the light of your own experience.

The second class of unusual accidents I shall present is the effect upon safety that one employee has upon another and included in this is the effect that supervision and management have upon the employee.

The accidents we have considered thus far have been failure of equipment and accepted practices. The other class I wish to consider is accidents arising from the failure of men to work together properly, although believing at the time they are, and usually I feel that these should be charged to the supervision. This type of accident should be charged to the supervision because somewhere it has failed to make each man's duty clear to him, so that he will work with his fellows to the best possible end. Now what I want to demonstrate by the following accidents is the hazardous condition brought on by lack of common understanding, though equipment and intentions are of the best.

We had a string of trucks at a location loading up a rig that was to be carried off. One of these had finished loading with a high bed load of rig irons, and then to help another truck load, it backed up to a band wheel to tie on and pull it out to where the other truck could load it. The helper got off the truck, went around to one side while the truck driver backed up to the band wheel. When he thought he was close enough he stopped the truck, threw it out of gear and threw the winch in gear to back off the winch line. The helper pulled back on the winch line until

he judged he had enough to tie onto the band wheel with. He then waved the driver down and taking the winch line, went in back of the truck, between it and the band wheel and tried to tie onto the band wheel. He then discovered that he did not have quite enough line to make the tie and called to the driver "slack up." The driver, seated in the cab in front on a high bed load, could not look out his rear window and see the man behind and also his engine was idling, so that he did not hear him clearly. Therefore, in the sincere belief that he had heard the helper call "back up", he threw the truck in gear and backed up. The result was that he hung the man between the truck and the band wheel. He told me afterward that he did not know why he stopped the truck as he had not heard his helper shout "enough", but he did stop and got down from the truck to find out how much further he needed to go and found his helper pinned between the truck and the band wheel at the hips. It was necessary for him to get back in the truck and go ahead to get the man out.

This purely and simply is a case of two men working normally and with an accident due to lack of common understanding. As the truck foreman was on the job with the men, although overseeing other work, I cannot see how he can fail to take the responsibility.

Another accident of a similar nature occurred at a lift station where the operator noticed from his gages and by the action of his compressors that he had lost a well. He could not by orders leave the grounds of the station, but he went to the fence and seeing the pumper standing near to a boiler some fifty yards distant, called to him that the well had gone off and that he was going to kick it off again.

This meant that the pumper should go to the well and open the line leading to the large central trap and close the one going to the well trap because it takes a much greater pressure to kick a well off than it does to operate it, and we do not kick wells off through the well trap for fear of knocking the trap over. After the well is kicked off, the well trap is opened and the lease trap closed.

The pumper, who was standing near the boiler, did not hear what the operator was saying and as he believed the operator was only passing the time of day, he simply waved to him.

The operator, believing that the pumper had understood him, went back to the compressor room and after giving the pumper plenty of time to open the central trap and close the well trap, kicked the well off. The pressure was too much for the small well trap, blowing the safety valve out of the hole on top of the trap. The air was immediately filled with gas and oil. The well was about fifty yards from the boiler which the pumper was firing. The wind was away from the boiler and no injury resulted. The accident, however, opened our eyes to the lack of system under which we were operating. It was clearly a management problem. Orders were issued that no operator was to kick off a well until told to do so by the pumper.

Please note the circumstances: two men, both wide awake and careful, good equipment and failure due to lack of common understanding. The fact that no one was injured does not make the accident less serious.

Now at this point I want to give you a theory you will accept or not as you see fit, but which is certainly substantiated by a number of accidents.

Work that is carried on jointly by two or more men is rendered hazardous by lack of coordination. There is more danger of unusual accidents happening to men who are working together than when working separately, for in addition to the hazards to a man working alone, men working jointly are under the possibility of misunderstanding one another. No matter how sincere, hard working and alert each man may be in performing his own duty, if there is not a continuous and perfect understanding between them, their joint work will result disastrously. Take for instance the accident to the truck driver's helper. Take another example: Two men were unloading brick from a truck. One was standing on the truck bed

throwing two bricks at a time to another who was on the ground piling them. After a while the man on the ground wanted to stop to rest but failed to say anything to the one on the truck. The result, of course, was that he got the next two bricks in the face. Lack of understanding.

So much of this theory, I believe, you will accept, but I wish to go a step further. When men from two or more gangs are working either jointly or separately at the same place or in the same area, their hazard is greater than when the same number of men are working together under a common foreman, or if the foreman is absent, are working together realizing that they comprise a single entity. The reasons for this, I believe, are: That men habitually working together are less distracted than when there are strangers around. That a gang of men are clannish and more or less ignore men from another gang. That such conditions are usually only temporary and seldom is there any designation of authority to one man to look out for the group as a whole.

At a California Drilling

One accident on a California drilling well bears this out very clearly.

A well crew was preparing to string lines through the traveling block and had the traveling block securely fastened to a wire line. A rotary helper had charge of the rotary draw works while the driller cleared the derrick floor of all men and gave a warning prior to raising the traveling blocks. The driller took a position under the headboard to prevent anyone from entering the derrick while the lines were being strung in the traveling block. The rotary helper then hoisted the traveling block to a position just below the crown block and upon receiving a signal from the derrickman that it was in the proper position, disengaged the clutch and applied the brake, which failed to hold, and the traveling block started to fall rapidly. The traveling block struck the floor, a portion of which broke through, killing a roustabout who was working on a water line below the derrick floor and who evidently had not heard the driller's warning to seek a place of safety.

Whatever may be said about this driller allowing a roughneck to take his place at the brake and whatever may be said about defective brakes, I consider this accident unusual; not so much because the blocks fell as because there was a fatality. The driller had taken sufficient precaution to protect all his men. The roustabout who was under another foreman, was working carefully so far as his own job was concerned and was not expecting or listening for any orders from the driller. If he heard the driller warning his men out of the rig he probably paid little attention to him as he was not expecting any instructions from that source.

I feel that we can do much to prevent such accidents if we will definitely designate full authority and responsibility to one man when men of two or more gangs are working together. Let it be definitely understood by all, no matter how temporary the throwing together of these two gangs may be, for that time the general supervision of the work and responsibility for the safety of the men lie in one man. This I feel is again a management problem.

I wish now to give you an accident which I consider unusual and to be affected by circumstances of both the two classes I have tried to bring to your attention: i. e., the too ready acceptance of equipment which one has some right to believe is in good shape, and also the increase in potential hazard brought about by two or more separate groups of men sharing in the work.

A rotary helper was killed when an elevator gate pin fell out of the elevator gate and struck him on the head. The crew had screwed on a stand of 3-inch drill pipe with the chain tongs. The deceased helper had been straightening the make-up tongs, and when the driller started to pick up the snapping ropes another rotary helper heard a noise and upon looking around saw the deceased helper falling. The cause

of his death was not known until the elevator gate pin was found on the derrick floor.

The accident was unusual and was due to faulty inspection of the elevator gate. An inspection made by the driller some days before the accident showed that the face of the elevator gate had been worn considerably, and he sent the elevator to a custom shop to be rebuilt and a new pin inserted in the latch gate. The mechanic at the shop was not familiar with how the pin and spring should be inserted and adjusted and left a note to this effect; one of the shop owners later inserted and adjusted the pin but did not rivet it in place as he should have done, and subsequent inspection at the shop failed to catch this oversight. The elevator was returned to service at night, and the driller's inspection of the gate did not detect the faulty gate pin.

In this accident you will note that in one sense the accident was due to the inspection by the driller in which he found the elevator in need of repairs. This inspection caught the condition and it was turned over to the shop where we have the above mentioned lack of complete understanding, due to the fact that the work was handled by more than one party. When the elevator was returned to the well any inspection of it was probably of a very cursory nature, as the driller and nearly any one else would, took it for granted that a piece of equipment direct from the shop where they had sent it to be repaired, would be in good condition.

I have wished in giving this paper to consider some of the very serious accidents which have occurred this year due to flowing wells catching on fire, but fortunately The Carter Oil Company has not had such an accident and I have been able to get only newspaper reports from those I would have liked to consider. I have been impressed from these reports by one thing, however. In practically every case there have been more people present than the actual drilling crew. Sometimes other foremen or men and sometimes visitors as royalty owners or guests. I consider this significant. Another case of a group not under a single recognized authority.

The Common Alibi

The importance of a consideration of unusual accidents is that we are always prone after the occurrence of such accidents as I have given you, to seek to alibi them; to point out how unexpected they were; how many precautions had been taken to prevent them and how likely it is that any one under similar circumstances could have met with the same accident. I feel that in many of the accidents I have given you we would have been somewhat justified in this attitude. The purpose of this paper has been to bring before you this condition with a view to accentuate the absolute need for refusing to accept usual equipment and conditions and practices without the closest study. So far in accident prevention work we have studied obviously dangerous conditions and I think it may be said that much has been done toward eliminating the accidents in these situations, but we must recognize the fact that we are never so hazardously exposed as when we feel ourselves perfectly safe. I feel that it is our duty, particularly as directors in accident prevention activities, to take the lead in the study of the apparently safe.

The other point that I have tried to bring out is the occurrence of accidents due to conditions brought on by men working either jointly or dependent upon one another, and this side, also, of accident prevention I believe may be gone into a great deal more deeply than it has been heretofore. Men working jointly are in an entirely different position than one man working by himself. There is always the chance for lack of common understanding. There is always the chance of one party depending too much upon another. There is always the possibility of lack of proper discipline and there is always the condition of distraction brought on when a gang of men are working in the presence of people who are not ordinarily present. I feel that a careful study by all of us of this phase of accident prevention may go some distance toward the elimination of these so-called unusual accidents.

To sum up briefly: I have tried to emphasize the need for study of new equipment for possible hazards, for the scrutiny of usual and accepted practices for unusual possibilities, and the need for the study of conditions brought on when two or more men, gangs or parties bring to bear on any situation the complex problem of synchronizing their thoughts, actions and sense of interdependence.

ADJOURNMENT

**Thursday Luncheon Session
October 15, 1931**

**R. E. DONOVAN, Chairman
Standard Oil Company of California, San Francisco, Cal.**

The meeting was called to order by General Chairman Donovan.

CHAIRMAN DONOVAN: Some of you were probably present at the annual meeting of members on Monday, at which the plaques were awarded to the first prize winners in various divisions of the Petroleum Section's annual contest. One of our pleasant duties today is to award certificates to the other prize winners in our contest. These presentations will be made by Mr. J. I. Banash, Vice-President for Finance of the National Safety Council, Chicago. I want to introduce Mr. Banash.

Awarding of Safety Contest Certificates

**By J. I. BANASH
Vice-President for Finance, National Safety Council**

June 30, 1931, marked the close of the Fourth Annual No-Accident Contest conducted by members of the Petroleum Section, National Safety Council. This contest by far surpassed all others conducted by the section, particularly in the number of units entered and the records established. For example, in the six months duration of the contest just passed, 361 units competed, or an increase of 56 over 1930. Likewise, the number of units having a perfect record at the end of the contest increased from 41 to 47. This is truly remarkable when we study the records which disclose that only five perfect scores were recorded in 1928 and fifteen in 1929.

In 1931, more than 183,000 employees worked over 229 million man-hours, during which time 2,856 lost time injuries were reported for an average frequency rate of 12.47. This compares most favorably with the 1930 record when close to 197,000 employees worked 246 million man-hours and suffered 4,316 lost time injuries for an average frequency rate of 17.55. In other words, with but a 7 per cent reduction in man-hours worked, the number of lost time injuries were reduced 34 per cent and the average frequency rate 29 per cent.

I am tremendously interested, and I know all of the National Safety Council Executive Committee and officers are, in these contests. We think they are great things. We believe they help you very materially in your work in the plants. As a matter of fact, the figures prove it for the average frequency rate of 12.47 for the past Contests is 31 per cent lower than the average frequency rate of all Petroleum members reporting for the entire year of 1930.

It seems to me that there are two rather fundamental facts that have to contribute to the desirability of these contests. I think the American people today are more and more realizing that there are lots of things that you can't make people do by police power or by law or by discipline. The second fact is that we are great lovers of sports, we like contests. Put those two items together. In the first place, you can lead people to do a lot of things that you can't make them do. The second is our love of contest. We know that in industry, as in other walks of life, it is necessary to enforce a certain amount of discipline but in addition to that, you can get enthusiasm and cooperation from those associated with you if you will lead them. All these contests do is to appeal to man's love of sport and helps these people to do things that you can't drive them to do, and they like it a good deal better.

That the Petroleum industry has succeeded in leading rather than driving is perfectly apparent from the number of excellent records established.

Now to get down to brass tacks. Today it is both an honor and a privilege to award certificates of merit to those units completing the past contest with a perfect record or in position 2 and 3 of their respective groups. Before so doing, however, I think it would be amiss if I did not mention the names of those who were awarded group trophies by President Bergquist during the Annual Meeting of Members last Monday morning.

Thirteen trophies in all were awarded as follows:

Manufacturing Department.

- Group A—Paulsboro Plant, Vacuum Oil Co., Paulsboro, N. J.
- Group B—Standard Oil Co. (Ind.), Casper Refinery, Casper, Wyoming.
- Group C—Bayonne Plant, Vacuum Oil Co., Bayonne, N. J.

Marketing Department.

- Group A—Standard Oil Co. (Ind.), St. Louis, Mo.
- Group B—Standard Oil Co. (Ind.), Billings, Mont.

Producing.

- Group A—Standard Oil Co. of Calif., North District, Calif.
- Group B—Hope Construction and Refining Co., Pittsburgh, Pa.
- Group C—General Petroleum Corp., Kern, Calif.

Natural Gas Gasoline.

- Group A—Standard Oil Co. of Calif., Standard Gasoline Co.
- Group B—Midwest Refining Co., Casper, Wyoming.

Pipe Line Department.

- Group A—Standard Oil Co. of Calif., San Joaquin Valley Fields, Calif.
- Group B—General Petroleum Corp., Southern and Terminal Pipe Lines, Calif.

Marine Department.

- Union Oil Co. of Calif., Los Angeles, Calif.

The National Safety Council has seen fit to recognize not only the winner, but the fellow who ran near to him and furnished him that incentive to go over the top. It is therefore with a great deal of pleasure that I present the certificates to the following companies:

Manufacturing Group-A:

- Standard Oil Co. (Indiana) Whiting Refinery, Whiting, Ind. (3,644,496 hours worked, 5 lost-time accidents with a frequency rate of 1.372.)
- Standard Oil Co. of Louisiana, Baton Rouge Refinery, Baton Rouge, La. (5,096,384 hours worked, 9 lost-time accidents, frequency rate of 1.766.)

Group-B:

- Shell Petroleum Corp., Houston Refinery, Houston, Tex. (No lost-time accidents, 617,430 hours worked.)
- Shell Petroleum Corp., Norco Refinery, Norco, La. (733,134 hours worked, 1 lost-time accident with a frequency rate of 1.364.)

Group-C:

- Pan American Petroleum & Transport Co., Mexican Petroleum Co. of La., Destrehan, La. (No lost-time accidents, 250,350 hours worked.)
- General Petroleum Corp., Torrance Division, Los Angeles, Calif. (No lost-time accidents, 181,264 hours worked.)
- Standard Oil Co. (Indiana), Greyliff Refinery, Greyliff, Wyo. (No lost-time accidents, 121,211 hours worked.)

Humble Oil & Refining Co., McCamey, San Antonio, Neches and Chilton Refineries, Texas. (No lost-time accidents, 120,042 hours worked.)
 Standard Oil Co. (Indiana), Laramie Refinery, Laramie, Wyo. (No lost-time accidents, 87,097 hours worked.)
 Standard Oil Co. of Calif., Bakersfield Refinery, Bakersfield, Calif. (No lost-time accidents, 83,840 hours worked.)
 The Freedom Oil Works Co., Vulcan Refinery, Corapolis, Penn. (No lost-time accidents, 81,648 hours worked.)
 The Texas Co., El Paso Works, El Paso, Tex. (No lost-time accidents, 57,567 hours worked.)
 The Ohio Oil Co., Marathon Refining Co., Bristow, Okla. (No lost-time accidents, 40,164 hours worked.)
 The Texas Co., Cody Works, Cody, Wyo. (No lost-time accidents, 39,916 hours worked.)

Marketing Group-A:

Standard Oil Co. (Indiana), Des Moines, Ia. (No lost-time accidents, 1,229,013 hours worked.)
 Standard Oil Co. (Indiana), St. Joseph, Mo. (No lost-time accidents, 887,792 hours worked.)

Group-B:

Associated Oil Co., Southern Sales, Southern, Calif. (No lost-time accidents, 181,528 hours worked.)
 Union Oil Co. of Calif., San Diego District, San Diego, Calif. (No lost-time accidents, 141,262 hours worked.)
 Union Oil Co. of Calif., California, Hawaii and Canal Zone Sales Districts, Los Angeles, Calif. (No lost-time accidents, 118,616 hours worked.)
 Standard Oil Co. of Calif., Santa Barbara Agency, Santa Barbara, Calif. (No lost-time accidents, 96,904 hours worked.)
 Standard Oil Co. (Indiana), Cheyenne, Wyo. (No lost-time accidents, 87,489 hours worked.)

Producing Group-A:

Sinclair Oil & Gas Co., Tulsa, Okla. (1,664,232 hours worked, 11 lost-time accidents with a frequency rate of 6.610.)
 The Empire Companies, Bartlesville, Okla. (1,424,647 hours worked, 13 lost-time accidents with a frequency rate of 9.125.)

Group-B:

Midwest Refining Co., Casper, Wyo. (651,144 hours worked, 2 lost-time accidents with a frequency rate of 3.072.)
 The Ohio Oil Co., Illinois Division, Findlay, O. (964,256 hours worked, 6 lost-time accidents with a frequency rate of 6.222.)

Group-C:

The Ohio Oil Co., Indiana Div., Findlay, O. (54,900 hours worked with no lost-time accidents.)
 Humble Oil & Refining Co., Amarillo Division, Houston, Tex. (46,234 hours worked with no lost-time accidents.)
 Southern Crude Oil Purchasing Co., Pecos Ector and Ward Div., Fort Worth, Tex. (13,985 hours worked with no lost-time accidents.)

Natural Gas Gasoline Group-A:

Sinclair Oil & Gas Co., Tulsa, Okla. (752,414 hours worked, 8 lost-time accidents with a frequency rate of 10.632.)
 The Empire Companies, Bartlesville, Okla. (424,197 hours worked, 6 lost-time accidents with a frequency rate of 14.144.)

Group-B:

Lone Star Gas Co., Dallas, Tex. (126,831 hours worked with no lost-time accidents.)
 Mid-Continent Petroleum Corp., Tulsa, Okla. (110,591 hours worked with no lost-time accidents.)
 The Ohio Oil Co., Rocky Mountain Div., Findlay, O. (71,250 hours worked with no lost-time accidents.)
 Shell Petroleum Corp., Wolverine Petroleum Corp., Tulsa, Okla. (55,929 hours worked with no lost-time accidents.)
 The Ohio Oil Co., Louisiana Div., Findlay, O. (33,885 hours worked with no lost-time accidents.)
 Shell Petroleum Corp., Comar Gasoline Co., Tulsa, Okla. (27,861 hours worked with no lost-time accidents.)
 Louisiana Oil Refining Corp., Cotton Valley Absorption Plant, Cotton Valley, La. (26,932 hours worked with no lost-time accidents.)
 Shell Petroleum Corp., Comar Oil Co., St. Louis, Mo. (25,409 hours worked with no lost-time accidents.)
 The Ohio Oil Co., Oklahoma Div., Findlay, O. (24,030 hours worked with no lost-time accidents.)

Pipe Line Group-A:

Oklahoma Pipe Line Co., Muskogee, Okla. (716,454 hours worked, 1 lost-time accident with a frequency rate of 1.396.)
 Standard Oil Co. of Calif., Trunk Line, San Francisco, Calif. (551,360 hours worked, 1 lost-time accident with a frequency rate of 1.814.)

Group-B:

Tide Water Oil Co., Tide Water Pipe Co., Bradford, Penn. (181,008 hours worked with no lost-time accidents.)
 Shell Petroleum Corp., Illinois-Indiana Line, Harristown, Ill. (149,025 hours worked with no lost-time accidents.)
 Midwest Refining Co., Casper, Wyo. (120,296 hours worked with no lost-time accidents.)
 Pasotex Pipe Line Co., El Paso, Tex. (117,080 hours worked with no lost-time accidents.)
 Standard Oil Co. of Calif., San Pablo Tank Farm, San Francisco, Calif. (No lost-time accidents with 96,064 hours worked.)
 Standard Oil Co. of Calif., Kettleman-Trunk Line, San Francisco, Calif. (No lost-time accidents with 72,744 hours worked.)
 Barnsdall Refineries, Inc., Barnsdall Pipe Line, Tulsa, Okla. (62,192 hours worked with no lost-time accidents.)
 Southern Crude Oil Purchasing Co., Southern Pipe Line Co., Fort Worth, Texas. (59,079 hours worked with no lost-time accidents.)

Marine:

The Atlantic Refining Co., Philadelphia, Penn. (822,464 hours worked, 10 lost-time accidents with a frequency rate of 12.159.)
 Associated Oil Co., San Francisco, Calif. (480,008 hours worked, 8 lost-time accidents with a frequency rate of 16.666.)

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Power Press Section

Officers 1930-31

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J. B. GIBSON, Western Electric Company, Chicago, Ill.
T. O. MEISNER, American Can Company, Chicago, Ill.

Tuesday Afternoon Session October 13, 1931

JOHN E. WALTERS, Chairman
General Electric Company, West Lynn, Mass.

The first session of the Power Press Section convened with General Chairman John E. Walters presiding.

CHAIRMAN WALTERS: The hour having arrived, the meeting will please come to order. Your chairman is asked to announce the Nominating Committee, which is as follows:

S. H. Slaymaker, Fairbanks Morse & Co., Beloit, Wis.; T. O. Meisner, American Can Company, Chicago; and J. W. Henning, Automatic Electric Co., Chicago.

I have been allotted two minutes of this session to tell you what has been accomplished in the past year. How and why we have had such a good year, in the face of the trend of events, is beyond me. I think it must be due to the kindness of a benign Providence who looks after us all.

Psychology has taught us that in times of stress and worry our minds do not function along regular channels, that we are prone to be careless in our activities, and therefore more prone to accidents. I think, this year, they have read it wrong; we have faced adversity as straight, outstanding Americans. We have gone about our duties with more thoroughness and more care. Therefore, by and large, it is a pleasure to say that the accident trend of the Power Press section in the past year, judging by the data we have been able to gather, has been very favorable. We face the return to work, either of old employees who have been away from their regular duties, or returning employees who have had diversified duties instead of their regular line of work.

Many of us who have lived through quite a few of these times know that the better times always come back. We face the problem, then, of special care in our accident work, and it is those problems which we are going to discuss here today. I care not what your problem is, if it pertains to Power Press work, I want you to bring it up. We are here to commune together, to get one another's ideas, to help one another. I am sure when a body like this gets together, we cannot help but help one another.

I have not told you much about what has happened, but my mind has been so full of what is ahead of us that I spoke only in a general way. I want to say that, in my year with the Executive Committee, I found a group of gentlemen who wholeheartedly, thoroughly and economically, also systematically looked after the safety work. The staff of the National Safety Council have, in my observation, worked harder this year to give you results than in any of the ten years in which I have contacted with them. They seem to sense the fact that we need their help now more than at any other time.

In the absence of Mr. W. L. Larson, I am going to ask Mr. E. J. Smith, Western Electric Co., Chicago, to present the Statistics Committee report.

Accident Experience in the Power Press Section During 1930

By W. J. LARSON
Chairman, Statistics Committee

The Power Press Section, whose 1930 injury experience is analyzed under the metal products industry in the Council's annual statistical report, made a good record during the year. Injury rates of a representative group of our members declined 35 per cent in frequency and 18 per cent in severity in comparison with 1928. These reductions are larger than those for all industries which averaged 28 per cent in frequency and 8 per cent in severity. Almost all improvement during the last two years occurred during 1930 for rate changes were small from 1928 to 1929.

I think that we can regard this showing with considerable satisfaction. From 1928 to 1929, operations increased sharply as indicated by a gain of 35 per cent in hours of exposure, without any appreciable increase in the frequency of injuries; and with a small decrease in severity. Then, during 1930, when operations were within 7 per cent of the 1929 peak, we achieved marked reductions in both injury rates. In other words, we have been able to check the frequency and severity of our accidental injuries during rising periods of employment when conditions are against us and to make actual reductions during slack times. This is particularly true of serious injuries because there was a sharp decrease

in the frequency of fatalities and permanent partial disabilities in our plants during 1930.

Some excellent results have been achieved by various divisions of our section during the last three years. Thirteen establishments manufacturing light metal stampings such as metal cans and similar products had only one fatality during this period, and have reduced the frequency of permanent partial disabilities about 50 per cent. The frequency of injuries of all types, however, has dropped even more—from 17.55 in 1928 to 6.97 for 1930. Equally sharp decreases have occurred in the severity rates for temporary and permanent partial disabilities.

Eighteen companies manufacturing signs, ventilators, sheet metal work for buildings and the like, have also been successful in their accident prevention work. The frequency and severity of serious injuries as well as temporary disabilities follow a distinct downward course during the last two years. Wire drawing plants, on the other hand, showed improvement over the previous two years with respect to the frequency and severity of temporary disabilities but not with serious injuries. Fatalities were more numerous and the frequency and severity of permanent partial disabilities were higher than during previous years, in spite of the sharp decrease in operating schedules.

This analysis I have been giving you is based on experience during the last three years of 181 establishments with an annual exposure of approximately 225,000,000 man-hours that have reported consistently. Since the identity and the character of these companies do not change from year to year, a reduction in their injuries is the best measure of our success in accident prevention work. Consequently, it is very important that every member report every year so that the number of our identical plants will represent a high proportion of all reporting members and thereby increase the reliability of variations in our experience from year to year.

Our records for 1930 alone, represented by reports from 442 plants with an exposure of 367,000,000 man-hours, was better than average. Industry as a whole had an average frequency rate of 18.47 and a severity rate of 1.97 in comparison to 17.59 and 1.26 for metal products plants. Our injury rates were also lower than in the majority of industries, as shown by a rank of thirteenth in frequency and tenth in severity in a list of 28 major industries. Among the industries with lower frequency rates than ours are chemical, automobile, steel and cement; our severity, on the other hand, is much lower than in the cement, steel or chemical industries.

Since our section is composed of many types of plants, frequency and severity rates from group to group fluctuate over wide ranges. Jewelry manufacturers have the lowest injury rates, 8.06 for frequency and 0.39 for severity. Frequency rates in other branches range upward to 37.08 for drop forging plants, which, together with structural steel fabricators, also have the highest severity rates. Wire drawing plants and structural steel fabricators, with only one-eighth of the exposure in the entire industry, had one-half of the total of 22 fatalities. On the other hand, permanent partial disabilities were most frequent in drop forging plants, metal furniture factories, and establishments producing light metal stampings. In groups with more than average hazards, however, are found small and large plants with records equal to the best that have been made in divisions whose operations are less hazardous. This indicates that some of our members are doing a real job in safety work while others are not accomplishing the results that are possible.

Various studies have shown the superiority of large establishments in safety. As our plants increase in size from less than 100 employees to over 1000, frequency rates steadily decrease from 33.48 to 10.73. While the decrease in severity with an increase of size of plant is not clearly established, there is, nevertheless, a downward trend. The experience of other industries also reveals higher injury rates in smaller organizations.

It has often been argued that small plants are under a handicap in accident prevention work; for example, they can not afford to hire a safety engineer. This, however, has not prevented small establishments in all industries from demonstrating that accidents can be eliminated. In our own industry, we can point to no-accident records during 1930 by a plant manufacturing metal containers which employs 349 people who worked 838,000 hours; a sheet metal plant with 126 employees with an exposure of 411,000 man-hours; and a structural steel fabricator employing 30 men with an exposure of 81,000 man-hours has a record of two years without a lost-time injury. An examination of the records of individual plants in all branches of our section will disclose other good records.

There are a few points which in conclusion I desire to emphasize. We made an excellent showing during 1930 in comparison with previous years and with other industries and it is not unlikely that we will do even better this year. On the other hand, there are many plants in all branches of the section whose rates are high in comparison to others in their classification and in comparison with plants of similar size. Now is a good time, while operations are curtailed, for companies with high rates to study and develop new safety methods. For all of us, however, there is the problem of holding the gains that we have made when business picks up and operations rise.

CHAIRMAN WALTERS: Are there any points in the paper or in the records, as shown by the National Safety Council for the past year which you would care to discuss? This paper will tie in very nicely with the next subject of discussion, by Mr. H. C. Howsam.

Production With Safety in a Small Power Press Plant

By H. C. HOWSAM

Superintendent, Hubbard Spool Company, Chicago.

Talks on plant safety at National Congresses have in most instances in the past been given by managers, superintendents, safety supervisors or plant engineers from large corporations, such as the automobile groups, public utilities or other nationally known concerns.

Safety work as conducted in these companies, where a large group of men are assigned to tool guarding, another group to machine guarding, and others to safety propaganda, the designing of posters, the conducting of safety contests and other forms of psychological appeal, is without doubt different than the safety work as carried on in a factory employing anywhere from 50 to a few hundred employees. It, therefore, follows that those who promote safety in these smaller plants entertain a different viewpoint on the subject than their brothers in the larger fields.

The purpose of this talk is to relate experiences in the development of safety in the Hubbard Spool Company, with which I am connected, and which employs approximately 125 people, thereby placing them in the small plant class. It is this past experience which has helped us to improve our safety program, develop our safety equipment and educate our employees to work safely.

A good many years ago all of our punch presses were operated with no guards or safety devices at all. Many of our operators, at that time, were of foreign extraction and could understand very little English. Instructions were therefore not always followed to the letter and accidents were frequent. It was hard to get any ideas from employees about safety, and accident prevention measures were few. After each accident there was a great deal of discussion regarding it which had the effect of keeping everyone on their toes for a while, and as a rule, the next accident did not happen until the last one was forgotten. After a few serious accidents our company installed a device on its presses which required operators to push two

widely separated buttons before the press could be tripped. This helped only until somebody found out how to lock one of these buttons permanently in the operating position, thereby making the safety device useless. After trying several other types of safeguards our company has found that by putting chutes and guards on dies it has approached as near to the ideal in punch press safety as it is possible to get.

Our first real consideration of safety occurred when we grew large enough to divide the shop into departments and install a foreman in charge of our press department. We picked a young fellow who seemed capable of filling this job, and sat down with him to discuss and explain what his new work would be. At that time it was the practice to let the press run, merely locking the clutch bolt (when-ever it was thought of) before making any adjustments to the dies or press. In order to be sure there would be no accidents we instructed this man to see that the belt was thrown off before taking out a die or making a set-up. This procedure was also to apply in making any adjustments, regardless of how small. This instruction was repeatedly given and it was the last thing discussed when the meeting broke up. Monday morning the man assumed his new duties and before he was on the job two hours he was called to make an adjustment of a rage pin and accidentally stepped on the treadle with the result that one hand was amputated and most of the other. He had forgotten to throw off the belt. This accident caused two men to faint and they were so badly shaken that they quit their jobs. We lost three good men in this accident and the morale of the shop was shot for several days.

To prevent a repetition of this accident we equipped our line shaft with clutches, making it possible to shut down one machine without shutting down the entire line. On new equipment, wherever it was possible, individual motor drives have been installed. Guards on the dies also make it impossible for operators to place their hands in the area of danger.

We also decided about this time that if we were to prevent accidents effectively we must educate the employee to work safely. Safety devices and guards were all right as long as they were used, but we must teach the employee to use them. By talking safety every time we had a chance, making it part of every instruction given, the use of safety posters, safety committees and safety meetings, we were able to put the idea across and accidents of a serious nature became few and far between.

Another accident worthy of mention here was that of a man rolling sheet metal tubes that look somewhat like a rolling pin. Inasmuch as he had to use both hands to hold the mandrill when he tripped the press, this job was always considered safe. One day, while placing a blank in the die, the mandrill fell on the treadle and tripped the press, taking off one of his fingers. We then put a guard over the treadle of each press. This is no doubt recognized, as hind sight, but safety was not being thought of in the manner it should have been and is today.

At one time we had a punch press delivered and the mover did not have the necessary equipment or help to unload it. The men in our receiving department helped accordingly, and because the mover had no skids they used whatever planks and blocking they could find. The press in coming down this makeshift skid fell over on top of one of the men, and had it not struck some cases in falling, would have killed him. After that we compelled the supplier to make sidewalk delivery.

We have a plating department in our plant in which we employ some unskilled labor. We were unable to keep a man in this department for any length of time because he soon had cyanide sores on his hands which invariably developed into serious infections. This department was ventilated so that it did not require a special room—the steam and fumes being removed completely. The floor was dry. Everything seemed ideal. But the men still became poisoned with cyanide. We had one or two men off all the time.

A careful study was made of this situation and it was found that the men did not realize the danger connected with this class of work. We put on a campaign of

education in this department, teaching them that all cuts should be treated at once; making sure that when they washed up they did a real job of it and that they did so more often. We also supplied a preparation which would counteract the effects of alkali and this they applied to their hands frequently during the day. Since the workman has been taught the art of cleanliness, we have had no more such cases and our labor turnover in this department is almost nothing.

A number of automatic spot welders in our plant gave us trouble for some time. Sparks from the work would fly in all directions and while goggles were worn they did not keep the sparks from getting under the clothing and causing serious burns. To prevent this, glass shields were fastened to the machines. To the bottom of the shields canvas aprons were attached. The men were supplied with gloves. By this step the difficulty from burns was eliminated.

It was noticed that very often an operator would ask to go home because of headache. We found that the stock he was welding had oil on it, which, when the metal became hot, would burn, giving off a smoke, which the operator would inhale. We installed a ventilating fan, piping it to each machine with a three inch opening, as close to the welding points as possible. This not only drew in the smoke but also a great many of the sparks. There has been no lost time in this department since this exhaust system has been in service.

In our woodworking department when planer knives become dull they are stoned. This can be done several times before they have to be taken out and reground. The operation of stoning the knives is very simple and was never considered dangerous. The way we stone them is to mount a guide, which is furnished as part of this equipment, on top of the knife head and attach a fixture to a stone. This fixture is moved across the revolving head by pushing and pulling it along the guide with a long wire hook. The planer has been in our plant for several years and the stoning performed a great many times.

One day the unexpected happened. The ring which supported the hook broke and allowed it to fall down upon the revolving head. The knives caught it and before the attendant could let go, drew his hand in and cut it badly. It was only a miracle that his hand was not taken off. To guard against future accidents of this kind a wood dowl is now used in place of the wire hook. Wood will break instead of winding itself around the knife head.

A severe accident was caused by a man operating a press when the set-up was not correct. He had been performing an operation which called for a chute on the die and a press tripped by hand. When the material he had been working with was used up the operator reported to his foreman and a change in the set-up was made. The chute was removed, other gages placed on the die and the foot treadle connected. Later when this job was changed back to accommodate the same material he had previously used, he did not report to his foreman but proceeded to feed the press by hand, tripping it with his foot with the result that he lost several fingers. This man had been in our employ for a long time and knew better than to run a job which had not been approved by his foreman. He took that chance which he knew was dangerous.

Another fellow told me when caught running a press without the guard in place, "I've set dies and run presses for over thirteen years and never been hurt." A short time later he did the same thing in spite of the warning never to do it again, and lost the tip of his index finger. These two accidents point out very clearly that regardless of how well equipment may be guarded, guards are useless unless the employer makes sure they are used. In other words it is up to the foreman to follow through and see that his instructions are carried out to the letter and that the safety equipment provided is used.

Another thing an employee must be taught if he is expected to work safely is that horseplay must be left outside the shop.

Rings should be removed, and sleeves rolled up for operating moving machinery.

Long neckties and overalls too long in the legs have been the cause of many preventable injuries.

One of the best methods that we have found of spotting the careless workman has been by maintaining a record of all injuries that require first aid. Where it was found that one man doing the same class of work on the same type of equipment as others required first aid treatment several times during the month, we felt that this man was careless or the equipment was not properly guarded. By taking the necessary steps to correct the equipment, make the men work safely or replace them, we feel that we have prevented what might have been some very serious accidents.

In looking back over our past experiences we cannot help but feel that most of the accidents we have had have been due to one thing more than any other, and that is "I didn't think." Guards have been removed by those who didn't think to put them back. A makeshift block and tackle has been used in place of a chain fall, and "I didn't think it was that heavy" exclaimed the rigger when the load dropped. Again, "I didn't think it was serious", when a small cut or infection was neglected. Or "I didn't think it would hurt him", when a foolish bit of horseplay caused an injury.

We have tried to make the employee in our plant think of "safety always" in connection with everything he does. We take the same action in minor injuries as we would in a more serious one, making the employee realize that any injury, no matter how small, is an accident, and the same amount of effort must be spent to prevent it happening again.

CHAIRMAN WALTERS: Gentlemen, this most excellent common sense, practical shop experience paper has given us food for thought. We are well ahead of our program. I am going to vary it a little so that you may take up with Mr. Howsam any problems you may have in some of the smaller plants.

H. S. MOODY (Bausch & Lomb Optical Co., Rochester, N. Y.): In the statement he made at the beginning regarding reduction of from 15 to 25 per cent, it seems to me a wonderful reduction and I am wondering whether all were reported?

MR. HOWSAM: Before we put this thing into effect—a period of about six or eight months—I discussed that with the foreman at our regular monthly meetings. Each time I brought up the subject, I would be told, "They will say they got that cut at home." They had a number of excuses. Finally I asked that it be tried out. I told the foremen that any man who had a cut on his hand which had not been taken care of would be considered as under the responsibility of the foreman. There was no time when we found a man hesitating to come up and report a minor injury because he was afraid it would put a mark against the department. We divided the shop into departments and rather ran a contest.

The first month, the record was unknown to anybody outside of the lad who took care of the first aid cabinet. At the meeting at the end of the month, I "sprung" it on the foremen, pointing out one man in particular who had a large number of cuts and came up for treatment during the month. We investigated his case and found the equipment he had was identical to that of several others and he, himself, was careless; whereas other men had not had any cuts at all during that month. By correcting this man, it reduced the accident record quite a bit.

C. W. WAGNER (U. S. Fidelity & Guarantee Company): Mr. Howsam stated he eliminated the use of the old device for better types. I would infer there were no guards on the fly wheels of the presses. If that is so, what precautions were made against fly wheel injuries or loose lacing injuries on fly wheel machines?

MR. HOWSAM: We have no guards on our fly wheels. The safety device about which I spoke is a pin, which can be set into the punch bolt so that when the treadle is tripped there won't be interference with the fly wheel.

We have had a number of plans for putting across the idea of safety, but we

never followed one plan for any great length of time. One plan, which I thought brought the best results, was to take a number of men, picking them off the floor and appoint them as a committee, but without a foreman or anybody in charge.

The committee consisted of five. Immediately after the lunch period each day, a man on this committee would go and get one or two men or three men, depending on the number we had in the shop. He took these men over to one side and talked to them on safety for a matter of five or ten minutes. In that way, during the month, each man in that shop had a personal talk on safety at least once, beside our regular safety meeting which we held once a month. We kept our bulletin board very clean, putting up only a few posters at a time. We had an electric sign, and safety slogans were solicited from the men. We put these slogans up in front of the electric light, and by pasting colors back of it we got colored letters and put the man's name on it, which created quite an interest.

R. W. HARDY (Olds Motor Works, Lansing): The gentleman spoke of horseplay. I am wondering where you find this individual. Nine times out of ten they won't report it. They are afraid they are going to get the front door. I understood you to say this horseplay could be eliminated by talking to the individual, but how are you going to locate the individual?

MR. HOWSAM: Horseplay does not usually produce an accident at the beginning. Horseplay usually starts out with some foolish little stunt that really does not amount to anything. The old timer or the foreman usually has a pretty good opportunity of witnessing that horseplay. By getting that individual right then and there and talking to him, and pointing out that carrying that horseplay on a little further might develop into a serious accident, I think much can be done. In connection with the safety committee, in getting the various groups of men together, that always stressed. Horseplay is always considered a very serious matter in our shop, because we have quite a number of young fellows who are just naturally inclined to fool around.

E. J. SMITH (Western Electric Co., Chicago): I would like to know whether any one here knows of an accident that was a direct result of horseplay.

MR. HARDY: Yes, I know of one which resulted in thirty-five lost days. The man was walking up to punch the clock. Somebody gave him a shove and down he went on a pile of fenders. He cut two tendons in his hands. We had a safety contest going on in the city of Lansing and we lost thirty-five days right there. A foreman was responsible for that man's presence, from the time he came inside the gate at seven until he left at night, regardless of the lunch hour, but the foreman was not in the line punching the cards. There were several who saw him, seven, I believe, but it is difficult to get anything out of them. Even though the old timers are in line, it is difficult, when you come to finally analyze it.

MR. WAGNER: Consider a case like this: With flanging and forging combination, with two-handed Benjamin guards on the machine, a man operates the left hand with his elbow, trips it with his right hand and eliminates the material with the tips of the fingers. Before he gets them away, he takes off three fingers. How do you eliminate that?

J. W. HENNING (Automatic Electric Co., Chicago): We had the same accident. While it resulted in merely a little scratch, it might have been serious.

H. C. WINFIELD (Olds Motor Works, Lansing): Is it possible to safeguard a machine so that an operator cannot get hurt?

CHAIRMAN WALTERS: You have to deal with the human element all of the time. As long as that is true, I would answer your question by saying "No." But with the cooperation of your force on the floor, you can educate that human element so that I would answer the question "yes." I care not what the guard is, there is none made that you cannot go around. On the other hand, you can have the most foolproof guard with the slide, and if some clump wants to reach down there to see if he

cannot move the material a little faster than it slides, there is nothing which is going to stop him.

I never had an easier job in my life than that of introducing the next speaker. I was going to say "one of our old timers." If you don't know him, you will before he gets through.

Is the Press Safe Because It Is Guarded?

By G. S. THOMPSON

Engineer, Gnau & Company, Detroit, Mich.

Everything we have today has come to us, primarily, through somebody making a mistake. We are just witnessing the passing out of a great man who made mistakes. He burned up a railroad car making a mistake, but he discovered something and benefited by it. I remember when Thomas A. Edison, down at Menlo Park, had his light in a bottle, and I don't mind telling you it was a beer bottle that was used first, because he could not get the tubes and the glass he wanted. He burned his finger, and when he did so, he realized that electricity had a potential power. The next thing was to play with that power, but he burned his fingers and made a mistake and learned something. I believe we have learned something by making mistakes but let us not make those mistakes twice.

Today, manufacturing, mercantiling, selling, production, everything is undergoing a change. We are going to see an entirely different manufacturing condition from now on. You are going to see an entirely different condition in your plants from now on.

Plants have been operating night and day, crazy with the heat. You can only get so much water into a bucket, and when you pour in more it runs out and becomes waste. That is exactly what we have been doing, wasting energy, wasting our products until we have the whole thing saturated. Of course, there is no saturation point as long as human beings still create more. Every kid that is born is a potential purchaser. That is all right. But they didn't analyze and get down to the point where they would say, "That kid cannot drive an automobile until he gets to be sixteen years of age," although some of them are trying to get permission to have them drive at fourteen and build up other automobile accidents.

The ambition of every safety engineer is to produce a zero rating for his plant, and he does everything he can to bring about this result, sometimes he almost reaches his goal and then the unexpected comes along and away goes the record. In going over some reports recently, I came across a number of cases that were in the class to which I have just referred. They almost made the grade, so I thought I would investigate and find out why, and every case finally ended in a machine failure. That is why I am presenting the question which is my subject: "Is the Press Safe Because It Is Guarded?" Let us review the safety history briefly. The first step we took was guards, and I feel quite confident it was overdone. In fact, I know of one concern that expended over \$100,000 to guard its plant. That is a lot of money. Did it reduce accidents? No, it did not. The chart still went up and production went down.

I want it distinctly understood that I am in favor of guards. Every dangerous part of the machine should be adequately protected. You will note I use the word "adequately." But it should not be fenced in in such a manner you cannot operate the machine. If you are going to do that, you might as well put a padlock on the outside and say, "You cannot come in," because that is the only time you will have the machines thoroughly safe, except when they are not running.

It is your job and my job to see that guarding is done, consistently, with one main thought in mind at all times, that when production ceases your pay check ceases, at the same time. Don't forget that. Production must continue, and I would say "economic production," or there won't be any need for you and me.

Another thing that is misleading in the guard situation is this: I have gone into plants and heard the manufacturer, superintendent and general manager say, "We have a wonderful plant. It is fully guarded. Our safety problem is all solved." After digging into the cause of accidents, you find that the only cause of accidents is carelessness on the part of the men. When I hear that, I am reminded of the Swede who was a track walker on a railroad. There was an accident, and the Swede was on the stand. The judge said to him, "What is your name?"

"Ole Olson."

"What is your business?"

"I work on the railroad."

"What do you do on the railroad?"

"I walk down the track and when I see spikes sticking up I drive them down. Ven bolts is loose, I tighten them."

"Did you see this railroad accident?"

"Yes."

"When you were looking down the track, what did you see?"

"I saw Number 6 coming very fast, sixty miles."

"When you looked the other way, what did you see?"

"Number Five going very fast, about sixty-five miles."

"What did you do?"

"I got off the track."

"Well, what did you think about that time?"

"I think it is a hell of a way to run a railroad."

I often think the same when these manufacturers start to throw this boloney around. They are not sold on safety. They are shifting responsibility. But remember the big fellow up in front has a big job, and when he brings you into the plant as a safety engineer, he expects something from you. Every department of every plant must be maintained at a profit. When profit ceases in industry, management changes, and usually the safety engineer changes, too.

That is just as true, gentlemen, as the fact that you are sitting here. You say, "How can we show a profit?" A safety engineer has one of those circle jobs. When he starts from this end and has gone around and completed the circle, he can start all over again; and woe betide him who does not start all over again, because he is going to have failure. He can look for it. He can see it in great big flaming letters, if he does not go through the whole thing again. It is like a three-ring circus.

I don't know whether it ever occurred to you, but do you realize that it takes a great deal of ingenuity and ability to even be a clown? Do you know a clown does the same thing every day for the whole period that the circus is on the road? He does the same thing in the same way and does it over and over again. His secret is being able to duplicate what he did yesterday, because he made the people laugh yesterday; and if he does the same thing tomorrow, he will make them laugh again; but when he deviates, he is lost. That is your job, too. Go around the circle and make them like it and then start around and do it again.

But when you get to the point that you sit behind the desk and say, "I am waiting for records," there won't be any records. The kind of records you will get from that time on won't be very pleasant.

I wonder if we are close enough to our manager. I wonder if we get the thought that management has for us. I am reminded of the story of three men in the lobby of a hotel. One looked at the other and went over and said, "I am Mr. Brown. I am an artist and paint in oils."

The other said, "Fine, we ought to know one another. My name is Smith. I am a sculptor. I work in marble."

The third fellow walked over and said, "I belong in this group. I am an artist. I am a safety engineer. I work in ivory."

We often think that is true, when we go around the shop, and see things done regarding which we have denounced time and time again.

I am going to make a few comparisons for you on guarding. A man had 500 employees, operating 125 presses, very poorly guarded. They went eleven months without a lost-time accident, and sixteen months without an amputation. A very fine record. Another plant doing almost the same kind of work with a well-guarded plant had the same number of employees, but had only 110 presses. There were six amputations and 22 lost-time accidents in seven months. I am not going to comment on those two concerns. I want you to do your own thinking.

I wish to give you a few examples, just a few of many. I shall give you only five.

Number 1. Press guarded. Fly wheel became loose and ran off shaft, fell to the floor, smashed the guard, injured an employee and damaged two other machines.

Number 2. Press guarded. Crank shaft broke and fly wheel and belt became tangled up, tore down the line shaft, injured two employees.

Number 3. Press guarded. Stud holding brake shoe broke off, ram dropped as employee was removing a part with tongs; tongs flew up and lacerated employee's face and eye.

Number 4. Press guarded. Latch broke and clutch locked, press repeated; stock caught employee's hand between bolster and overhang on punch and crushed the hand.

Number 5. Press guarded. Brake drum fractured and broke; shoe was caught in fracture, gears stripped, counter weight arm broken and crank shaft strained. No one injured, but some very close escapes.

I could go on telling you of dozens more, and there is no doubt but what you could do the same. But the thought I want to get to you, more than any other is: Don't you think we are placing entirely too much confidence in guards on inspection? Personally, I do, and that is borne out. Some one has said that our safety problem is 25 per cent guards and 75 per cent education. I don't agree with them. Guards are absolutely necessary; education is also necessary; but there is something else in our problem, or it would be a perfectly simple proposition. It would be purely mechanical to go along and guard all the machines and say the job is done. We could say, "Give me my pay check and I will be on my way, because you won't need me any more." But you know that is not so.

Once again that circle starts. What is this something? I believe it is eternal vigilance. First, inspecting every press, every day before it is started. This is proven by the fact that a certain concern I could mention operated 600 days without a lost-time accident. In fact, it is the best department in that entire organization; purely because they adopted the inspection method. Every press is inspected, morning and noon, by the foreman and his assistant and operated by them before the employee is allowed to continue on the job. The result is that production has increased and accidents have decreased.

The only way you can find out how good a pudding is by putting your finger in or getting a spoon and trying some. That is the way to find out. This is something that has been tried, not in one plant, but in a number of plants and in every one of the plants it has proved successful.

There is another thought linked to this method. Are you using all the available material you have at hand in your plant? Have you taken the machine repair man along and made a safety man out of him? How about your die setters? Have you made them part of your safety organization? How about your maintenance crew? Have you made them the strong right arm of your safety department? If you have not, you are missing a big bet. I find those birds are pretty hard-boiled, but they are just human, even as you and I, and they can be appealed to and can be of material assistance to you, if you use them. The material is there, and why should not they be a part of your organization? Why should not you take them in

counsel and in confidence? They know those machines. They know every nut, bolt, and screw on them.

Are you just taking somebody's word for it, or are you correlating facts and applying them to your job? Have you just taken it for a fact that because you have harnessed a boiling machine with guards your safety job is done?

Is a press safe because it is guarded? No. Don't let anybody tell you that it is. Every piece of mechanical equipment that has ever been created by man has failed sometime in its career; and why should you expect a punch press, a power press or any other kind of contraption to be an exception to that rule?

Men, I appeal to you to go back to your plants, regardless of guard or any other condition, and to resolve that the only way you are going to stop accidents is not to allow conditions to exist that will produce them. Verily, he that sitteth down upon a tack shall rise again. And so will you, if you continue to believe that a few guards have solved your safety problem. They have not. Education, yea, and what else. I would rather go into a plant and take a new employee—I don't care whether he comes from the farm or where he comes from—take him to that punch press and tell him if he puts his finger in a certain place it will be injured. He will follow instructions often, better than the more experienced man. Instruct him in the very beginning. It is his due. You are responsible for him if you don't.

Would you set a child on a railroad track and expect him to crawl off the track in time to save his life if a train were coming? Of course, you wouldn't. The child does not know, and if the child is killed, who killed him? You did because you put him there.

The same thing is true when you throw a man into the press department and say, "God be with you." I have seen foremen, hard as bricks, take them in and say, "You take this and put it on there. You step on that treadle and go ahead." You know what to expect in such a case. You know in twenty-four hours that poor bird is going to be all messed up. Yet we call them foremen!

A hard-boiled foreman had this experience, which was repeated by the head of a large organization, and has been confirmed. This foreman wanted production. He didn't care how he got it, but he wanted production. He was having accidents. He had a girl in that department who was rather sweet on him. He was going to marry her some day. He was over there trimming up the die; it didn't work in the right manner. The press came down and nipped his finger. He gave her a piece of cold rolled steel shaft, just big enough to go under the ram. He said, "When those pieces stick in there and you have to get your fingers near, shove this under the ram first." Had that shaft repeated, it would have broken the bolster plates, ram, and everything else.

I said, "Harry, what did you do that for?" The answer was, "I don't want any woman in my kitchen with two fingers off." Then he was asked this question, "What do you think this other fellow thinks about the woman he is going to marry, and she is operating a wide open press? How about all the rest of the girls in the department? They want to be married, too. Are they going to be made to suffer because they have one finger off, which you caused? Why don't you give them all blocks of iron?"

He stood around for a minute or two and said, "I have been a damned fool." His employer said, "You have not been a damned fool, but you have been waiting for somebody to say the right thing to you."

He got busy, and out of 65 jobs in that department, mechanical safety devices of some kind were put on each one, and greater care exercised. This man is married and has five children. His wife still has all her fingers, and he has kept all the fingers on the men in the department for the last several years. It got to the man. It was not the guard, although they are essential. But it was that one application of common sense.

Don't tie the machine down so you cannot get production, because if you do,

there is no pay check. It is so easy to get both production and a pay check, too. In closing, I am going to ask for your own conclusion as to whether the press is safe because it is guarded.

CHAIRMAN WALTERS: When I introduced Mr. Thompson, I told you that those who didn't know him would know him before he got through.

H. C. WINFIELD (Olds Motor Works, Lansing): Mr. Thompson said you could put a baby on a track and if a train came along you would be responsible for killing the baby, because the baby didn't know enough to get off. He compared that to putting an operator at a machine, where you would be responsible if he had his hand taken off. Do the baby and the man have the same judgment?

CHAIRMAN WALTERS: I think you missed the point. If you place that man at the machine without any instructions, except to tell him to take out something and put in another, the conditions would be similar. It reminds me of the story of the Jew who said, "Iky, get up on that table. Now jump down. Go on and jump. Papa will catch you." Iky jumped. Papa was not there. Papa said, "Now, Iky, that will teach you to trust nobody." You have to show them. Mr. Thompson, have you an answer?

MR. THOMPSON: I don't need an answer after that. I would like to say this about press inspection. I took a census of about twenty different plants on a questionnaire, covering East, West, and Middle West, relative to press inspection. I was not satisfied with that and got a copy of the report of the Department of Labor of Great Britain. Their labor inspectors inspect every press that is operated in the Empire of Great Britain, once a month. Some of the main points of inspection are condition of clutch key, key setting, fly wheel busting, spring trip mechanism, brakes. There is something which we rarely ever think about and which has much to do with a lot of accidents—the poor old slides. How many of you can raise your hands and tell me the slides in your punch presses have been inspected to the extent where they are at least 75 per cent perfect? If you have gotten nothing else out of this meeting, that is one thing to look for. The poor old slide goes up and down, and what does it do? It has a big function, but we rather slip sideways on it, because we put all our dies on dowel pins today. We have done it because it is quicker to set a die. When I was in the press room, we had to take the die and set it down. We had to register the punch and die together. It was a mess. If the slide was not right, we just sheared the cutting edges on that punch and it was just too bad.

The next thing is the guard on the machine. There is one other thing to which they go into a little bit deeper than we do, in this inspection in Great Britain. If a defect is noted at times when these periodical inspections are made, they want a report on the nature of the defect, the date on which it was reported, the action taken, date on which the defect was remedied, and the name of the person by whom the defect was remedied, and the name of the man who made the repair on that press. You have the responsibility delegated down to the man who did it. If he does not know his job, he has no business to be on it and if the defect happens again, it is perfectly obvious he didn't fix it right in the first place. It is a check. The English Government is rather thorough, particularly in such things as this.

R. W. HARRY (Olds Motor Works, Lansing): How do they know it is in condition?

MR. THOMPSON: It is like the fellow who adjusted the old music box. I can go into a punch press room where everything seems to be going along all right. Somehow or other, I have an uncanny way of detecting something because of a noise that is not harmonious. I run it down and find the press is tripping, or the latch is out of adjustment, or there is a weak spring, or something of that kind.

When the foreman of that department comes in the morning, and the power starts, as soon as those wheels begin to turn, he knows whether the tune of that shop is right. They go down the line of 125 presses and start from the beginning. If ever a defect will show up in a press, it will show up in a press standing over night. When you start it in the morning, the oil is hard and cold or something of that

kind, and there is a drag if there is anything on edge; for instance, if your latch is just about ready to go or your trip is about ready to go. It is a case of experience, and intelligence. I cannot tell you any other way to do it, because there are only two ways the thing can be done, good or bad. A punch press, in my estimation, cannot be half way in either instance, and qualify.

There are many ways in which you can know whether a press is hitting properly, whether it is hitting too hard. There are many strings to that harp on which you can play. Your die man, your machinery repair man and these other men should be qualified to know whether a thing is reasonably right. If they are not right, stop them, because all the guards in the world won't correct the condition.

H. S. PUTNAM (American Can Co., New York): How are you going to detect the fact that the crank shaft is becoming crystallized?

Mr. THOMPSON: By not misusing the press in the beginning, and it won't become crystallized.

Mr. PUTNAM: Sometimes the fracture shows they are not properly heat treated.

Mr. THOMPSON: I find more shafts have been crystallized through abuse of the press than any other way. The fly wheel is put on to throw the press over to center. A throw in the crank shaft is made to give the fulcrum of the lever power so it goes over to center. If the key begins to get loose and the fly wheel is allowed to rotate, every time it hits the bottom, the fly wheel has the tendency to go forward, torquing the shaft back again to overcome the inertia.

You put this crystallized material under the microscope, and you will find your metal will be spiral at its breaking point, which indicates torque. Failures have occurred in bad metal, but I have confidence enough in the punch press manufacturer today to know that he will not knowingly put out a piece of steel that does not meet all of the requirements. I do find failures of machinery where presses have dropped their wheels, cast their wheels, as we call it, or crank shafts have let go. If you trace the history of that machine, you will find somebody has been using that punch press for a drop hammer, or you have been hitting so hard you have torqued the shaft. That can easily occur. In the die setting, in the variation of metals, you may have a rough job. A set of dies were made for making license plates for a certain state, an automobile license plate. They had men doing penal servitude rotating the presses. The presses were interchangeable, like a pair of scissors. You made three plates at a time.

When those boys wanted a few days off, they took a handful of metal, put it under the press and kicked it, because they didn't know what was going to happen. They broke the crank shaft and the ram and stalled the press and broke the motor. Until the press could be repaired, they had bread and water, but they did, at least, have time to think. They were looking for a rest, and one way to get it was to jimmy up the press.

I mention that to show the results of overstrain. The press may be made for two pieces. If you put eight in there, you will have six too many. The press attempts to perform its function. It cannot do so, because it does not have enough elastic limit.

LOUIS BORAKS (Liberty Mutual Insurance Co., Boston): I wonder if Mr. Thompson can tell the percentage of accidents due to mechanical failure in the press?

Mr. THOMPSON: There are more accidents, I may say, due to improper instruction than there are due to mechanical weakness or failures; but there are mechanical failures.

Mr. BORAKS: Our company covers about 15,000 presses. We have a pretty good record, which shows that three per cent of all punch press accidents are due to mechanical failure in the press.

Mr. THOMPSON: I wouldn't want to be misunderstood. I want it in large type that I DO believe in guards. Guards are necessary. We have had them all around us and can prove that they are fine, but they are not the entire job.

R. W. HARDY (Olds Motor Works, Lansing): In Pittsburgh, last year, we had quite a hot discussion in this particular session, in regard to safety engineers being

responsible for accidents. Mr. Winfield is superintendent of the punch press division at the Olds factory. I don't think they hold me responsible for the accidents in his division. I think the man in charge of that department is more or less responsible than the safety engineer himself. As I understand, the safety engineer is only the spiritual advisor.

Mr. THOMPSON: Yes, I do think you are an advisor, but I do think you have a responsibility, and what is it? What did the plant hire you for?

Mr. HARDY: They have told me several times that I am not responsible for the accidents, just to advise.

Mr. THOMPSON: I think they are making a mistake.

H. C. WINFIELD (Olds Motor Works, Lansing): Mr. Hardy said he was not responsible for accidents at our place. We have gone twenty-five months without an accident on the press, which I think is a pretty good record. The only way that record is any good to us is to keep Mr. Hardy out of our place, and the only way to keep him out is not to have any accidents.

H. W. SWINGLE (Geo. Hertmann & Co., Chicago): In regard to the crystallized shaft, we have had considerable trouble, and have placed a cast steel guard over all direct connected presses which don't have back gears. We have had one or two shafts break so that the fly wheel dropped, since we put that guard on.

H. S. PUTNAM (American Can Co.): I believe you can now get them with these guards attached.

ADJOURNMENT

**Wednesday Morning Session
October 14, 1931**

JOHN E. WALTERS, Chairman
General Electric Company, West Lynn, Mass.

The second session of the Power Press Section convened with General Chairman Walters presiding.

CHAIRMAN WALTERS: Yesterday we had the best attendance, the liveliest, the most interesting meeting of this Congress. The people who are here are here for what they can get out of it. The almighty dollar is the thing that is controlling the meeting.

I am going to ask the Nominating Committee if they are ready to report at this time.

S. H. SLAYMAKER (Fairbanks, Morse & Co., Beloit, Wis.): Mr. Chairman, the Nominating Committee wishes to submit the following slate of officers for the coming year:

General Chairman—W. J. GRAVES, Michigan Mutual Liability Co., Detroit, Mich.

Vice-Chairman—A. L. KAEMS, Simmons Company, Kenosha, Wis.

Vice-Chairman (In charge of program)—P. G. HUNTER, Motor Wheel Corporation, Lansing, Mich.

Secretary and News Letter Editor—E. J. SMITH, Western Electric Co., Chicago, Ill.

Chairman Poster Committee—E. G. STAHL, Transue & Williams, Alliance, Ohio.

Chairman Membership Committee—J. D. LYLE, Fisher Body Co., Cleveland, Ohio.

Chairman Statistics Committee—HERBERT ROTH, Gillette Safety Razor Co., Boston.

Chairman Engineering Committee—GEORGE S. THOMPSON, Gnu & Company, Detroit, Mich.

Chairman Slides and Kinks—J. E. ROCKOFF, Detroit Steel Products Co., Detroit.

Chairman Health Committee—DR. G. R. NICHOLS, American Can Co., Chicago, Ill.

Chairman Publicity Committee—C. R. BRYANT, American Can Co., New York.

At Large, LOUIS BORAKS, Liberty Mutual Ins. Co., Boston. J. W. HENNING, Automatic Electric Co., Chicago. T. O. MEISNER, American Can Co., Chicago. S. H. SLAYMAKER, Fairbanks, Morse & Co., Beloit. J. E. WALTERS, General Electric Co., West Lynn.

CHAIRMAN WALTERS: You have heard the report of the Nominating Committee. Are there any further nominations from the floor?

E. J. SMITH (Western Electric Co., Chicago): I move the nominations be closed and the report be adopted.

(The motion was seconded.)

CHAIRMAN WALTERS: It has been regularly moved and seconded that the list of officers as presented by your Nominating Committee be duly elected. Are you ready for the question?

(The question was called for, and the motion to adopt the report of the Nominating Committee was carried unanimously.)

CHAIRMAN WALTERS: The report of the Nominating Committee is adopted.

I am going to ask Mr. Graves to come up here and take the chair on my right.

Gentlemen, I think we have a strong slate, a slate that will maintain the prestige of this department. We always say we have the best, and the best is none too good. I am going to prove it to you now by a change in the program. I have told only one man I am going to do it. I rather think he sat up late last night getting ready for it. So I am going to call on him first. I think about the only name we can give it is a general round table. There is going to be no restriction. The sky is the limit. Bring us your troubles, as long as they are press and shop troubles, and bring us your good ideas along the same line if you have them. I think that is

enough latitude. I am going to call on Louis Boraks to tell us anything he has seen in his travels, or something that will get the boys going.

General Round Table

Led by LOUIS BORAKS
Liberty Mutual Insurance Company, Boston, Mass.

I don't know whether it is an honor to be called on without any preparation. It is pretty difficult to make an unprepared talk, so I am going to tell you the story of my life, and when I say life I mean my life connected with the Power Press industry.

I am a safety engineer with an insurance company. Originally, away back in 1900, my father took me by the hand and apprenticed me to be a die maker. After serving many years, I learned a little about it. I am still learning. I served in various capacities in the die making room, foreman, supervisor, and spent about twenty-five years doing it. When I look back to that time, one of the things which I remember very plainly was the fact that the foreman who taught me my business, and all the line right up to the big men, had the idea that in making dies for presses the thing to do was to make the dies to specifications. In other words, the dies had to be accurate. That is true in almost every line; dies have to be accurate. A failure, an error in a few thousandths of an inch is a serious matter.

He taught me one other thing, and that was "For the love of Pete, let us have that die." They wanted speed on the die, but nothing was ever said about making a safe tool. We had accidents in those days, plenty of them. I can remember that if there was an accident on a press we had an official photographer come in and take a picture of that machine. The foreman of the press department was all ready to make an affidavit that this press was in good mechanical condition and there was no further liability on the part of the employer. We didn't think much about it in those days. I was as hard-boiled as the rest and thought it was too bad. We had sympathy for the man who was hurt, and that was as much as we thought about it.

This went on in my life for quite a while. I had charge of the tool department. The last position of this type which I had was one where I had 2,000 employees to contact with. There were about 100 tool and die makers. My department was a tool job. We had very few accidents in our department. It was probably one of the less hazardous departments in the plant and I felt no connection with the press department or any other department. I had the same problem which many of you gentlemen undoubtedly have today—get that out at cost, a low cost, a cost that would compete with outside labor, and get it out quickly, because they were waiting for it.

That is the typical condition which prevailed in 1920. We had accidents in this plant and didn't care much about them. We had them in the tool room, yet we didn't care much about them. The works manager didn't care much about them. The works manager never came to the tool department to say, "Boraks, what are you going to do about this? Can't you make some dies that are safe? You are responsible."

Our plant was in pretty bad shape as far as accidents on the press were concerned. One day the insurance company, which had covered us and had not been able to do much, brought a gentleman into our plant. He came there with his trunk full of samples. All the foremen and supervisors (about thirty in all) were herded into an office. This gentleman, in his fine, aggressive way, told us much about this punch press job. We all knew it, as far as the die making job is concerned. There was no question about it in our mind. Our whole problem was the fact we never had been told to do safety work. Mr. Kaems, the gentleman to whom I refer, awakened the works manager. He didn't do much with the rest of us. We all agreed. He went through the plant with me and told me we could do a certain

thing with one die and could put feeds on this and that. I agreed with everything he said. He sold the works manager. We went to work and did a fine job in that plant. I went with the insurance company later, and am trying to do what Mr. Kaems did with me.

I wonder if you men realize the number of plants today that are just as bad as they were before I ever came in contact with Mr. Kaems away back in 1920? I visit and try to work in perhaps 300 plants a year and have been doing it for six years now. Of course, the plants to which I go are the plants which are not doing very well. They are having accidents. They are not sold on safety. They don't want anybody to get hurt, but they are not doing much about it. They just think it is too bad, and they all have various reasons for it.

When I come to these meetings, I sometimes feel we have not the right body of men in attendance. Every one of us is sold on safety and every one of us is doing everything we possibly can. Every one of us knows this punch press proposition. I don't think there are a great many men coming in here this morning who have questions. If they have, they probably know the answer, but they want to know the other fellow's answer, so they may take new suggestions away with them. It is a difficult thing to really take something away from this room, because all of us are trained, I believe. But there is one thing we can get out of such a meeting, and all of us have our limitations, no matter whether it is making guards for dies or guarding a press job or anything in the plant. Nobody knows it all and they never will.

There is a man in every plant who is probably the most highly skilled that you have there, the die maker. He knows dies; he knows presses and lives with them. He has much imagination; he is intelligent. Do you ever talk over your problems with him? Of course, you are all safety engineers and know all about guarding presses, but I claim you can get much information from the die maker.

Back in the old days when I found a die which was different, where I wanted to combine a number of operations and get the job out at a low cost, did I decide it? No, I had seventy-five die makers on a bench. I took the blueprint apart and went down the line and laid down five or six blueprints and asked them to stop what they were doing for one hour, to make sketches of the job, the number of operations. We compared them. At the end of one hour, I slapped my work down on top of his. We got his opinion and mine, and that is how I learned my business. I had the information from those seventy-five die makers, and they taught me plenty.

If you have any problems on guarding your presses, why don't you do the same? After all, the guarding of dies cannot be done any better than the manufacture of them. Our company, today, is going right to the die makers. I have samples of as many as eight operations compiled into one. As I go around the plant, I show them these things. I had them at Rockford, at a session we held, and laid them on the table. We didn't want these fellows to throw away the dies and make an operation that was an eight operation in one. We didn't want them to think the die people had an operation they were not using. We interested those people particularly in safety; that is so far as having safety organizations and safety engineers, through the production element. We increase their production, and they get it through safety, through the design of tools, through the use of slide feeds such as Mr. Kaems advocates, and which cannot be beaten.

We all know individual die guarding is the very pinnacle for safety work, for die work. We cannot all do it, but they can work and start it, and some day they will have a successful plant.

When I go into all these plants, I try to put in a plan for safety. After all, that is the thing we all want. Here is a plant making a million and one articles, with different lines and different problems. Here is a man who changes a die six times a day in this press. Here is one who runs the same press for a month. There are all types of operations, and how are you going to guard them. There is not really a die on the market that will cover every type of operation. If there were,

I would be out of a job. I don't care what die you speak of, they all have good qualities, but they cannot be used on a press where there is any change in operation. You may buy a guard suited to the particular operation. That is what we have tried to overcome, and we have overcome it, in a way. But if you want a problem to take home with you, especially the guard manufacturers, why don't you design a guard that will cover every type of operation? We have such a guard and anybody who wants a drawing of it can have it. We have three or four working successfully. They are not one hundred per cent guards, but they are good.

The American Can or Continental Can probably don't need that guard. They are a large enough organization, and have the funds with which to guard each individual die, and probably do. Their quantity production is large and they can build a guard suitable to that operation, but there must be some executives here today who have the type of plant of which I speak. The General Electric Company can do a lot of things others cannot do, and can get a guard that will cover every type of operation.

There ought to be a press guard that will cover every type of operation, no matter what it is. If a man has a thousand dies and twenty operations of presses, it is pretty difficult to make a thousand guards in a minute. The plan is to guard the twenty presses the easiest way. Give him the combination guard. If you have not one, dope one out for yourself and go to work on the thousand dies and pick out the most hazardous operation on which the combination guard does not work. Have your plan of individual guard on a press and then plug it on your dies. The next thing to do is, in connection with your new dies as they come along, take the die maker into your confidence and say, "We want a guard that will give production and safety." Put him on his toes and he will dope out something.

The most wonderful inventions in the world were made by tool and die workers. They developed the ideas, and every one knows they can develop a guard for dies. Any one who wants a combination guard for your press can go to your die maker and he will give you one. There is that much of the plan that I think is a good thing for your press job. You have your press guarded. Your hazardous jobs are coming along, and you are going to guard individually.

The next thing is to combine your operations. That is really the finest way to do a job, and you can only do it when quantity permits, of course. But you would be surprised at the way some work is being done in this country. I go into plants and I know. You go into one plant and see tools which are wonderful and not expensive, if made properly. You go into another plant and see things done the way they do them in China. You can educate your die makers if you start in doing it. There are some plants that are still working the way I did when I was an apprentice. The only thought is to get the die out at a low cost and have it accurate.

I don't think any kind of guard of any manufacturer, or even one you make yourself, is any good without education and supervision. They all go together. You have to have presses guarded. That is the first step. Then you have to educate your employees to use them intelligently and you have to supervise them.

I think it would be a fine thing to bring somebody to this meeting from some other plant, where they don't think safety is an important thing and don't do a punch press job with the factor of safety involved. I am going to make it a rule to bring with me some executive from some other plant, where they have not put this safety idea into motion in their own plant. We will grow if we do that.

CHAIRMAN WALTERS: I want to have you see an example of perpetual youth, "Gus" Kaems.

Discussion by Mr. Kaems

A. L. KAEMS (Simmons Co., Kenosha): Most of you have heard me before, and sometimes I think it gets stale when you have to hear the same fellow so often. But if we cannot get the managers to stand behind us, we cannot get very far. I have been with the Simmons Company for almost thirteen years and have some fine

fellows with which to work. But I worked for three different managers and was not able to get them interested, not as interested as I wanted them to be, until just within a few years.

They gave me a free hand to do anything I wanted. My word was always law, and yet one thing was always missing. That is, the manager himself didn't come out and show he was interested. A girl, running a sewing machine, lost a finger. In that instance, I succeeded in making them see they had something to think about in this work. We made what we called a double-edged seamer on the machine and the cloth was carried through the machine by the broken chain. The machine was designed in our own plant. When I first saw it run, I saw the sprocket chain was not guarded. I immediately had a guard put on the sprocket, and went to the designing room and told them what they had missed. The man who designed the machine said, "Wait a minute. Leave that alone. I will make a drawing of that and we will take care of it immediately. I want it to be so it will go on every machine." He sent a man, made a drawing, and took it to the machine shop to have it put on. It was an insignificant thing, they thought. The machine shop was busy and they didn't think it was necessary to do it at once. The next thing we knew a girl lost her finger. Immediately the machine shop got busy and put the guard on.

The thing got under my collar. I put my desk in order and went up into the lion's den and said to our manager, "Do you know, we lost a finger up in one of those sewing machines?"

"Why, yes, that is too bad. What did you do about it?"

"What did you do about it?"

"Nothing."

"That is the trouble. You don't do anything about it. Let me ask you this: Suppose it were your daughter who lost a finger. Let us suppose she was a good piano player (as happened to be the case with this girl) but she lost one joint of her second finger. Of course, that would end her ability to play. Perhaps one night you would ask her to play some one of your favorite pieces and she replied, 'No, daddy, I cannot play it since I lost my finger.' What would you do?"

He sat for a while and then said, "Those are rather hard words, but I think you are right."

I said, "This plant is just as fine and clean and efficient as you want it; no better and no worse. Until you begin to take an interest, we are going to have things like this."

He said, "In an hour's time, I am going to call a meeting. I want you to be there and want you to tell me everything, and if you can enlarge on it, I want you to do it." He brought in the master mechanic and superintendent of the tool room and others. He had me sit in at the meeting. He called on me to tell this, and I did. I told a great many other things. He said, "Boys, what do you think of it?" Nobody answered. He said, "I guess August is right. The plant is as clean, orderly, and efficient as I want it. I am to blame, as I have not taken an interest in this work. From today on, I am the safety man of this plant. August is my assistant. Safety comes first and then production. Any one who is not in line with that may be in the right church but he is in the wrong pew. From now on, August, if you ask a man to do a certain thing and he does not do it, write me a letter. I want you to understand there is not a string tied to a man in this room."

Only once was it necessary for me to say I would write a letter. I wanted some work done in the machine shop and the fellow said he didn't have time. I said I would write a letter, and he insisted I shouldn't. We didn't have any more trouble.

When I came to the Simmons Company, we were having many accidents. Now, if we have one, we wonder what went wrong, and everybody is concerned, because we know we must have slipped somewhere (which we cannot help sometimes), but we take the responsibility upon our shoulders for accidents. I have kept records for eleven years. It is not a nice thing to say, but of the serious accidents which have occurred in the last eleven years, 85 per cent could have been avoided, and we

were to blame. We ought to foresee the things the poor devil cannot see who does not know anything about it. There is not a die which goes out of the tool room without my okay. If the superintendent wants a die badly and comes to the tool room to ask whether it is finished, they say, "Yes, but it has not been okayed. If he takes it without an okay, the blame rests upon his shoulders and he is not going to take it. That is one of the reasons for the few accidents we have."

Before I went with the Simmons Company, I was connected with the Wisconsin Industrial Commission. The reason why I went with the Simmons Company was because I had made a lot of trouble for them when I was with the Commission. They thought it wise to hire the man who was always making trouble for them. They had lost 313,000 days due to accidents, in four years. In eleven years, we have lost 106,000 days, a saving of 207,000 days. On top of that, we have increased our production for the plant about 35 per cent. It has been a paying proposition. The two go hand in hand.

CHAIRMAN WALTERS: Before calling upon the next speaker, I am going to take the chairman's prerogative, and bring out one little point. We must remember that the results of these meetings do not last for two or three sessions; they last fifty-two weeks in the year. If you have not brought your problem with you and it comes up after you go home, write to the chairman of your committee, and if he cannot answer it, he will refer it to some one who can.

S. H. SLAYMAKER (Fairbanks, Morse & Co., Beloit, Wis.): Mr. Bonaks told something of his life, and so did Mr. Kaems. Sixteen years ago, one of my very good friends left Fairbanks, Morse. He was just a young fellow. In fact, his given name was the same as mine. He left Beloit and went to Flint, Michigan, for the Buick Company a shop superintendent, and later became manager of the forge division of the Buick Company. Since that time, he has been promoted to educational director of the Buick plants. He has not attended a National Safety Congress before. This is his first one. He said he was only here because he was sent here. But I want to introduce him and say when better forges are made Sam Morgan will make them. We would like to hear from him, I think.

SAMUEL MORGAN (Buick Motor Company, Flint, Mich.): I said I was here because I was sent. I didn't want to come. I spent forty-three years in the forge shop, never did anything else. In those forty-three years, I have never had any fingers between the dies of a hammer. I don't care what kind of a hammer. I have seen many hands go, more than most of you have seen, and I never saw one go that it was necessary to lose.

I am going to say something about forges and trimming presses. I believe we ought to practice what we preach and not do those things ourselves. I am never in a hurry to do anything. I always have plenty of time to do anything. I have been a foreman for thirty-five years, and if a fellow stops me in the shop, I always have time to talk to him. When you see a foreman going down the shop with both hands full of papers, his coat tail sticking out, don't think that fellow is busy, because he is not. He has a job that is too big for him. There is plenty of time to do it. I don't care what you are doing, take plenty of time.

Of those fellows who are holding jobs above yours, not one-half could do what you do. I am conceited enough to think that. I have made various things, from sewing machines up to battle ships. Whenever you have a man working on a hammer, setting the dies, and something is not right, insist that he be safe about the thing. Almost all of the steam hammers have a multiple guide so you can take a two or three inch piece of round material and set it in that corner and it will stop the hammer.

Some accidents have occurred from things falling off the hammer. I don't believe a guide bolt, cylinder or column bolt ever fell out in a minute. I think it took four or five hours, perhaps four or five days for that to work out. Perhaps the cotter pin came out at the top of the bolt and it gradually worked out. I ask every hammer man to oil his own hammer. While he is up there, have him look it over

well, and nothing is going to fall. No doubt, a chunk could come off the top or a ram might let go, but usually, if there is a little inspection, this will not occur.

I want to say a little about the trim press. I remember going into the shop one day and telling a man that if he continued the operation as it was he was going to lose three or four fingers. I didn't know when, but he would lose them, if he kept it up. I said, "I don't know what they are worth to you, but they are worth a million dollars apiece to me, and they don't belong to me."

His answer was, "If they are worth a million dollars to you, they must be worth something to me." It was impressive. I told him what ought to be done. He said, "I cannot get enough done." I told him if we could not get enough done, we would raise the price, but we were not going to do it that way. We didn't change the time on the job, but made it a little easier for him.

CHAIRMAN WALTERS: I wish to read a short note from one of the committees. "The chairman of your Committee on Engineering wishes to report he has reviewed and suggested, also communicated on nineteen safe practice pamphlets during the past year, and would call your attention to the pamphlet on heat treating and the one on Use and Care of Hoisting Chains. Those two new pamphlets are very practical and contain some very valuable suggestions. During the past year, your committee has only been called upon twice for suggestions and has not received any new suggestions from the members. Therefore, suggest that the members be requested to present new kinks which can be passed on to the Editor of the News Letter, and in that way all members will be kept advised. There are many new safe practice pamphlets now in the making and they will be worth while."

"It has been a pleasure to work with the officers during the past year and I wish to thank the members for their confidence."

"Respectfully
"George S. Thompson"

G. S. THOMPSON (Gnau & Co., Detroit): I have felt, for a number of years, that this division has not been getting as much good to the general membership as could be had. The News Letter Editor has had one of the most laborious jobs of any man in the division and if you don't think it is much of a job to get up a News Letter, just try it. Every one of us has a new problem. Every one of us has a new kink, something about which we have not thought, which was not of particular advantage to any one but ourselves, but we have overcome a difficulty. We keep it to ourselves and it just becomes a local option. When you have your problem, send it in. Let us put it into the News Letter and send it out. Don't get the answer from one person, but get the answer from the whole organization. I think, if we do that, next year, when we meet in convention, we will have about three times as many present as we have today. We will give publicity to the thing and will really function as we should as a Power Press Section.

CHAIRMAN WALTERS: It gives me a great deal of pleasure to say we are going to get something now that a lot of people throughout this section should have. Professor Henry P. Dutton, Department of Industrial Management, Northwestern University and President of the Chicago Chapter, Society of Industrial Engineers, will speak to us.

What is an Efficient Power Press Department?

By PROF. HENRY P. DUTTON

Department of Industrial Management, Northwestern University, Evanston, Ill.

For a number of years I have been a student of management practice. I have operated punch presses and run them, but don't feel I am a specialist. My principal connection is with the McGraw Hill Company, one of the associate editors on industrial management. I still continue my classes at the University, but give the major part of my time to the company.

In that connection, I get around a great deal, in the various parts of the Middle West, in a good many plants. I see some developments in the field of punch presses. As a punch press specialist, I am reminded a little of the story of the priest who was going to preach a sermon on matrimony. After the sermon, some of the women of the parish were discussing it. Mrs. O'Leary turned to Mrs. O'Brien and said, "That was a wonderful sermon the Father gave on matrimony, wasn't it?"

Mrs. O'Brien said, "Yes, Mrs. O'Leary, it was a wonderful sermon, but I wish I knew as little about it as the good Father does."

I feel that with the special phases of punch press work, in the management, perhaps I have had a little more contact. I have seen a few developments. It occurs to me that one of the best ways to start out is to mention some of the interesting developments in the field of punch press work which I ran across in the last year or two. I think we might start off possibly with the technical phases and then later touch a little on the administrative phases of the punch press work.

In the first place, as to the press itself, it is an old tool and has not changed. I was interested, in going into the Mesta Machine Shop in Pittsburgh recently, to see a departure. Some of you may have heard of the flying shear which represents quite an interesting procedure in the steel game and holds promise of development. They are taking steel directly from the rolls, red hot, fastened between shapened rolls, and between synchronized rolls which carry cuts. The steel keeps moving through and drops off, a cut plate of steel which is red hot. The piles are guarded and stacked, very much as paper is on a printing press, and cools in the pile.

That has several advantages. Of course, it is an enormously speedy operation, as compared with the old operation of putting in the plate by hand and cutting it. The steel lands hot and cools under cover so that it does not form anywhere near the scale which otherwise would form. The vice-president of the company, in showing the machine, said they had quite a number of ticklish problems. The metal is cut hot and you have to allow for cooling, for the expansion of the rolls to keep those shears in accurate contact, but they are working it successfully. And a number of their customers are cutting off steel in that way. It is an interesting departure from the old alternating principle of the press. There we do what has been done in the printing press.

We usually print paper with an up and back motion. We are printing newspapers in two or three colors, if desired, with a continuous motion. I don't know how significant this is but it is producing quite a revolution in the steel field and possibly there may be other developments which will follow along that line. That is one little point as to the press itself.

In my old apprenticeship in the Pullman Car works, I had to follow up work in the entire press department. Quite a number of fixtures were formed by hand, by a spinner who laid the flat plate and spun it out. You probably all know the process. It is still used for small lots and occasionally for die work, but we can make anything on a press today which used to be made by spinning.

I wish I could tell more that I know about what is going on in the study of metals, but I think that is a subject of great interest to the safety shop man who has anything to do with the planning of work as distinguished with merely carrying it out. We started out with Taylor's work in the cutting of metals and studied metals from a new light, from the standpoint of the minute processes which take place. Yesterday I was looking at some microphotographs of the flow of the metal around the tool. We know that in a forming process of the same sort its effectiveness depends upon the crystallization of the metal.

Very interesting studies are also being made in the development of Neon light. I was interested in a research laboratory in a large plant in the city to find a little zinc ash tray. The gentleman in charge piqued my curiosity by saying it was pure zinc but it behaved like brass. The formula is still a secret and I don't think the product is yet commercial, but it indicates the possibilities that lie before us in the

use of new materials. That zinc, by the addition of a small quantity of some other metal, had been changed. We see the same thing in copper steel, where we make the steel largely rust-proof by the addition of a fraction of metal. The same thing is true in regard to duralumin. The composition contains quite a substantial proportion of other metals.

There seems to be a study going on today, which I think is worth a great deal of research on the part of men in this field, in the changing of the property of these metals, by careful study of crystal action and alloy action and comparison with small amounts. I suppose zinc is probably about one-third the price of brass, and the development of the thing to which I referred would mean a tremendous economy.

I am going through, rather systematically, a number of points in connection with the work. As to the matter of dies, you know more about them than I do. I won't attempt to go into that beyond pointing out the fact that the same work in alloys is developing new possibilities in the wear of dies. I suppose all have heard of chromium plated dies. I would be interested to see how many are interested in that process, giving the steel die a plate of chromium in order to increase its wear.

I understand experiments are also being made in the use of some of the high speed cutting material such as carbide in the facing of dies at certain wearing points. All those things promise a good deal in the wear of dies. In regard to the design of dies, you are probably much more familiar with the current trend than I, although I shall touch on some safety developments which I have noted.

I was interested in seeing the pantograph combination of a guiding tool which works from a model, a milling cut, mounted on movable head by which the finish cuts beyond the final surfacing; cuts are taken on a complicated model. This was at work in the Mesta Machine Company's plant and represented that part of saving where the die work was complicated. You have probably seen pictures of the same machine used in sculpture work. The sculptor makes a small plaster model and works to the large model in bronze. I have seen it in a number of shops for cutting of dies, first effecting the construction of the dies.

I ran across a little development in the making of temporary dies in a shop which manufactures gaskets for automobiles. They make them out of cork and paper and out of metal, such as a combination of asbestos and other material. They have an enormous variety of patterns to cut. Instead of making permanent steel dies for those, they use a process which interested me a great deal. Some of you may have run across it. They take a piece of laminated wood, and lay the pattern on it. They block that with a good solid block of wood and first cut out the pattern in the laminated wood with a jig saw. Then they take a piece of hardened steel which has one edge very sharp and lay that in the groove which is formed and glue it in. It makes a workable die for small runs. Their work is almost entirely small runs and the life of the die, I believe, is practically indefinite for that class of work. That represents one of the little things you see in getting around among shops.

I am going to leave the press and dies and turn to the matter of feeding. I think the matter of feeding is probably of the greatest interest from the standpoint of safety men, because the new method of feeding almost eliminates that ghastly possibility, almost always present, of the man getting out of time and getting a finger in there. I, myself, have seen a man lose a finger in a shop and have not forgotten it. The newer methods of feeding are not only safer but faster. They are confined mainly to quantity work and yet a great deal of press work is tending to be of that type. In that field, there has been marked development.

There are several methods which are all recent, although none are new. One of the first of these is the magazine feed. I was interested in a large plant in the city where they make a small electric light bulb. The socket or base of the bulb is composed of a wooden part, also followed by a lightening process. To that is clipped a little tin piece that is bent up. The two parts had to be put together in the press. The wood parts are formed before they are used. They come in the magazine and

the magazine is so arranged automatically to sort out the pieces with the little pointed end. The piece is shaped with the lower end notched and the upper notched in reverse. They come forward one at a time and are picked up by a pair of instruments and put into position in the press. Each stroke of the press forms and bends the little tin part. The final stroke, which I believe is a two-process stroke, puts the two together. That is typical of the magazine feed. In some cases, it is simple, where you have a straight part to feed or something of that sort. In others, considerable ingenuity is used.

Another development is also recent, but I think is of considerable importance to a good many manufacturers. We run into so many of those old shops where they are still using the presses Noah used. The press I have in mind can be combined with the multiple operation in an effective way. The press has, mounted a little to the side and forward, a revolving dial or run plate with positions for the parts. Instead of putting the work under the press, the operator simply puts the part to be formed in place in the first die. At each stroke of the press, the die is revolved and registered. As one operation is performed, perhaps the next is being performed at the same time. At the final stroke, the finished part is delivered and either moved by hand or ejected by the die. The operators have no excuse or any chance to get under the press. It also makes possible much better rhythm.

The trouble with the old safety device was that it interfered with the natural rhythm and slowed down operations. By making the feed automatic, it avoids that possibility and makes it possible to speed up the work a great deal.

Another development, somewhat along the same line, is the automatic position of the parts. I have seen a great many processes which are basically new. But in recent years, I don't think the developments in the fields of new processes have been as important as the development in handling the material to the process. If you stop to think, you will find that very true of die work and perhaps a great extent of other work.

I wonder how many of you have seen the frame forming lines of the Smith Company in Milwaukee. It is an interesting example of this process, which is not used, as you might think, for one standard production exclusively. They make frames in large quantities but in very great variety. They make anything along that line. Perhaps a little description will give you an idea of the process and the newer developments taking place in the field.

The steel comes in off of the car in bundles of flat plate steel, and is picked up and put through an automatic inspection machine with three sets of fingers. One set passes back at the end of the plate and is picked up by a magnet. The third set passes over and is gauged for thickness—if any one is out more than five-thousandths of an inch. The inspection machine alternates, first one set of magnets come down and then a second set of magnets. That process is continued, but if any one piece is out of gauge more than five-thousandths of an inch, the second set is active and picks it up and puts it into a pile for defectives.

It is put into another machine, where the parts are fed automatically to a moving conveyor line, which passes under five very large presses. The set of fingers or jaws hold the piece in the first operation. That first operation, by the way, is exceedingly interesting to the pressmen. They take a piece five or six inches wide and perhaps a quarter of an inch in thickness and upset that set sideways a couple of inches, which is a very difficult operation. It is performed very smoothly and saves the company all the metal that would be otherwise cut out and thrown into scrap and sold for scrap metal.

The plate is being held at this time by the fingers. The next operation passes it under a blocking press which puts in seventy or eighty holes. They have semi-flexible dies which permit them to set up any combination of holes they want. The dies are different for the products of the different copies. Between operations, the first press punches only the right side and takes every other piece. Between the first and

second press the piece is nipped over so you have a left, and the second press gets the left hand set of operations. The next operation is the channeling operation and the tool pieces right and left are ready for the next process.

These parts are set in by hand, one of the few hand operations on another conveyor which runs at right angles. The first will run across the room from the five presses. The large part is picked up and the two parts put in position. They are, roughly, in a position in which they will be assembled, held in position every time in this frame. As they pass the first operation (let us say it is a riveting operation) the line will advance one stage. The first press will send out a set of fingers to the riveting press and close the rivets in place and will withdraw. The line will move on. At each of the other points, the same process is being carried on, until the two pieces, all assembled with the little brackets and so forth, are delivered finally to the final assembling line.

One of the most interesting machines I have seen does the work of setting up the final assembly. The two side rails are put in together in another set of dowels traveling at right angles. The three or four or five cross beams are put in position there, but separate. Their line travels down to what they call a nailing machine. Some seventy or eighty rivets are blown, by compressed air, into the holes and given a little tap to hold them in position. The piece, now in form, travels down and each of the rivets is closed up, two or three at a time at another line of presses. That automatic positioning again removes the hazard of personal handling and speeds up the work. You see it coming into effect, not only in large work but very small work.

At another plant, I saw the same thing being done for a glass operation, in which the tool was sealed by the upper end, exhausted and sealed at the lower end, tested for vacuum and taken out completely—all automatic position. That represents one of the important developments in this work, which is the use of automatic position of one sort or another, the dial fed semi-automatic magazine, full fed automatic strip fed also automatic, and these newer developments for control in this way.

One other development which is interesting and which I doubt many have seen, is a combination of these with a production control system. I think I am violating no confidences when I say I am hoping soon to have an article in our magazine regarding this. The Western Electric Company has developed an interesting development for the handling of work. Most of us think of the straight assembly line as being the latest idea. We think of the press coming directly in that line, or the feeder of the line. But we are having a change in manufacturing conditions with the change in market conditions.

Variety is greater and we cannot include the large runs and carry as much stock as we did in the old days. Industrial engineers have had to modify their work to fit these circumstances. At the Western Electric plant, they made up what they call a sequent switch. It is one of the parts that runs the automatic telephone which the company is developing and putting into cities. It is quite a complicated assembly of punch part and press part and automatic machine parts. They have the whole thing in one union. We will say it is in a room the size of this room. Around this room travels a conveyor. It goes completely around the room. There will be a feed spurting off from that conveyor to this machine, perhaps a row of half a dozen machines. The spur will feed behind or convenient to the whole set of machines. If it is a punch press operation, perhaps the work will initiate with the raw material and the operator will take the raw material and put it in a tote box and will key that box. It has half a dozen holes punched in it, and the operator will insert plugs in holes number 1 and 5, a combination like a Yale lock. Perhaps the next operator will have holes 2, 3, and 4. Those little locks will be set on the box. The box will be put on the outgoing line, which also feeds each group, and will travel out to the conveyor. It will keep going around, being power driven, until it strikes the next operation. That operation will be keyed to admit those boxes and the boxes will slide off, down the line, and come to rest ready for work at the department.

If the operator has enough parts to supply for the time being, the conveyor will reject the box. It is one of those trip conveyers where the weight of the lower boxes will throw out when there are enough of them. It will reject the box and the box will keep traveling around the circle for a couple of weeks until needed. The length of that line is calculated so it will hold a supply of parts for the operation. Instead of putting parts into the stock room, they stay on the line until they are needed.

Every operator works on a schedule. When that operation has been done, they will change the keys, shift them from one place to another, put the box out again and it will automatically come out at the next operation. That is an exceedingly interesting development and touches upon press work, and I think upon almost all assembly work and represents a flexible arrangement by which we have to schedule for the initial parts but don't have to work with a great many of those operations.

So much for the press and technical side of it. A word about safety. The first safety device I ever saw was the old Benjamin two-arm levers. The operator pulled them both down to where she could run a press. In one of the factories I visited, I believe one of them was tied down and the other was put down by the operator. The most modern successor is where you press the two buttons, and I believe I have found a factory where they found a way of eliminating one of the buttons. Those, however, are useful devices which require inspection. There are some cases where we cannot get anything better than getting the operator's hand on the work.

Another device is the sweep in front of the press, which will knock the operator's hand out of the way before the press comes down. That, in itself, delivers quite a blow, but is better than losing the finger. Another variation is the gate, usually at the side. The operator has to push the gate up in order to work. When the gate is up, the press will not work. Those are all devices outside those directly attached to the dies, which make for safety.

I have heard of a device which I have not yet seen, which is somewhat spectacular. I understand some companies are using a photo-electric cell, which sends a beam of light across the front of the press; as long as the operator has his hand in the press the light is shut off and the trip cannot be operated.

As was stated by the gentleman from the Simmons Company, a great part of the safety work lies in the management. One thing that impresses itself on me is that nothing in the nature of a safety program can be canned and turned over and left to run itself. Our National Safety Council posters are the best in the world. You see them illustrated in Italian, Russian, and English magazines. But merely having a safety poster service does not absolve a company from its liability or the general manager for his liability for all these lost fingers.

If the company has a program whereby every machine is gone over by the operators, or sometimes preferably by a specialized maintenance engineer, you catch the hazardous things. In connection with most of those accidents which happen, it is because we do not see the possibilities. If we thought far enough in advance, they would not have happened. If we went to the press and found the dowel or the release clutch was not working well, we would have fixed it. It is just as criminal to neglect inspecting it as it is not to fix it.

The modern tendency is systematic maintenance as distinguished from the old method of casual maintenance. When you maintain a press or other machinery and oil on schedule or grease and change the lamps and wash the windows on schedule, the work is done by specialized workmen who do nothing all the time but wash windows or change lamps. You know what it is going to cost.

I don't suppose there is a more disharmonizing program than to keep men on something unpleasant. Last night I talked to a group of foremen. One of them mentioned the fact that their plant has had an excellent safety record for a couple of years. They use a great deal of gasoline in the process, also those gunpowder polishes. They had a fire, due to a thing which could have been avoided. Nobody thought of the fact that you can use an induction motor that has no sparks, but if

you use a starter, it does have sparks. For twenty years there was that hazard of explosion with fumes of gasoline all around. Since then, apparently, they have had an outbreak. My suspicion is that probably there had been little safety in their safety program. The men in charge had taken it as a routine. They got out the posters monthly and made the usual change in lights over the engines of the plants, but that was all.

The punch press department has rather a bad record for accidents. I feel they are nearly always avoidable by the maintenance program, by education and by the better method of feeding. I will touch on one side of the question, which is entirely outside of press work, except from the executive standpoint. The question of control is something which most of us should know more about.

Our chairman very aptly touched upon the fact that we are in an economy era. The fact that you are here is an endorsement of the fact that companies generally find it pays to send their men to meetings of this sort. I think the safety convention is a demonstration of the fact that this work has its dollar value as well as the humanitarian value to the companies represented here. There is a tendency among the more progressive plants to make the foreman or superintendent of a department very much more a manager than he used to be. That has developed out of our newer refinements in cost accounting and general accounting primarily. In the old days, the accountant was a bookkeeper with a few routine duties, who kept the customers' accounts. He scratched his pen along and stuck it behind his ear when he was not busy. When not busy, he also puzzled over methods of distributing overhead. The manager said he was a doddering old fellow, let him play with his figures. The accountant didn't know costs. The practical manager, looking at them, and seeing his costs going up and the prices going down, said that was all poppycock.

We have developed machinery accounts and the theory of accounts. The other day I went into the U. S. Television factory and found them budgeting every department on a cost basis. One of the things I am going to emphasize as a development of importance to the operating men is the suggestion that they get in touch with some of the newer methods of accounting. I won't take the time to go into it now except to say they do affect directly our estimates. Nowadays, when we have bought a press for a department and put it into operation, if the press is idle, we are charging that off to profit and loss. We don't throw it into cost and say our costs are increased. We are working for a standard cost basis and charging the deficit, if there is any, in the overhead account. It puts a greater pressure on the management to fill out gaps. If you are competing against an outside department in the work you can do for your organization, you can bring pressure to bear by mentioning you need this work to carry that overhead. If you consider it in making your costs, you can present a better picture from the cost standpoint than otherwise. I have seen plants that sent out work and increased their costs because of this fallacy.

J. D. LYLE (Fisher Body, Cleveland): I am wondering whether Mr. Dutton will elaborate a little on the chromium die.

PROFESSOR DUTTON: Chromium die has a very hard finish. The process used, after completing the die, is to throw a plating of chromium on it. It is used in printing, in making rollers from which the work is printed, and is also used in other work in which the die has a good deal of wear.

J. W. HENNING (Automatic Electric Co., Chicago): When the die comes to us, it wears a surface of a quarter of a thousandth or half a thousandth and if we have to make a new die we just take it down to the plating room, chromium plate half a thousandth and put it back in the shop. In one particular job last week, where we had a canning job for our condensers, I found it was worn and the result was it didn't close up at the end. After doing this, it has run for two weeks and has not shown a sign of wear.

We have a good many gauges which we chromium plate and bring back to size.

It takes only a little time. It is not hard if you have a chromium plant in your department.

LOUIS BORAKS (Liberty Mutual Ins. Co., Boston): I use a system that was used quite a bit during the war. Where the wear is very slight, as Mr. Henning mentioned, I think his idea is good. But if you are drawing up a material that is of heavy scale you don't have much success. We found the only thing we could do was to shrink the die and turn it over again and reharden it. We used it for gauges and found it satisfactory.

E. J. SMITH (Western Electric Co., Chicago): We are not using the chromium plating on dies as extensively as we probably will later. But we are using it mostly on rolls. We find that steel is porous, no matter how fine a grade you get, and we have a number of operations where a tenth of a thousandth of clearance is too great, particularly on our rolling of tensile bronze wire. By chromium plating these rolls, it closes up all these pores and we are able to turn out a very satisfactory product. The life of the roll is considerably increased by the chromium plating. They are attempting to do it on some of the dies where the work is extremely close, and how successful they are going to be I am unable to say at this time. We have started in that field, and I anticipate that chromium plating of dies and rolls will, in a very few years, become a common practice.

H. C. WINFIELD (Olds Motor Works, Lansing): Our experience with chromium plated dies has been that we have put as high as ten-thousandths on the die.

ADJOURNMENT

Thursday Morning Session
October 15, 1931

Joint Meeting of the Automotive and Machine Shop and Power Press Sections

WALTER J. GRAVES, Chairman
Michigan Mutual Life Insurance Company, Detroit, Mich

The joint meeting of the Automotive and Machine Shop and the Power Press Sections was called to order by Walter J. Graves, Michigan Mutual Life Insurance Company, Detroit, who presided.

CHAIRMAN GRAVES: Following the usual custom, we have this morning the joint session with the Automotive and Machine Shop groups. The general subject of the meeting is "Machine Guarding." It is an old subject but there are always new and important problems. We have often heard the saying that if you have good supervision, guards are not necessary. That is hardly true because you cannot always count on the supervision. There are always lapses; in fact, we all have lapses, and to take care of that, guarding is very necessary.

The first speaker is Mr. E. J. Smith of the Hawthorne Works, Western Electric Company, Chicago. Mr. Smith has the background of one of the largest and probably the finest factories in Chicago or middle west, with a very large machine problem and where things are very highly developed. For that reason he should be able to bring us some very interesting things this morning.

Recent Developments in Power Press and Machine Shop Guarding

By E. J. SMITH

Director of Safety and Health, Hawthorne Works, Western Electric Co., Chicago

As your chairman pointed out, there have been plants that have been almost accident free with very little guarding because of close supervision. You want to remember though the statement made yesterday by a speaker that 85 per cent of accidents are due to the human element. The guarding only represents 15 per cent of accident prevention work; but he failed to say how this would average if we had no guards. I can see a wonderful value in building safety into a die or tool. I can see not only its practical value, but also its psychological value, and I hope to be able to impress upon you this morning that if we have done nothing else but the building of guards on our machines, we have created in the minds of the workmen the thought that the management is doing everything in its power for their protection.

I heard another speaker yesterday give his three fundamental rules for safety. They were engineering, education, and enforcement. He called them the three "E's." I want to add another "E." It is one that I have preached every time I was on a platform, and that is "Enthusiasm." You must have enthusiasm in this work. You must be sold on it, and you must be a part of it. I don't care how much fire and vim you get into your body when you go away from this meeting—if it doesn't become an integral part of your soul you will not be a safety man. It has got to be a part of your every-day life, just as much of your duty to yourself and those reporting to you as any production order you have in your files. That is the kind of enthusiasm that is going to put across a safety program. That is the kind of thought I want to leave with you this morning.

I have eleven typical slides, and I think a cross section of the guarding system at Hawthorne. You are welcome to anything we have. If you get any idea that is going to prove valuable to you in your work just drop us a line and we will be glad to tell you all about it. There is no charge for that service and that is what we want to do to help the cause.

Now, in presenting these slides it is my purpose to give you the picture from the safety engineer's or layman's point of view. I probably could have had one of our mechanical engineers go into the matter more thoroughly from the technical standpoint and give you the intricate workings of one of these safeguards in detail, but my purpose is to show them to you and explain what they are doing for the safety movement.

They are typical of those used on all punch presses throughout our plant. That they, along with our safety educational program, have accomplished their purpose is exemplified in the fact that punch press accidents have become negligible. In fact one of our press departments employing a large number of women operators has not had a serious accident within the past five years.

Slide No. 1—163625: Now, slide number one is a No. 20 Bliss Press equipped with front and side guards. The fan shaped swing guard in the foreground consists of light fiber sheet mounted on a light steel frame. In addition to sweeping careless hands out of danger, this solid faced guard arrests flying pieces of fractured dies or broken work more effectively than the open wire type formerly used. The guard is actuated by the operator's foot pressure upon the treadle. Both it and the two side guards are interlocked with the press tripping mechanism so that the clutch can not be engaged until all three guards are in the protecting position.

The combination of individual motor drive and solid flywheel is also, we think, a step forward in construction for safety. No unguarded spoked wheel is allowed lower than six feet from the floor at Hawthorne. The splash guard protects the operator's clothing from grease and oil and at the same time affords an excellent background for safety propaganda. The shaded lamp is concentrated on the work. These machine lamps operate on 25 volts, greatly reducing the possibility of injury from electric shock.

This operator is feeding blanks into the press with a conventional type of tweezer from a supply pan, conveniently located in front of the bolster plate.

Slide No. 2—163695: This is the adaptation of an enveloping and telescoping type of guard to blanking work. This set-up is in a No. 21 Bliss Press and, as in the previous picture, the solid flywheel, splash guard and the lamp are in evidence.

Slide No. 3—163698: Perforating operation on small sheet metal parts in a No. 19 Bliss Press. The blanks reach the die by a slide feed and the finished parts are removed manually.

Slide No. 4—131427: This is the first draw on a telephone transmitter face, a part with which all of you are familiar, the operation being performed on a No. 83 Bliss Press. The feeding is done by a combination magazine and slide and finished parts are ejected by a die pad and knockout.

Slide No. 5—153051-A: This is a kick press equipped with two-hand release. The handles actuate pawls which engage with the ratchet on the ram. It is quite simple and effective.

Slide No. 6—149655-A: This is an automatic Baird punch press covered at the rear and sides by a single guard unit composed of several sections hinged to permit access to machine parts. A number of separate guards would actually impede the efficiency of the machine, make accessibility to machine parts difficult, and add greatly to the cost of making the machine safe. Roll stock is fed automatically from reels, seen in the background. Parts fall into the pan below, while scrap is collected on a take-up reel.

Slide No. 7—139730: This slide shows a semi-automatic dial feed with gravity operated magazine. Parts are threaded in a stack on to rods made for the purpose

and set in place in the holder over the dial as shown. Weights at the top of the stack exert steady pressure so that parts slip one at a time into the depressions on the dial, and are carried under the ram. At the completion of the stroke a blast of compressed air ejects the part from the die into the chute emptying into the container below. Although there is no necessity for an operator's hand to approach the punch and die, they are protected by a screen guard. Two magazines are provided so that they may be refilled alternately and the machine need not be halted.

This is a stamping operation and the set-up is in a No. 18 Bliss Press.

Slide No. 8—139736: Here is a combination magazine and gravity feed set-up on an inclined press. Parts release from the magazine one at a time by the action of a cam, slide into the die beneath the punch, and are ejected by air at the completion of the stroke.

This is a forming operation. It is being performed in a No. 21 Bliss Press.

Slide No. 9—171124: Here is an automatic dial feed with hopper magazine used in connection with a regular No. 18 Bliss punch press. The operator keeps the hopper filled and the machine does the rest. Parts descend the miniature conveyor in close order, enter the die spaces in the rotating dial, and are carried under the punch. As in the case of the semi-automatic gravity dial feed, at the end of the stroke parts are ejected by compressed air into the chute leading to a container. The chute may be seen as the light projection in the lower left hand corner. Again as in the case of the semi-automatic dial feed, even though there is no occasion for an operator's hands to come in proximity to the punch, it and the die are protected by a guard. This guard is hidden by the conveyor in this view.

The seeming proximity of flywheel to curved guard at left end of hopper is not as close or hazardous as it appears from the angle in which this picture was taken.

Slide No. 10—170837: This, and the slide which follows, show a heavy Cincinnati Bending Press equipped with a combination hand operated trip and pipe rail guard. In this view the guard is shown in the upward or non-operating position.

Slide No. 11—170837-A: Here you see the same guard in the outward or operating position. The clutch does not engage until the pipe rail has assumed this position, keeping the operator a safe distance away. You will note a sheet metal guard at either end of this rail. These guards protect by-standers as well as machine setters from the ends of the descending ram.

CHAIRMAN GRAVES: The next speaker is a man who is so well known through his long activities in various sections of the Council that he hardly needs an introduction. I would emphasize that his connection with the Buick Motor Car Company over many years has given him a wonderful background and knowledge of mechanical guarding problems. I am glad to introduce Mr. R. F. Thalner.

Recent Developments in Safeguarding

By R. F. THALNER

Safety Director, Buick Motor Company, Flint, Mich.

When your program committee asked me to participate in this program I was just a little dubious as to how far I might go in showing slides that might not exactly come under the subject at hand. I realized that there were three other men on the program and knew that we undoubtedly would get a very fine cross-section of mechanical guarding principles, and so with that thought in mind I have not confined myself entirely to recent developments in guarding.

I will show slides which deal with recent developments in our plant. One shows the extent to which an employee may become safety-conscious. Another slide shows the extent to which a foreman may become safety-conscious.

Still a few more are on housekeeping, from possibly a newer angle; another

is on what I might term an isolated department or one not in our manufacturing process, and another on fatigue.

With the kind assistance of my good friend M. J. McCarthy, from the Fisher Body Corporation, we will proceed with the slides.

This is the first slide, which shows a real safety-conscious employee. The article which is being manufactured is an axle for a large truck, to haul a ditch digger, and this employee, wanting to be sure that he or nobody else became injured (although the motion of the lathe which was used for this purpose was very slow) took it upon himself to have a temporary gate guard installed and hung up in front of this machine so that it would be absolutely impossible for him, through a fainting spell, sickness, or a mental lapse to become caught between the revolving axle and the bed of the lathe, both of which came very close to each other in the rotation of the work.

The next slide shows a view of what we term a "Big Bertha." It is a machine used for rough and finished turning, the pins on our crank shafts facing the cheeks and so on, all in one operation. The machine has eight different cutter arms which operate at the same time, all being fed hydraulically by about 120 pounds of pressure, the operation of the machine from the front being relatively safe.

A condition did arise, however, which was discovered by the foreman, brought about by visitors coming through our plant. The back of this machine faces on the main aisle and there are two doors which can be opened for inspection of the working parts, and as this machine operates the various reciprocating arms present a hazard which would tear a man's hands in bad shape if he were not familiar with what was going on. It became a practice for visitors who came through to want to look into this machine, and the foreman, seeing that this curiosity was difficult to curb, had a glass plate put in the door and an electric light switch put on the outside with an incandescent bulb on the inside. The doors were then closed and remained closed and all visitors who came through after that time could observe the actual working of the machine by peering through the glass and turning on the switch. This seems to be a relatively simple thing and it is, but it just demonstrates the extreme to which a foreman can be safety-conscious and be looking for accidents which might be happening in out-of-the-way places, where we are not ordinarily expecting them.

The next slide shows the same doors in a closed position and the glass for looking into the inside.

This view is one of the housekeeping slides and has to do with the use of a cooling compound. Formerly on this machine four barrels of compound were used to cool the tools. A large tank was set on the floor to contain that compound, taking up an unusual amount of room. The foreman on this particular job (and all due credit goes to him) conceived the idea of having a basin with an intermediate basin, one having a solid bottom and the other one having a screen bottom. The compound comes over the tools and works down through this chute—this being merely a splash plate—falls into the chip box, drains through into the container below and then is pumped back up through the system. The chips collect in the first container, with the result that when any changes are necessary with regard to cleaning the machine, the machine just has to be stopped for a minute until the compound drains out of this container which is then placed on a truck. A new container is then put in its place. This has reduced the use of compound from four barrels to three gallons. It has made it possible to get around the machine to the working parts much more easily; it has given more floor space to the shop; it has made it impossible to have scrap hidden in the shavings because the container is so small that no large number of pieces can be hidden; and it has, of course, improved the house-

keeping condition by keeping the fluid confined to the tanks and not splashed about upon the floor.

This slide shows another application of the same process, only it is used on a drill press. This apron is lifted and the box is pulled out. Whatever shavings might have accumulated on the drill press table are scraped into the box and a new one is then substituted. In this particular box a partition near one end and a small baffle plate in the bottom separate the shavings from the place where the pump takes the fresh supply of cooling compound, an overflow or sump system being used. It is surprising to know that on this machine, in place of using two hundred gallons of cooling compound, they now use six gallons for the same amount of work. With this system it takes two minutes to clean the machine and remove the shavings, whereas with the old system it took forty-five minutes of a man's time.

In addition to the housekeeping effects that I have already stated, it is a time saver as far as the service of the machine and the man are concerned.

Here is a drill press showing you the small amount of compound needed in this container, using from five to eight quarts. It formerly used approximately three or four gallons on the job.

This is an operation which was performed in our sheet-metal plant and is the retaining wall for the trunnion bearing in the front of the motor. This work was formerly done in six operations and was made by putting it into the die of a press. In addition to having the hands exposed between the dies in an unsafe manner, the extra operations were costly. By having two operations before it came to the roll machine, and then inserting it in the roll machine, the number of operations was reduced from six to three and the cost of producing it, in labor, was reduced 54 per cent in addition to making the job almost fool-proof.

This is a forming operation. It forms the steel backing for the main bearings. The piece is laid in where you see it and is then pushed through by hand to the first operation in which the ends have been turned up. This arm is designed to remove the piece after it has been formed, as shown in the next slide.

By pushing in this piece, it in turn pushes the piece ahead of it for the first operation and the descending punch forms the piece and takes it back up with it, and as the hand slide pushes through, the arm removes the piece which has just been formed.

I spoke of the hazard that is sometimes contained in an isolated department and I referred to our cold room in the experimental laboratory. We have a cold room into which a car can be driven and subjected to all the rigors of the north pole. The extreme temperature of 30 degrees below zero can be maintained in this cold room and a wind velocity of perhaps 50 miles an hour can be set up. It is necessary that mechanics work in this cold room to observe the condition of the car while it is in operation.

There are certain hazards connected with it. There is the possibility of leakage from the ammonia coils. There is the possibility of leakage of exhaust gas from the car through the piping that is supplied to remove it. There is the possibility of the man becoming chilled and faint or becoming ill. A small switch is installed on the side of one wall with a button and a lever attached. The lever connects to a rope which entirely circumnavigates that room so that this man, at any place in the room, can pull the rope if he is in danger. There is the added precaution that when a man is working on the inside another man is observing him through a glass window from the outside. The exhaust gases are taken away through a gas line system. The doors which lead outward are so arranged that by simply falling against them or subjecting the weight of the body to the doors they will open. When this man presses the button or pulls the cord actuating this switch he blows a whistle on the outside of the cold room. Every man working on that floor has instructions that the minute the whistle is heard he is to rush to the door (which is shown in the next slide) and

open it, with the idea of saving the man inside who is in danger. This door handle, by one jerk, opens the door and on the opposite side of this handle is a ball (shown in the next slide) which is actuated by pushing against it. These inner doors actuate the locks from the inside and open the doors, allowing fresh air into the room.

This is an operation which I think is rather unusual, and was designed by a foreman in our motor plant. A rocker arm is placed under the punch and a steel ball is pressed through the bushing to size it. Before the rocker arm comes to this operation the facing operation on each side of it and the chamfering set up a slight burr and it is necessary to remove this burr to get a snugger fit. Formerly the steel ball was placed on the rocker arm and the punch allowed to descend, which presented a hazard to the fingers and thumbs of the men who were operating the press. The foreman on this particular job, seeing the danger involved, set to work and devised this mechanical feed.

The next slide shows you the operation of the cut away sections. There are fifteen balls in this opening. These balls are a little over three quarters of an inch in diameter. Here is the tube and at the opening of this tube a slight spring which allows this ball to descend almost to its extreme diameter. It is held in place by that slight pressure. Tipping the press causes the punch to send the ball through the rocker arm, pushing the entire assembly around, rolling another ball in place. It is a very simple operation and in addition to making it safe, the device has made the operation just a little faster.

I spoke of the element of fatigue entering into our work and these two slides are to show what can be done from a mechanical standpoint to eliminate fatigue.

Crank shafts which are handled in our factory weigh all the way from 90 to 120 pounds and a man handling those all day, in addition to becoming fatigued and not being able to turn out as much work, subjects himself to the possibility of accidents. This device was evolved from a previous home-made device; I will explain this device and then show you the one it evolved from in the next slide.

We have here an I-beam frame work containing a pulley and a balancer, a Pedwyn balancer. This balancer is attached to the shaft in this location and from that same shaft comes the cable which hooks to the crank shaft. The rope in the man's hand is attached to a sheave wheel which has a leverage of about three to one. By pulling down on the rope the balancer effort is overcome and the hook descends. There must be enough effort expended by the man to lift a slight amount of the crank shaft. The balancer does not lift the shaft entirely. That in equilibrium is not maintained. The man actually handles about 10 per cent of the weight. It was deemed advisable that he handle 10 per cent of the weight in a lifting motion rather than in a downward pull because he would have better control of the crank shaft.

The next slide shows the crank shaft being placed in the machine; the rope, which is attached to the sheave wheel, is not now needed in the operation and the crank shaft is handled as he would ordinarily handle it, with approximately 90 per cent of the weight going through the countershaft to the balancer. The installation of this device has not only eliminated accidents but has also improved production. It has eliminated fatigue, and with elimination of fatigue men have been able to do more and better work. The device that this was evolved from is shown in the background. We have some of them still in operation, consisting of a counterweight arrangement. The counterweight is in this can and operates on the shaft the same as the Pedwyn balancer. The objection to this was that it was more expensive to maintain, because as this carriage was moved back and forth along the track, reciprocal motion occurred with every shaft that was handled. The length of this counterweight can had a deteriorating influence on the material which attached it to the I-beam, so that they were

constantly breaking off. A bracing effect was put on to offset that but, of course, the balancer type is so far superior to this that there is no argument for the old type at all.

CHAIRMAN GRAVES: The next speaker is a man whom I have not known very long, but I have heard something about him by reputation. It is not unusual to have the general superintendent of a plant interested in safety, but to have one come to address a safety congress is a little unusual. I take great pleasure in introducing Mr. Wm. B. Kirtland, general superintendent in one of the largest light stamping industries of the middle west.

Safeguarding the Shop Machinery

By W. B. KIRTLAND

General Superintendent, Ternstedt Manufacturing Company, Detroit, Mich.

Yesterday I heard two splendid talks, one by Mr. R. H. Sullivan, personnel director of the Fisher Body Corporation, Detroit, who spoke on "An Executive's Viewpoint on Accident Prevention" and another by Mr. Sam. Morgan, director of education, Buick Motor Company, Flint, Michigan, who spoke on "Safety Practices in the Plant." These talks brought home to us in striking fashion the progress made by the safety movement in this country, and the attitude taken by the management in all industries toward accident prevention. From what I hear, and more especially from what I see here today, the attendance at the convention is quite as large as it was last year and this in spite of economic conditions—this depression of which you might have heard some little rumor. This is indeed strong proof of the tremendous interest which industrial management is taking in the continuance of the safety movement.

It is my privilege to have been here at the convention since Tuesday night, and in this time I have had a little opportunity of observing the way these Chicagoans drive their automobiles. Indeed, last night, as I stood outside the hotel I could not help but observe that in Chicago the population seems to be divided into two classes—the quick and the dead—if you're not quick, you're soon dead. Now, gentlemen, this used to be the situation in all our industrial plants before the introduction of safety devices. Time and time again the machine operator who wasn't quick in getting out of the way of a possible accident was soon minus a hand or a couple of fingers. Today, thanks to the great safety programs which have been initiated throughout our industrial plants, this situation is fast being eliminated.

This morning's talks have all been devoted to the recent development of guards. Surely we all can take home with us some ideas from the three previous illustrated talks and I hope that I will have something to show you which will prove of interest.

In the development of guards and safety devices at our plant, it is our idea that the simple, easily attached—easily adjusted guard receives a good reception from the die setter or job setter. It has been our experience that when you make a guard hard to put on or adjust, the job setter will fight against using it. So we have attempted, successfully, I believe, to overcome this attitude by simplifying the design of the guard itself.

I am going to show you pictures of some of the guards now in use at our plant and I want you to notice especially the simplicity of these devices.

(The slides were described as follows:)

Two types of swing-arm press guards of our own development are used in our plant applicable to high-speed, small-stroke presses of both the large and small types. The first is a device adapted for use on heavy-duty stamping presses

from 3 inch stroke and up. In this example, the object of the design was to get a large swing of the double arms with a small movement of the press slide and to have this movement take place during the initial advance of the slide while there was still considerable opening between the punch and the lower die.

A feature of the guard is its simplicity. The two gate arms are pivoted about a common point, forming an X-member in which the upper part of the X is about one-tenth the size of the lower part. The upper end of each arm carries a roller that engages one side of a V-wedge block carried on the press slide. As originally laid out, the arms were only 18 inches in length, and the strap carrying the pivot point was originally set at the third gib bolt from the bottom. This arrangement, however, gave an extended opening of the arms of only 18 inches, and also swung in a small arc which was insufficient to insure the operator's hands being taken from the die area. Hence, the pivot point was moved up to the position shown, the arms increased in length, and the dangling pieces attached at the bottom to produce positive removal of the operator's hands from the danger zone as shown with the arms open and the slide in the descending position. These added pieces were simply picked out of the scrap pile, the ends drilled and bolted to the end of the arms. At the point of contact with the operator's arm, the gate arm is covered with soft rubber. This new arrangement increased our extended opening to 30 inches.

A somewhat similar arrangement applicable to smaller presses is shown in this next slide. Here the gate arms are actuated by separate bell cranks that cross each other when swung simultaneously, in opposite directions. Here, in order to get an appreciable movement of the arms before the slide has descended a fraction of an inch, advantage is taken of the fairly large horizontal movement of the crank bearing cap before the vertical movement of the slide takes place. This is accomplished by fastening the bracket actuating these bell cranks to a common member on the connecting rod head. The links used, between the bracket and the bell cranks, are the turnbuckle type which makes it possible to adjust the arms to any position required for the best feeding of the die. By means of five drilled holes in the bell cranks, we are able to vary the swing of the arms from 19 inches to 32 inches. The arms are made of wood $\frac{3}{4}$ inch by $\frac{1}{4}$ inch and are held in the bell crank by a set screw which makes them easy to put on or take off. This guard can be used as a single sweep guard swinging either right or left hand or as a double sweep guard, whichever is needed.

Where there are trimming operations that involve metal flying off and possible injury to the operator, or where white lead is being used in drawing operations at high speed with the danger of splash, the shield type of guard, as shown in this slide is applied. The same guard is used, you will note, as shown in our last picture except a different arm is used with a fiber fan shield added at the lower end of the arm. Before reaching the shielded position shown, the arm swings the operator's hands out of the die area.

If you have a die to run which requires an enclosure type guard instead of a sweep type guard, instead of removing the complete guard from the press you merely remove the arms from the bell cranks.

We use the small Johnson single sweep guard on all small high speed short stroke presses. We believe this guard is very effective for that type of job.

In order to prevent the operator working from the side of the press, thus circumventing the swinging arms of the guard, side barriers are placed on either side of the guard so that it is impossible for the operator to position a piece in the die except from the front of the press. These side barriers consist of a light gauge frame covered with one-half inch wire mesh. The barriers have two key-hole slots on the rear end which can be slipped onto two studs which are installed on the frame of the press for that purpose. They are very easy to remove for adjustment to the die.

On some jobs where we want to use an enclosure guard instead of a sweep guard, we use a front barrier in conjunction with the two side barriers. These are made of the same design as the side barriers but are equipped with two key-hole slots on either end which fit on studs placed on the front ends of the side barriers. An opening is made just large enough in the front barrier to allow the insertion of the stock being used. This makes a very effective fence completely around die, affording the operator no opportunity of getting hands under same.

Our pedal guard is a housing made of malleable iron. Inside dimensions are 9 inches by 9 inches and 6 inches deep, with a foot rest in the lower left corner. This guard will prevent any falling objects or passing trucks from striking the pedal, and the foot rest is a fatigue factor. The foot rest is part of the casting 4 inches high—4 inches wide and 6 inches deep. Pedal must be adjusted about one-half inch higher than the foot rest to prevent operator's foot slipping off on pedal.

On our V. and O. presses where pedals are controlled by a spring and which occasionally break causing the press to operate and repeat, for protection against accidents when this occurs we have placed a 24 pound counterweight on the back end of the pedal arm which counter balances the pedal if the spring breaks.

The simple and inexpensive guards we use on our Milling Machines are made of a strip of steel 6 inches wide, 18 inches long. This strip of steel is bent over the steady rest arm, extending down to a position below the cutters. The sides of this guard are formed over so as to make a flange which contacts with cutter arbor preventing cutter from touching guard. A slot is cut in the face of the guard to allow for insertion of work, and at no time can the operator's hands come in contact with the cutter.

On board drop hammers we guard the operator against accidents by placing a pair of wristlets on the operator's wrists. To each wrist strap is attached a $\frac{3}{4}$ inch sash cord which is drawn through conduit pipes which are clamped to each side of the frame of the drop hammer. The ropes are led through these conduit pipes up the side of the hammer and over a pulley near the top of the frame and are attached to the arm. When the operator releases the ram, the ram descends, pulling the ropes with it which automatically pull the left and right hand out of the danger zone.

For protection against sparks on our Spot Welding Machines we have placed a cone shaped shield around the contact points. This shield is 14 inches in circumference at the top, 20 inches at the bottom, 9 inches deep and is made in two halves. One half is one-half inch smaller in circumference than the other allowing this half to telescope with the first half. These guards are suspended on arms 7 inches long which pivot on a swivel, riveted under clamp and tightened to point holder. The big feature of this guard is that you can close in the points entirely or telescope the two halves to any size opening that the work may require. In addition to the telescope guards a glass shield 6 by 8 inches is placed for the operator's protection against sparks flying through the front opening.

Sparks from butt welders have the habit of shooting in all directions, so we have made a housing of galvanized iron to completely close the back and top. This housing or hood has a 6 inch hinged door on the front which may be opened for insertion of work and closed before making contact.

We have other types of guards in use at our plant which we have not shown today as our time is limited. I have with me a set of photographs of the slides shown which I will be glad to show to anyone who is interested. I shall be glad, also, to give out any information you might want concerning these devices.

CHAIRMAN GRAVES: What Mr. Kirtland said about getting photographs of the things that are described here today applies also to the other speakers; you can

apply directly to the National Safety Council, describing what it is that you are interested in and they will refer your request to the speaker.

The next speaker, Mr. P. G. Hunter, from the Motor Wheel Corporation, Lansing, has an interesting plant and has some interesting problems, I imagine. Mr. Hunter has not had \$100,000 a year to spend for guarding. He has been forced to make the best of the situation, and that has led to the developing of some interesting things. This is the time of motor invention and it is in times like this that the new ideas come forth. I take great pleasure in introducing Mr. Hunter.

Developments in Power Press and Machine Shop Guarding

By PERCY G. HUNTER

Safety Engineer, Motor Wheel Corporation, Lansing, Mich.

We guard our presses possibly the same as all these slides you have heard described. We got some of our ideas from the Ternstedt Manufacturing Company which we have found very good.

Personally, I am not a believer in a two-handed trip or any mechanical guards if it can possibly be avoided. When a job comes into the shop the last thing I think of is a mechanical guard to guard it.

As our chairman has told you, we have all been forced to work with very little means for these things. My idea has been that if you can possibly get the stock in and out of the press without putting the hand under the punch you are one hundred per cent better off. Any mechanical guard or two handed trip is subject to failure at some time.

Practically all the guards that have been described here have been on a small type of press which has been regarded as the most dangerous type. We have guarded them all this way.

Our large presses run mostly on brake drums, backing plates and large stampings, and we have found that by using a wooden paddle about five feet long we can remove practically all of these drums and stampings with very little effort on the part of the worker. The stamping usually follows the punch up and either a stripper or knockout pin takes it out. You will be surprised at the number of large stampings that can be handled in this way.

On any blank and draw job that stays on the die we use steel hooks or rings to pull them off; there is usually some inexpensive way of handling these stampings without the use of mechanical guards, and I advise you to give more time to trying out some of these methods. Your firm will appreciate the saving in cost.

We have the inclosure guards on our small dies; and I would like to stress one point, be sure that you have ample room between the punch holder and the guard to allow the fingers to enter so that if an operator should get his finger in there the guard would not be the cause of cutting the finger off. Make them so that plenty of light can enter, and run the bars up and down as this is not so hard on the eyes.

I would like to bring out one other thing; that is the speed of the press and production.

We are all trying to increase production and we think that this is only possible by speeding up the press. Suppose you had a large press running 720 revolutions per hour, and you had to hurry to get the stock in place and sometimes it would stick or go in crooked; you have to stop the press to right it and are only getting 520 pieces per hour. By cutting the press speed down to 600 revolutions per hour you get away from the hurried movements of the operator, which cause accidents, and the slower speed allows the stock to be placed

correctly every time. You do not have to stop the press and your production will remain the same or will be increased.

However, the slow speed is not always the safe speed; if your speed allows the operator time to stargaze or turn to speak to somebody standing by, this is a menace. Gauge the speed of the press so that the operator will be kept busy feeding with no time to look around, but not so fast he has to make hurried or uncertain movements. You can sometimes make the job safe by increasing the speed as well as slowing it down.

Safety can also be promoted and production held by increasing the stroke of the press, giving more space to get the part in and out; also by slowing the press down and using a double die instead of a single die.

On some of these large presses where the operator has to throw out the clutch every little while, due to not having the part in place, you can increase safety by installing air controlled clutches. This does away with fatigue and is quicker acting. Just use a standard air cylinder and hang it so the plunger will connect where the hand lever connects to the clutch. Your maintenance man will know how to install it properly.

I also advise you to guard the pressure springs on your small presses as they are a source of danger. The rods sometimes break, fly up and come down on your foot. This can be corrected by the use of collars. Remember in any guard you make be sure that it can be taken off easily or it will not be put back on again. This is the cause of many of our accidents.

CHAIRMAN GRAVES: Now comes the best part of the meeting, men. Who has any question to ask?

MR. HUNTER: What will happen on one of these guards, say a sweep guard, if one of the screws should fall out while it is being changed over on the top of the press?

WM. B. KIRTLAND (General Superintendent, Ternstedt Manufacturing Co., Detroit): It has never been our experience to have a ram screw break on any of our presses and I am thankful of that. The only ram screws that we have had break are screws on jobs where the guard does keep the hand away. The only time we have ram screws break at all on these presses is when we have overloading on our presses. When you are doing a job that is heavier than the press should carry, you naturally crystallize that screw, and then it breaks. On all our jobs we try not to have overloading.

CHAIRMAN GRAVES: Mr. Thalner spoke about eliminating the fatigue on some jobs, so it came to me the other day that, as an operator is generally seated, it is his arm that gets tired, and it might be a good plan to put arm rests on each side of the press. This might add to the success of your safety work.

ADJOURNMENT

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**Tuesday Morning Session
October 13, 1931**

E. S. BEAUMONT, Chairman
The Peoples Gas Light and Coke Company, Chicago, Ill.

The first session of the Public Utilities Section convened with General Chairman E. S. Beaumont presiding.

CHAIRMAN BEAUMONT: The first talk on our program is one that is decidedly interesting to safety men. We have discussed it before but there is much for all of us to learn in selling the safety program. Whether we sell it to the management, to the men, or to the public, those are but different phases of the safety program, all of them being important. The gentleman who is to discuss this subject is highly qualified to do so. It gives me great pleasure to introduce Mr. Joseph W. Hicks, of the Byllesby Engineering and Management Corporation, Chicago.

Selling The Safety Program

By JOS. W. HICKS
Publicity Director, Byllesby Engineering and Management Corporation

A well known industrial executive said recently that there are four main ways and means of reducing accidents in this country: first, the enactment of laws; second, the enforcement of those laws; third, improved engineering practices; and fourth, education, which he said is the most important because it has to do with the human element.

Certain efforts have been made by power companies in recent years to educate the public concerning hazards which result from ignorance and carelessness. Public utilities have done considerable newspaper advertising with the appeal that care should be manifested by those who may carelessly or recklessly come in contact with power hazards. Among the most common types of advertised warnings with which you are familiar, probably, are those directed against kite flying with wire used as string or tail. In discussing this type of advertising with a utility executive of long experience the other day, I was surprised when he remarked, "Why is money wasted in printing advertisements about kite flying? Nobody ever sold any power to a kite and this kind of advertising has never brought us any business."

It occurred to me then that if this man was sincere in his statement there must be other executives whose attitude regarding safety education is similarly warped; and while we are working out ways to make our present and future citizenry safety conscious, we might profitably spend considerable time and money in an effort to educate some of our own associates as to their duties and responsibilities, from a safety standpoint, to their employees and their public. In other words, perhaps our chief safety educational program should start under our own roof.

The public utilities safety program could be sold more quickly and more effectively, in my opinion, if we utilized more completely and more intelligently some of the facilities which we now have at our disposal. Having entered the utility business by the employee magazine route, after a number of years as a newspaper man, I believe an employee publication can be equally as valuable a factor in safety education as it is supposed to be in promoting *esprit de corps* and building employee interest in the growth or development of an organization.

The National Safety Council and other safety agencies have done such a thorough job of broadcasting safety information, however, that nine out of ten employee magazine editors have been spoiled. They have become too lazy to originate and develop a safety news department based on the news and experiences which are obtainable from within their own organization; the safety end of their job has been made too easy.

Employee magazines in industrial institutions have grown with tremendous impetus during the past five years. They have been a valuable factor not only in the promotion of loyalty and service but in educating executives and employees in the scope of commercial development and institutional training. They have utilized every available accessory in becoming editorially and mechanically perfect. Some of them rival in appearance and make-up some of our leading fiction magazines. Yet, generally speaking, their safety departments contain less originality and more boiler plate, syndicated or clipped sermons, and more alleged essence of philosophy than will interest the average employee, attract his attention, or make any impression on him as far as his safety consciousness is concerned.

Proper utilization of the employee magazine is one of the foremost means of selling your safety program. But first of all, be sure that you have an editor who is safety conscious and one who is permitted sufficient time to study hazardous conditions that may exist in your system and work out means of bringing these problems to the attention of your employees in a forceful, interesting and effective manner.

He may give broad publicity to safety campaigns. He may print and reprint safety rules of your company. He may outline how accidents happen, and he may, through the help of his safety supervisor, tell how those accidents might have been avoided. He may publish the names and cite the instances of careless acts without regard for the personal feelings of those who are responsible for carelessness; for it undoubtedly is better to offend the sensitiveness of an individual through constructive criticism than to permit a repetition of his carelessness, which may result in further injuries and casualties to himself and his fellow workers.

If any section of a magazine permits frank speaking and constructive criticism, the employee magazine's safety department is the one place where such statements may be broadcast in the loudest tones.

I do not mean to be critical of the material I have styled sermons and boiler plate, emanating from the publicity departments of organizations interested in safety promotion. However, the wide awake employee magazine editor, instead of using these general statements of fact and philosophy in their verbatim form, may obtain from them ideas about which he can develop local items of local interest resulting in local benefit.

Contact between the utility company and the homes of employees offers considerable value in safety education work. Most of our companies maintain such contacts in various ways. A safety section appears in practically all of the companies' employee magazines each month and in some companies special issues are produced devoted almost entirely to safety work. These publications in several of our companies are sent directly to the employees' homes.

The safety teams and safety classes conducted by utilities have been valuable assets in training employees and the public. However, care must be taken to see that the use for which these first aid teams are intended is not overshadowed by the utilization of their services as publicity attractions rather than in the actual furtherance of public first aid instruction.

Newspapers will cooperate with any industrial organization in the dissemination of safety information, so long as the information or cooperation given them is based on news and does not smack of publicity tomfoolery. One of the most reliable news sources that I ever had as a newspaper man was a public utility company which maintained an inhalator squad available for public benefit as well as for use in life saving attempts among its employees. An emergency line crew carried it with other equipment in answer to every fire alarm, and it was used also in covering a radius of 25 miles whenever drownings were reported to the police department.

This company's publicity department reported to the city desk of each newspaper in that town immediately upon receipt of information concerning a fire or accident, thus enabling the city editor to dispatch reporters to the scene many times when the regular

reporter assigned to such news was detained with other stories or was not available at the breaking of such a piece of spot news.

The question of public relations often enters, not only into the outside dissemination of news pertaining to safety work, but also has an important bearing upon the manner in which internal publicity is given safety activities. Several months ago I was called into conference with a power company executive who wanted to start a safety magazine. In it he planned to publish the bloody details of every accident reported to his safety bureau. That included everything from a scratched finger to the electrocution or mangling of a worker. His idea, from an inter-company standpoint, contained a certain amount of merit. He was permitted to proceed with the printing of one issue of the publication. It rivaled some of our metropolitan newspapers in sensationalism and some of our detective magazines in thrills, and if it had fallen into the hands of a misunderstanding newspaper editor or the wife or mother of an employee, the company would have become known immediately as a murderous institution and a place unsafe for its workers.

This matter of giving instruction direct to employees concerning accident prevention, however, is not a job requiring tact or diplomacy but it requires a hard boiled reality that cannot be successfully overcome through evasive measures. More responsibility must be placed on foremen to effectively sell your safety plans. More responsibility must be placed on those comprising squads coming in contact with hazardous undertakings. Each casualty makes for more concentrated thoughtfulness for a temporary period but we cannot afford to kill or injure people as an example to inspire periodic thoughtfulness.

If it were possible to penalize employees for being where accidents happen, it might cause them to look out more for the safety of other people as well as themselves. There are lots of things we do or have done because of custom. In accident prevention it is time for us to become less conventional, and the money and lives that may be saved as a result may be applied to profitable investment and the continued effort to improve working conditions.

The enactment of laws intended to assist in reducing accidents has been suggested. Traffic ordinances and other matters of legislation have been provided, improving safety upon the highways. Laws have been enacted prohibiting the sale of firearms and ordinances have been passed regulating the use of public bathing beaches. Other ordinances intended to assist in life saving or the prevention of accidents are matters of record with which you are equally familiar.

In nearly every city there is an ordinance making it a misdemeanor for one to attempt suicide. A person may be fined if he is thwarted in an attempt to take his own life, and other penalties provide for confinement in prisons or asylums for such offences. However, a person may scale a high fence surrounding high voltage electrical equipment despite posted warnings placed there by the power company in the interest of public safety; he can climb up the superstructure of the substation, grasp a high voltage line, fall to the ground dead or severely injured, and his family will sue the power company for damages, an expensive affair for the utility, win or lose.

A child capable of reading danger signs may climb a power line pole with the intention of pulling a tight-wire circus act on the overhead wires, as was done in one of our cities during the past year, and the responsibility for his death legally rested not with his parents but with the public utility company. These and numerous other illustrations indicate reasonable justification for having local ordinances enacted imposing penalties upon persons for trespassing in dangerous quarters as well as for their general careless acts.

Three serious accidents, resulting from kite flying, occurred within two days recently. One of these resulted in death, one in serious burning, and in the third case a high voltage line was burned in two because an extremely large box kite flown by a wire kite string had come in contact with it.

In each of these cases a sample of the kite wire used for string was obtained and was found to be exactly the same kind of wire sold in five and ten cent stores for use in making paper flowers. A spool containing 68 feet could be purchased for five cents. The manager of the local dime store was interviewed. The manager of the local safety council and members of the police department took steps to explain the entire situation, with its attendant dangers, to the supervisor of safety in the public schools. A story was given to the newspapers pointing out the danger of the practice; and after finding that the wire could be purchased from a number of stores in that community, managers of all stores were interviewed and each one agreed to place cardboard signs on counters where such wire was sold, warning against the use of the wire for kite strings and instructing sales persons not to sell this wire to children. An ordinance regulating the sale of such supplies might be an effective measure and thereby place upon parents the greater responsibility of protecting their children from electrocution and burns as a result of kite flying with wire string, to say nothing of the damage which results to utility company lines.

The question of better engineering in the promotion of safety offers an opportunity for commendation to be expressed to the engineering branches of the utility industry. I was surprised recently when inspecting a large substation development to find the care that had been taken in placing cross-arms considerably above the height of an average man, and the placing of transformers and other electrical equipment out of reach and contact with those who might become meddlesome or curious.

I was talking with a construction superintendent of a large utility company about safety work recently and he told me that his ambition is to make things so safe about his construction projects that employees will not have to exercise any precaution in their own behalf. No greater goal could be set by department managers and if all foremen were equally ambitious there would be little work left for a safety engineer.

The radio offers possibilities for instruction in accident prevention work. I have listened to instructions on how to bake a cake, the kind of food my child should eat to make her healthy, and to the setting-up exercises with musical accompaniment intended to make us physically fit. However, I have not heard a graphic description by radio of the manner in which a person may be saved from drowning, electrocution or asphyxiation by the prone pressure method resuscitation. I have seen booklets outlining these procedures and I have known of their being taken home for the family to read. They were placed on a shelf like a bottle of medicine and were not thought of until serious necessity presented itself. And it requires little imagination on your part to consider the difficulty one may encounter in his efforts to force the expansion and contraction of a victim's lungs with one hand while attempting to read a book of instructions held in the other.

It is as easy to visualize, however, the picture, in your home or mine, of families going through the motions attendant to prone pressure resuscitation on the floor in front of the radio, as it is for us to stand before the same radio and go through suggested contortions in our feeble efforts to remain physically fit. The development of television should further the possibility of broadcasting safety instruction, and if power companies will give to safety instruction a proportionate amount of the time now spent on the air investment lectures, domestic science, household training, and other helpful programs, dividends might be realized on such an investment which will pay for all their radio advertising.

It cannot be assumed that supervisors always approve the appointment of a safety engineer. Too often this executive action is the signal for a general let down and consequent placement of responsibility wholly upon the safety department.

Unlike other business, a safety engineer succeeds best who does the utmost to keep the responsibility on the operating heads. The more he can make them do, the greater will be his success. His duties are purely advisory, encouraging and stimulating those who lag; and undoubtedly the greatest success will attend the safety program where

the executives are sold most completely. Therefore it should first be the aim of the safety department to interest the management by creating a full realization that:

Accidents are an economic waste not only reflected in compensation costs and medical expense but in other hidden costs which increase these losses many times;

That accidents result primarily from man failure, which in the last analysis is indicative of the need of more competent supervision;

That effective safety performance is but the natural product of effective man power which, while not entirely possible, may be approximated by proper selection, training and placement of employees. It is generally recognized that the same element which produces the maximum efficiency and improves production likewise produces good safety records. It is natural to presume, therefore, that the accident prevention record is one of the best yardsticks of the competency of supervision and men;

That the accident rate is merely an index of the extent of man failure. Many failures occur which do not result in immediate injury or property loss but they later cause extensive losses;

That safety presents a common ground upon which man and management meet. It promotes better understanding between employer and employee, builds up morale and improves industrial and public relations;

That it promotes good housekeeping, thoughtful and careful habit, which in turn are reflected in improved production and efficiency;

That safety causes men to think. Thought creates new things, and safety problems have developed new methods which have in many instances improved production.

In our opinion, if the safety organization will constantly keep facts and supporting data proving these contentions before the management, it will have little difficulty in keeping the management sold on the safety program.

With regard to the worker, convincing arguments and facts must be kept before him at all times, proving to him that accidents are not predestined but can be prevented. The old alibi usually expressed that "accidents will happen" no longer is justification for negligence. Facts which show that accident rates have been lowered, whether in an employee's own division, the entire company, or other companies, are most convincing.

Workers must be convinced that it is the management's desire that accidents be prevented. This can be accomplished by the display of executive interest in the control of accidents, by complete inquiry into the facts of each occurrence, by planned improvement in the way of guards, improved lighting and better working conditions; by individual or group commendations; by executive appearance at safety meetings; by encouraging suggestions and acting upon them; and by the verbal and printed word. Workers must be convinced that the occurrence of an accident is an indication of error, fault or failure, and that the accident rate is a true yardstick of job competency. Examples given to workers which show that accidents and inferior workmanship go hand in hand should produce results. Careless habits produce accidents as well as poor jobs. Similarly, poor jobs produce hazards which later result in accidents. The worker must also be convinced that accidents cause monetary loss to him and his family and create a long train of pain, suffering and misery.

The maintenance of complete statistical records permits detailed analysis of accidents and this information is made available to employees. In many companies pre-employment physical examinations are the rule, with compulsory examinations for certain employees who are subject to a health hazard, while drivers of motor vehicles are also examined for vision and hearing. All of these are cited because they help to sell the safety program.

One of our companies has interested itself in the training of customer personnel in life saving and first aid, particularly for those who have an electrical hazard. During one year the employees of 23 large industrial customers were trained, while many

others of which no record is available were trained by company personnel on their own initiative in their respective communities.

The benefit the public has received from safety training of personnel was evidenced at a recent catastrophe in Pittsburgh, where 50 employees of various Philadelphia Company subsidiaries demonstrated their knowledge of first aid and safety instruction when fire broke out in an old people's home. More than 80 inmates of the institution were carried to safety by company employees alone. Several employees in that group are now about to be recipients of life saving awards for their heroic action on this occasion. Those who were not heroes in carrying persons from the flaming building and participating in resuscitation work, however, performed equally heroic services. Some carried oxygen tanks, some helped firemen with hose, others assisted hospital and ambulance crews; and all of them, with the exception of a few, came to the scene of the catastrophe, volunteering their services at an hour when they were not engaged in their regular duties.

Every public utility company is confronted with safety problems requiring individual attention, and in selling a broad safety program the public utility man has a very definite obligation to perform to four distinct groups, each of which imposes upon him a distinct responsibility.

First, we must sell our safety program to the public because satisfactory service is dependent upon efficiency, and safety promotes efficiency. Through customer ownership the public has become a partner in our business, and if we include them in our program of safety education we may anticipate their cooperation in safety and other matters that are reflected not only in the service but also in the dividends that they receive from their public utility investments.

Second, we must sell our safety program to the employees who comprise our organizations, for the manner in which our personnel is trained concerning the safe administration of their duties is reflected in the productivity of their efforts, their interest in their work, their relations with their fellow employees, and their contacts with the public.

Third, we must sell our safety program to supervisors and foremen because in their hands rests the responsibility of efficient employee performance, and the manner in which they perform their duties may be a constant example to those working with them.

Fourth, and perhaps most important of all, we must sell our managements and impress them with the fact that ideas and practices have been developed which are workable and which can and should be placed into operation.

It seems to me that a most complete and efficient program has been mapped out by the Safety Council, the safety committees of the trade associations, and the local companies for the selling of the safety idea, but all of these plans and ideas for promoting safety consciousness are like the proverbial mule which is absolutely useless unless somebody can be found who will put him to work. An executive of the American Gas Association said to me recently that too many safety plans have been set up as a parallel activity to the other departments of the companies, and have not been made a part of the company's operations as a whole.

We must remember that the public utility business constantly is becoming more complex as new uses are found for power and as service demands continue to increase, and the safety plans that have been employed by these companies have consistently shown marked improvement. Despite the advances that have been made, there still is considerable room for improvement in reducing accidents, and none of us in the utility industry should be satisfied until every possibility for the least accident has been eliminated.

With all of the media that may be made available for selling our safety programs—the newspapers, employee magazines, different forms of advertising and publicity, slogan campaigns, posters, radio, safety campaigns, motion pictures, first aid teams, employee and customer training—all of these are of no avail unless executives and

department managers who want employees to practice safety are first completely sold on the safety idea. They must cooperate in making use of all the available media in a constant campaign for accident prevention; rather than be content with the periodic campaigns which are revived occasionally because somebody has been suddenly reawakened by the loss of a life or even a greater catastrophe—as a result of carelessness.

CHAIRMAN BEAUMONT: Mr. Hicks has given you some mighty fine material. Possibly you have already used some of this data but there are many ideas expressed that can be brought into your program. He has emphasized the importance of selling the management and has given you six points on which to work. They are: (1) The economic gain of accident prevention, (2) Increased production, (3) Better supervision and greater efficiency, (4) Better morale, (5) Improved housekeeping, (6) Thinking workmen. Those are six good points we can use in selling our safety program to the management.

I particularly liked the expression in regard to selling the program to the employees, the matter of showing to the employees the personal gain to themselves. There is nothing more valuable than showing the individual how he personally may profit from activity in a safety program and in that way securing his cooperation.

W. F. NORRIS (General Safety Supervisor, A. T. & T. Company, New York City): In that wonderfully exhaustive and instructive paper of Mr. Hicks, my over-sensitive ears caught one sentence that he used. It was, "to be hard-boiled with your foremen."

Mr. Hicks told about trying to create interest in the employee. Out of my association and very close contact with men, I find I can't get an employee's interest if I teach the foremen to use hard-boiled methods. He must get the interest and confidence of his men, but he will never get it if he uses hard-boiled methods.

Mr. Hicks: I agree with Mr. Norris most heartily. It is much easier to lead employees in safety work. But it requires a hard-boiled reality in this matter of giving instructions direct to the employees concerning accident prevention; it is not a job requiring tact or diplomacy. We must tell them what they must do and we can't evade or mince words. We are dealing often with foreigners, with people who may not understand, who may not comprehend our expressions, our interpretations of the things we give them. We have to make them do some things whether we do it by leading or pushing.

CHAIRMAN BEAUMONT: The next paper is equally interesting and possibly bears some relationship. It is my pleasure now to present Mr. E. D. Dee, of the Western Electric Company, New York City.

Helping the Foreman Shoulder Responsibility

By E. D. DEE

Personnel Assistant, Western Electric Company, New York City

At about the close of the war and at a time when it had dawned upon the public that industry had contributed gallantly to the successful termination of hostilities, there appeared in *The Saturday Evening Post* a profoundly inspiring article by Forrest Crissey, "Top Sergeants of Industry." This article, no doubt, was appreciated by every industrial supervisor. By it he was lifted in mind and in reality to a recognition that justly was his. This excellent article, because of its literary style, was also widely read and understood by the general public. More than one was impressed with the important place, both to industry and society, that the foreman held. Thrilled by the war accounts of the heroics of the top sergeants the analogy was apt and served to enhance the foreman's position materially.

Like a trumpet call, speeches, newspaper articles, house organs echoed the catchy phrase and "Top Sergeants of Industry" was hurled at us from everywhere. Like every other good thing it suffered its abuses. Some unwisely ambitious people expected that with such a name the foreman should emulate overnight his

army namesake in a series of brilliant triumphs. They expected he should go over the top and in short order conquer the enemy of industrial progress, disregarding the fact that his army namesake had spent weeks and months of intensive study and severe training under competent leaders and instructors before he acquired the knowledge and ability to discharge the responsibilities of his most important job.

The top sergeant was not invited to a camp meeting, made to listen to some spellbinding exhorters, and then told to go out and win the war. Neither was he singled out and blamed for not winning the first skirmish.

He is an important link in the whole organization chain but his job, just as that of his industrial counterpart, is to follow out that part of the plan formulated by the general staff and transmitted to him through lines of organization. While the link represented by the foreman is important, it is not more or less so than any of the links above him.

Management Responsibility

Accident prevention is as much a managerial responsibility as buying the material that goes into the product, or any of the other obligations that go into industrial management. On that basis it deserves as much thought and careful planning by the management as any of the rest of its work. Because of its human aspects it deserves far more thought than it gets now and should rate as one of the most important.

When the personnel are convinced of the unselfish interest of the management, which is truly reflected by the foreman, you create a loyalty and build up a morale which in times of stress you can depend upon. Making friends with your employees is no different from making friends with your neighbors. And what is more wonderful in times of misfortune than the unselfish friendship of a good neighbor? One does not ask nor demand the unselfish friendship of a good neighbor, nor broadcast his good intentions in the neighborhood; he conducts himself and his interests so that friendship for him and what he represents is cheerfully given.

Illogical Presentation

To combat this common enemy—accident—why is it so popular to make an appeal to sordid influences for its defeats? Observing the enthusiastic patriotism, with its excellent results, displayed by the military top sergeant, why does industrial management persist in presenting to their top sergeants the analogy in the stupid and mercenary terms of dollars and cents? What does the man of the street care if told a huge corporation loses millions for accident payments? His immediate reaction is akin to joy that they must pay it. "It is good enough for them", is his usual rejoinder. To him a million dollars is inconceivable and inwardly he is glad that some poor souls like himself are able to get some of it. The financial comparison blinds him to the real problem and the altruistic means of defeating it.

When management ceases emphasizing cost to them and places emphasis upon their sincere desire to reduce and ultimately eliminate accidents to employees because it is the only right and humanitarian thing to do, then and then only, will they get enthusiastic cooperation. The employee will appreciate and recognize such unselfishness and will be careful; the supervisor will gladly give his best judgment and efforts in such a noble cause; and the man in the street will give in good-will his contribution and have a higher regard for industry and his countrymen who run it. It is the ideals which men believe in which make them conquerors.

Accident Prevention Should be Seriously Treated

It seems to me we complicate the foreman's job by not doing the best job of coordinating ourselves. While on the one hand we quote the cost in tremendous sums of money with the idea of impressing the seriousness of the matter, there are those who, for some inexplicable reason, still treat this most important subject lightly

by presenting safety posters in the form of cartoons. Some misguided artist tries to be funny. Some clever publicist wants to wax facetious or be witty or gruesome at the expense of the man who is hurt. Accident prevention is a serious matter. Every man knows that. What then is the reaction on both workman and supervisor when the management sponsors mirth provoking literature? Can they take us seriously? Can we expect to obtain friendly cooperation from the man who is hurt if we humiliate him by holding up his injury, or the cause of it, to ridicule? Wholesome regard for the possibilities of danger is essential to safety success. There is distinct difference between fear of danger and recognition of danger. The fearful workman is an accident hazard; the confident, well-informed one is a safety asset.

The American workman is an intelligent man and is sensitive to travesties upon his intelligence. When treated with dignity and respect he becomes more self-reliant and as he becomes impressed that the management has a definite plan of campaign, well coordinated, well managed and captained, and unselfish in its purpose, you will find him lending his intelligent and enthusiastic effort to assist.

The worthwhile efforts of the foreman and consequently the overall results are sometimes hampered by the over zealousness of some petty officials who take the attitude that the injured man is playing possum and is deceitfully trying to take unfair advantage of the company. It is perhaps true that occasionally the man with crooked intentions tries this unethical procedure. It is also true that nobody enjoys being beaten by these shysters. However, great harm can be done to the morale of the 99 percent of honest men by subjecting them to the same methods designed to catch the occasional crook. The Philosopher Emerson said, "Trust men and they will be true to you; treat them greatly and they will show themselves great." The American worker can be just as devoted to the ideals for which his country fought.

Let us show a more genuine interest in the protection of our men; let us show a real sympathetic attitude to them when hurt; let us spend money if we must to heal them if they are wounded and I am sure the great mass of intelligent American workers will repay us in cooperative effort with an enthusiasm and zeal that only Americans can give.

Recognition for Accomplishment

Every foreman should get personal and official recognition when his department has made progress. This makes him proud of his department and impels him to give serious thought to the ultimate end. This serves not only to inspire him to still greater attainments but it will inspire other foremen to emulate his progress. It is the official publication of box scores and records that inspires both the professional and amateur athlete to sustained progress. The same use of this simple method will secure the same results in any industrial group. When any man or group of men can take justifiable pride in their performances they are a long way on the road to success. When their efforts are commended and appreciation shown for them it is but a step to that competitive enthusiasm that knows no limitations. Under such circumstances the job, or any part of it, assumes aspects of a game and contributes a zest that makes men cheerful, happy and industrious to accomplish a given purpose.

The military top sergeant was thoroughly schooled in patriotic psychology. To do this, great artists were employed whose drawings drove home well conceived ideas. Great writers were used to incite him. Songs were composed and sung for stimulating purposes. Great orators and lesser spellbinders exhorted him to titanic efforts. While this positive psychology was used he was thoroughly trained in the rudiments of his job. He was consciously elevated to that high plane of protector of his home and family, protector of the future liberty of his children, protector of his glorious country, of democracy, of mankind. Appeal being made to his finer qualities, it is only natural that acts of bravery and heroism were performed that

stirred in us great surges of pride, wonder and admiration. Why not use similar means to exalt the foreman to the realization of the importance of his position in industry and to society?

A Serious Battle Must be Fought

During war hostilities our hearts constantly cried with the anguish for the dead and the dying. A wounded soldier was greeted with a mental salute but outward dignity forbade its literal demonstration.

Today we have those same hostilities to confront in the form of accidents. Lives of children and of their parents are as quickly snuffed out by machinery and its products, just as cruelly, with all the pain and suffering that the warrior suffered. And we do not weep. And we do not cry when an unimaginative statistician tries to impress us with the stupendous cost.

When a foreman, or any man for that matter, is continually scolded he becomes resentful, he gets stubborn, he starts looking for excuses, invents alibis, and shortly loses sight of the real objective—reducing accidents so that his fellowmen may be happier in safe surroundings. Negative approaches are more often signs of defeat than they are of success.

Objectives Set Forth

This top sergeant of industry should be working toward a definite aim. He should be given an attainable objective. Educational posters of an inspiring kind should be prepared and furnished for his use. He should receive official recognition for the progress his department makes. His interest and enthusiasm will always be a reflection of the interest and enthusiasm shown by the management. His suggestions for improvements in methods and machines should be sympathetically received and willingly adopted if they will reduce hazards. Once he is convinced that management is sincere his devotion to success in this noble cause will be boundless.

Because of the personal bond of sympathy between man and man there perhaps is no other personnel activity in the realm of industrial management that lends itself to such complete, all inclusive, and cordial cooperation as does this subject. With proper use of educational psychology, with help and encouragement judiciously given, there is no reason why excellent progress cannot be attained.

The American worker being intelligent is, therefore, quick to respond to intelligent educational programs. No man wants to get hurt; neither does any man try to get hurt. He may have a mishap in a too keen desire to help his foreman fulfill a promise of delivery. He may have an accident in his eagerness to assist or protect another workman, or he may be injured because of any number of good intentioned reasons. All of these reasons are highly commendatory to his interest in his work and in the standing of his company in the world of industry.

A General Campaign

The management can help the foreman shoulder his responsibility if they logically analyze the problem and shoulder their full measure of responsibility. It is their job to outline a plan of campaign and to set up objectives to be reached; the ultimate objective, the major objectives and the sub-objectives. It is their job to supply educational literature and comparative statistics. When an objective is reached credit should be awarded to the department attaining it and the next objective introduced. Deal in positive psychology as against negative. A commendatory letter from the superintendent, manager, vice-president, or some responsible official will be convincing evidence of interest and such action will inspire other foremen to greater accomplishments. Every man takes pride in accomplishment and he is doubly proud if such accomplishment is dignified by commendatory, official notice. Incidentally, your accident prevention endeavors will be greatly facilitated if friendly visits are

encouraged by your foremen to the homes of your accident sufferers. You will then and there make a staunch supporter and a liberal teacher to his fellow workmen.

I have confined myself to the broad principles governing accident prevention effort. I have purposely refrained from a detail plan because such will vary according to the size of our industry. Were I to set forth more or less detail I would most assuredly lay great stress upon the value of first aid training as a wonderful contributing factor in promoting safety consciousness.

This plan is fundamentally simple, fair, and gives the foreman the necessary ammunition to arouse his men to sustained effort not only to guard themselves but their fellow workers from danger. It is such a plan which has brought success to our company far beyond our fondest expectations when originally initiated. By the proper kind of support from his management the foreman can raise this great cause from a disagreeable chore to the sanctity of a mission. Just as the commanding officers of an army have many ways of enhancing the morale of its top sergeants and men during a campaign so can the commanding officers of industry, with a little imagination, enhance the morale of their foremen and men and win just as important a victory for the great and peaceful army of industrial workers.

I have great sympathy and profound respect for the difficulties and importance of the foreman's job. He may be the key man of industry but his position has its limitations in both authority and responsibility. As a factor in accident prevention cooperation his enthusiasm is necessary, and it is up to management to inspire it. It is an axiom of good organization that both supervisors and workmen will do what the management wants done. If convinced that management is sincere and altruistic they will respond with a fervor which can only be followed by success.

CHAIRMAN BEAUMONT: Thank you, Mr. Dee. I am sure your paper will prove an inspiration to many of us.

In tackling the problem of helping the foremen shoulder the responsibility, I think Mr. Dee, in spite of his parallel to regimentation, did a fine job. He emphasized the fact that sometimes we give the foremen the responsibility without any of the glory and possibly just that fact should be emphasized again of giving credit where it is due, to the top sergeants of industry. He emphasized the fact that when there is fear of a hazard (imaginary or real) the best antidote is complete knowledge and understanding. This is especially true where the public is concerned. Full cooperation results when we face the facts.

Next on the program is a topic of particular importance, "Safety Work as a Community Service." It is a pleasure to present, Mr. George Opp, of The Detroit Edison Company.

Safety Work as a Community Service

By GEORGE C. A. OPP

Safety Engineer, The Detroit Edison Company, Detroit, Mich.

Did you ever stand upon a street corner and watch a magician turn an automobile into a lamp-post? That work of magic I am going to try to make use of in exemplifying the need of increased consideration on the part of our utility companies in the interests of community-wide safety.

Let's imagine, by work of magic, a typical individual given the multiplicity of lives of the old black cat, only, in this case, we are going to add one to the traditional nine. This man, typical of any workman in industry in the United States today, by chance is killed upon the job, but by reason of this virtue of renewed life, he leaves the plant again that evening and, on his way home, by reason of the facts and figures collected, he encounters from four to eight times the possibility of being killed enroute to his home compared to his hazards at work.

But we will be reasonable. We won't let him get killed eight times. We will let him be killed four times. He has used up, then, four lives already. He has gotten home, turned the key on the front door, started to walk across a slippery floor, and has fallen and struck his head on the radiator valve and is killed again.

Renewed life permits him to go to the basement stairs to see how the furnace has been operating in his absence, and he falls and is killed again. By reason of the fact he has a renewed life, he gets over that death and endeavors to see whether his wife's kitchen knives are in good shape. He cuts himself and three days later dies again by reason of infection. Then, finally, having done a bad job of looking at the furnace, the house burns up and he dies by fire.

He has used ten lives, all of them in the proportion in which happenings of everyday life are occurring to every single individual in industry. Away from work, we are faced with the possibility of from four to eight times as many deaths to the industrial employee, by reason of public activities upon the streets and highways and of conditions in the home—the so-called haven of safety. He encounters as many possibilities as he does upon the job, and finally, by reason of this ever-present hazard of fire, another tool is taken equivalent to one-tenth of the total of 100,000 lives lost per year.

By this unusual process, I have endeavored to bring to your minds the immensity of our safety program. We are doing, in the public utilities, just as outstanding a job as any other group. I challenge any other to equal the sincerity of effort that is being expended by the personnel of our management and employees throughout. But just the same, after we have done the job upon the lines, in the plants we still have the possibility of the loss of our personnel, due to reasons often beyond our control, but well within our power to offset or diminish if we take our safety activities beyond our walls, beyond the gates of our institution, and make this wholesome interest in safety a community-wide service.

The National Safety Council is spending, during times that are normal, thousands of dollars a year in propagandizing and popularizing safety. In addition to that, a total of about sixty communities, by virtue of organized territorial safety councils, are spending from \$350,000 to \$500,000 a year to localize and intensify accident prevention. We know the splendid work the N. E. L. A. is doing to extend safety into the homes by reason of the Women's Committee in cooperation with the Accident Prevention Committee.

The American Gas Association is doing an outstanding work, and yet with all these activities combined there remains so much more to be done that it means that we shall have to take a little wider horizon, a wider vision, of this whole problem, and come to realize that our responsibility for accident prevention, after we have set our own house in order, must go beyond the confines of our own institution. It means we must take an interest in the community aspect of accident prevention. It means active participation in such activities as are tending to eliminate street and highway accidents. It means going into the matter of protection afforded by so many utilities in offsetting the toll of drownings by reason of the splendid public service that some institutions are doing who already appreciate the value of looking at this thing from a community standpoint.

After we have done all of that, we still have more to do, and it is for that very reason that we must appreciate the immensity of this job and tackle it just as broadly as we possibly can. At a time like this we are faced by stress of circumstances to weigh every expenditure of time, effort, and money, but so much can be done without going into the matter of a "price tag" in the effort that we can put forth as individuals in our own communities. See that some consciousness on the part of the public is aroused to the possibilities of accident prevention. Active participation in your own local group is a thing that is mighty welcome. It is a thing that many of you are doing now. To bring expenditures to a productiveness in keeping with other items of efficiency that you are following, you should look into the activities of those local councils wherever they may be located to inculcate in your own community a very definite interest for such activities.

The utilities need not hold their heads in shame when accused of introducing educa-

tional efforts against accidents into the public schools. If necessary, I think any one of us, as individuals, could well be ready with ample proof as to the justification of the splendid efforts made by the utilities on every hand concerning the efforts to propagate knowledge of the Shaefer Prone Pressure Method, the splendid efforts at first aid, and all the products of such admirable things as were mentioned by Mr. Hicks. We could show real, honest, sincere effort in pointing out the hazards of kite-flying and things of that nature.

The result of the efforts of the company already mentioned is a recognition of the responsibility on the part of a company for community-wide safety work. That story of the Pittsburgh company should be emblazoned across this land as an indication of the work and the interest taken by the utilities in community-wide safety.

That sort of work, like any other, whether it be personal or on a community basis, needs to be basically founded upon certain fundamental precepts that cannot be challenged. First of all, any safety program needs the foundation-stone of sincerity. If your organization or you are not sincere in the time, effort, and money you spent in behalf of accident prevention, then stop right there. Don't waste time or money in trying to put over a program if it is not fundamentally based on the corner-stone of sincerity.

The next important attribute is that of aggressiveness. The aggressive program is the only kind that is actively productive. You can't be passive in a militant organization. You must be pushing the thing constantly. This kind of program needs to have aggressiveness behind it constantly. It needs to be founded upon a far-sighted policy. Nothing of immediate import, nothing of immediate reaction, favorable or unfavorable, should deter it. It is the far seeing and the broad horizon that are necessary in that activity the same as in an institution.

Next it needs to be productive of thorough enthusiasm, enthusiasm, that well-spring of esteem that just seems to keep pushing the thing forward, overcoming the why and wherefore, that pushes so as to overcome every obstacle.

But even with enthusiasm, it doesn't mean a thing unless it is done. There is that element of thoroughness again. The program must be complete in every detail. Don't make it splashy or splochy. Make it complete in every detail, carry it all through the organization, because goodness knows, with all the work that is being done in all the utilities, it is sometimes appalling to see the number of accidental deaths that are registered upon the charts otherwise clear in our utility companies, due to happenings outside the confines of the organization.

Again, bringing home the need of an appreciation of all the aspects of a community-wide campaign as a whole, your program should be wound up so tight that the main-spring won't run down until the job is done. No train upon a railroad is productive of revenue if it stops ten miles short of the terminal. Let's put our safety work, like every train that operates efficiently, right through to the bumping-post and make it all-inclusive.

I have been spelling out a word: S for sincerity; A for aggressiveness; F for far-sightedness; E for enthusiasm; T for thoroughness; and then we come to the final element.

Safety, in your institution, where it has registered effectively, has been a success by reason and virtue only of its being a cooperative enterprise. No single individual whether he be at the top or at the bottom can carry upon his own shoulders the completion of a safety program. It is so intertwined with the interests of everybody as to make it a cooperative and undertaking, the "we" interest of the thing, the "together"-ness of the thing, the you (the Y) and I of the thing, and if we just keep on hammering at these personal aspects of accident prevention, that we shall succeed. Goodness knows, you need not do it by hard-boiled methods, but only by an appreciation of the facts with which to challenge the individual's responsibility. When you get that you get the "us" into it, the "we"-ness, the "together"-ness, the cooperative aspect of the thing--the thing that puts over not only the individual, the institutional, but the community-wide aspect of accident prevention. We can't stop short of the utilities in the leadership we have assumed until we have gone into every aspect of accident

prevention for we will get just as big a return on the public side of the thing as from our own industrial personnel.

The records in the accident prevention contest show the effectiveness of the efforts of the employees of the utility companies, and with the splendid standing utility possesses in a community, you can readily assume the leadership of getting over this program of accident prevention, not alone to the good of our institutions but that, in itself, will justify every bit of the effort.

So let's take the wider vision and do the accident prevention job which we have been confining to our institutions heretofore on a basis that is spread as wide as the horizon itself. It is going to pay big dividends in public relations.

CHAIRMAN BEAUMONT: Thank you Mr. Opp. Certainly the wide-awake, alert safety man need not fear of losing his job, for there has apparently been no depression in accidents, and we have so widened our horizons that none of us need to be concerned about our jobs.

Mr. Opp has demonstrated that the safety man's life is made up of the elements with which he spells safety, and those elements will make for his success.

The executive committee this year, in answer to persistent demand, thought it desirable to split up the sections, so as to give each group a chance to air their views. At the session this afternoon Mr. Vandergrift will preside. This meeting will be in the interest of the Telephone and Telegraph group.

In concluding the session, I should like Mr. Opp to give a report of the Nominating Committee.

Report of the Nominating Committee

GEORGE OPP (Detroit Edison Company, Detroit, Mich.): The list of officers selected for your consideration by the Nominating Committee is as follows:

General Chairman--G. A. DOELLER, Columbia Engineering & Management Corp., Dayton, Ohio.

Vice-Chairman in charge of development and research--GORDON WILSON, The Management and Engineering Corp., Chicago, Illinois.

Vice-Chairman in charge of electric interests--C. B. BOULET, Wisconsin Public Service Corp., Milwaukee, Wis.

Vice-Chairman in charge of gas interests--C. HOWARD STEWART, The Laclede Gas Light Co., St. Louis, Mo.

Vice-Chairman in charge of telephone and telegraph interests--Wm. M. DICKSON, The Bell Telephone Co. of Pa., Pittsburgh, Pa.

Secretary--HOWARD M. SHAW, Northern American Light and Power Co., Chicago, Ill.

News-Letter Editor--ROY M. GOODWIN, Philadelphia Electric Co., Philadelphia, Pa.

Poster Committee Chairman--H. A. FROEMY, Public Service Co. of Northern Ill., Chicago, Ill.

Membership Committee Chairman--IVAN L. SCOTT, Central Public Service Co., Chicago, Ill.

Film Strip Committee Chairman--A. A. OLFIELD, Wisconsin Power and Light Co., Madison, Wis.

Program Committee Chairman--F. M. PEPPER, Illinois Bell Telephone Co., Chicago, Ill.

Publicity Committee Chairman--JOHN J. BARADA, Laclede Gas Light Co., St. Louis, Missouri.

Statistics and Contest Committee Chairman--E. P. DURFEE, Hamlin & Company, New York, N. Y.

Engineering Committee Chairman--R. A. BLOOMSBURG, New York Power and Light Co., Albany, N. Y.

Special Representatives--S. C. DICKINSON, Pacific Gas & Elec. Co., San Francisco, Calif. (Pacific Coast.)

W. H. MULLIGAN, Hydro-Electric Power Commission, Toronto, Ontario, Canada.
(Canada)
W. A. BUCHANAN, Appalachian Electric Power Co., Welch, W. Va. (National
Electric Light Association)
Roy M. Goowin, Philadelphia Elec. Co., Philadelphia, Pa. (American Gas Assoc-
ciation)

Members at large—W. H. BROWN, Northern States Power Co., Minneapolis, Minn.
D. L. CANNON, Carolina Power & Light Co., Raleigh, N. C.
A. A. KLINGE, Public Service Co., of Colo., Denver, Colo.
E. J. KREB, Philadelphia Company, Pittsburgh, Pa.
P. R. KUHN, Penn Central Light and Power Co., Altoona, Pa.
Councillors—E. S. BEAUMONT, Peoples Gas Light and Coke Co., Chicago, Ill.
B. B. McCULLOCH, Bureau of Safety, Chicago, Ill.
H. L. MEADE, Ohio Bell Telephone Co., Cleveland, Ohio.
Geo. C. A. OFF, The Detroit Edison Co., Detroit, Mich.
C. J. RUTLAND, Texas Power and Light Co., Dallas, Texas.
C. B. SCOTT, Bureau of Safety, Chicago, Ill.
J. L. VANDEGRIFT, The Chesapeake & Potomac Tel. Co., Washington, D. C.
H. F. WEBB, West Penn Electric Co., Pittsburgh, Pa.
H. M. WERNER, Illinois Bell Telephone Co., Chicago, Ill.

ADJOURNMENT

Tuesday Afternoon Session
October 13, 1931

Telephone and Telegraph Group

J. L. VANDEGRIFT, Chairman

Chesapeake and Potomac Telephone Company, Washington, D. C.

The session convened with Mr. J. L. Vandegrift presiding.

CHAIRMAN VANDEGRIFT: This opens the first sub-section meeting of the Public Utilities Section for the discussion of telephone and telegraph organizational problems.

The subjects on the program are popular ones and I want to see the meeting made as informal as possible.

The first speaker is Mr. G. W. De Revere.

Accident Prevention—The Foreman's Job

By G. W. DE-REVERE AND ROY L. SMITH

The Bell Telephone Company of Pennsylvania, Philadelphia, Pa.

I am no expert in the science of words, and the sources from which they come into our everyday language are not things about which I concern myself in my everyday job. But I am interested in the word "foreman" and how it is that this little collection of seven letters from the English alphabet came to be strung together in the order we find them, and how it has come about that the word means to us what it does mean.

Back in tribal days, when our ancestors roamed the plains and forests in small bands, they recognized the need for a tribal "voice" by nominating one of their number as a sort of spokesman, a man who could speak up for the whole crowd, as it were, when there should be occasion for important talk with outsiders and who, in turn, could drop a few words of wisdom and advice now and again to his own outfit. This old fellow had to be pretty wise. He held a position of authority. He had to be a leader, a chief, a pretty smart all-around man because his job continually kept him in the limelight. He was out in front on all occasions. He was continually to the fore. He was, in fact, the "fore-man" for his particular group.

The ancients found this system of appointing one of the group as leader, or foreman, a pretty good proposition. They found that, because the foreman was selected out of the group, he had the confidence of the rest of its members. They would believe him and look to him for guidance. And they also discovered that, when some outside event was impending which was to concern the group, this foreman of theirs could interpret it and explain to them what it was all about.

As the number of nomad groups increased so that one tribe rubbed shoulders with another, life became complex and the function of the foreman became increasingly important. He was the "go-between." He was the man in the middle and therefore the point of focus for his own group as well as for the other groups round about. He became a coordinator. It became a part of his job to run his own group in such a fashion that it could live happily and well and still be in harmonious accord with the activity of neighboring groups. It was a good system, and the ancients liked it because it worked.

As a system, it still works. Our highly organized, highly efficient modern industries have lifted the system intact out of the past and installed it in shop and

factory, yard and office. And today, as in the past, the foreman is a pivotal point upon which our lives—our industrial lives, at least—hinge.

Let me paint a little picture for you to show you what I mean. Suppose we take this room and fill it with material and machinery. There it lies, static. Nothing happens—no activity, no production, no profits and, to be sure, no accidents either. In order to accomplish something with all of this we must supply man-power. Let's take fifteen or twenty men, toss them into this room full of material, explain to each of them what he's to do and start them all working.

Right away we have a lot of activity and pretty soon we get a finished product. Within a short time, however, small difficulties will develop, and as time goes on these become major in importance. Our crowd of workers is a group of individuals, each man interested solely in his own little job. He will not be interested in the welfare of his fellow workmen; he will probably not consider the safety of any one other than himself, and it will only be a short time before many hazardous conditions will be introduced by material lying around, broken and defective tools, improper maintenance of machinery and careless handling of the finished product.

There will be little thought of cooperation, practically no discipline; confusion will exist, and our little picture will resemble a ship under way without a guiding hand to hold her to her course. No doubt there is something missing in our set-up and we now must look around for a solution of our problem.

In order to tie these men in with the management of any organization they should be able to go to one source with all their difficulties or problems. And so that there will be no confusion, they should be able to go to this same source and this source only, at any time they see fit. Modern industry has provided this source. It's the guiding hand which supplies or obtains all the needs necessary to produce a finished product done in a safe manner at the lowest possible cost. And it is called the foreman.

He's the same fellow, dressed up in modern clothes, that used to guide us safely through the perils of existence when we all lived in tribes and wore goat-skins for clothing. He is the whole point of contact that management has with the working force and the working force with management.

As we break down and analyze this first line supervisor's job, we find that it seems too much for one man to accomplish. It will not be necessary to enumerate all the many qualities which we expect a foreman to possess, but it would be well to stress that a successful foreman must possess the ability to properly plan and lay out as well as maintain an orderly job. Without these, there is bound to be a waste of time and material together with an ever present accident hazard.

It is very difficult to make a distinction between production and safety. The foreman who is considered most successful is the one who can produce the most goods at the least cost and even if we consider the safety of our men from a cold-blooded dollars and cents standpoint, we will come to the conclusion that the safest job is the cheapest job.

I can recall an experience I had in an industrial plant before I became a member of the Bell System. I was in the electrical maintenance gang, and the foreman had been pushing his men to speed up production, since his rating was rather low. It was during the noon hour when one of my buddies, a very conscientious fellow but not one particularly trained in safety, decided that he would repair a bumper plate on the main truck of one of the cranes. Of course he had a safety lock on his belt which he was always supposed to use to lock out the main switch in the driver's cab before he did any work on the crane. In this case, however, he figured that the crane driver, who was not in the cab, would not have any occasion to run the crane so he would just slide up and clean this job up in a hurry and be that much ahead of the game. He had not been working on the bumper plate five minutes before the crane operator (who had finished his lunch and was getting ready for the afternoon's work) climbed into the cab to start the crane. If that old

safety lock which my buddy had on his belt had been on the main switch nothing would have happened. As it was, the crane was started and he was critically injured. Production in that particular part of the plant immediately came to a standstill. I can vividly remember hearing the shouts from every direction and the men running toward the crane. We all knew there had been an accident because it was not the first time this scene had occurred. It was the first time, however, that it was brought so close to home. After much confusion the injured man was taken to the emergency hospital and the men finally returned to their jobs with a higher pulse and a generally nervous feeling. The production for that day was low, and it was affected for several days later.

Now, since that foreman was interested in his production, he should have seen to it that nothing happened to reduce the output of his men. He should have realized that of all the forces that tended to reduce his rating as a good producer, Old Man Accident has one of the highest batting averages.

In order for any foreman to succeed in wiping Mr. Accident out of the picture, he must primarily develop the power of keen observation. By this, I mean the ability to see and foresee at a glance, the possibility of something happening that may be injurious to himself or to the workmen in his group which will pull his production down. He should detect the possible failure of machinery and tools, whether it be a crane, a loom, a pike pole or a tire. He should observe traffic conditions along a highway and see to it that neither traffic nor his men are interfered with in any way, or if this is impossible, provide the necessary warnings, guards or signals that will assure safe conditions to all concerned.

As far as the work will permit he should keep all his men in view, so that he may observe any possible indiscretions on the part of his men. True, this may seem to be a little more expensive and in our business may require an additional setup or two of the reeling equipment, but this additional effort will pay big dividends.

His observations of his group will help him determine and assign the heavier and the lighter work. Not all men are built alike, physical strength varies and the foreman must consider this feature. In making his assignments he must do so without showing favoritism in apportioning out the lighter work. The ability to shift men about diplomatically in the interest of accident prevention is an art to be developed by the foreman.

His general and detailed study will provide an analysis of each man. The good and the bad, the careful and careless, the reasonable and the chance-gambler, all appear individually in his mind. It is his duty to weed out the chaff from the wholesome wheat. Only in this way can he be sure of an organization that breathes sincerity of purpose.

His eyesight and his brain must function quickly and with perfect timing, and he will then be guided by his better judgment. He must act accordingly and with authority to execute his judgment.

The power of keen observation on the foreman's part carries with it the responsibility of developing and training a cooperative group about him. If he is a helpless sort of a fellow, his group will eventually become equally helpless. He must be on his toes to help and stimulate the employee who tends to lag behind in production as well as in accident prevention. He must develop in his men a safe-working complex, which is understandable, sincere and of the "Be Your Brother's Keeper" kind. Their confidence in him must be such that will fearlessly permit them to come to him with the difficulties in their work, for their coordinated solutions.

Complexities in performance movements which are not understood often lead to serious accidents. The foreman of the old school who, like the mechanic who served a four-year apprenticeship, hesitated to tell his men too much of what he learned through hard knocks and perseverance, has no place in the present day scheme of things in industry. He must be constantly training his group in all that he knows.

He must impress on them that his most important duty is to see that they return home to their families each evening safely and soundly.

The development of open-mindedness on the part of the employees by the foreman will encourage suggestions and ideas from his group. These suggestions are always of value to both management and the foreman. After all is said and done, and with due respect to engineers and efficiency experts, the problems of production are answered by the employees who do the work. Their intimate knowledge of the operating details and the mechanism involved is not to be disregarded.

In order to illustrate this point I can remember the time in the Bell System when we had numerous minor injuries to the hands caused by hitting the drill a glancing blow when drilling small holes in masonry. Within a short time an employee submitted the suggestion that a shield be provided to protect the hand when drilling. A leather shield with a hole in the center was developed for this purpose. This served as a satisfactory protection if used as intended, but management did not stop at this; they developed a drill holder with a rubber grip and shield molded to same, making it impossible to use the drill holder without the protection. This was not the original idea, but we must confess the employee's suggestion gave management the required inspiration for further development. This is only one example of the many suggestions being received from the employees and developed by management to remove accident hazards from the everyday job. As the foreman encourages suggestions from his group, he will also develop a confidence with his men which will enable him to become familiar with their personal difficulties.

If you would analyze the cause of accidents, you would attribute many of them to thoughtlessness. If you would analyze the cause of thoughtlessness you would find much of it due to the employee's thoughtfulness for family or financial troubles.

The foreman who can hold the confidence of his men regarding their personal welfare possesses a valuable attribute.

Having this information in hand, the foreman can do very much in an advisory way to help the employee in his charge keep both feet on the ground. What an aid to accident prevention, if the employee can go about his work with his mind concentrated on what he is doing.

This phase of the foreman's job, namely training and securing the assistance of his men in producing goods at a profit with safety, I would call "Group Cooperation" for want of a better word. Unless the foreman can tactfully obtain this cooperation, he cannot be classed as a successful supervisor.

In the Bell System it is agreed that the responsibility for accident prevention rests with management, and management has accepted that responsibility by providing a very definite plan to prevent accidents. It, however, must rely largely on the first line supervisor or foreman to meet this responsibility as its agent, and with this in mind has provided him with the necessary means to accomplish this end. The foreman is in a key position and the application and control of safety measures rests entirely in his hands. Since the foreman is the keystone in our accident prevention arch it is quite essential that he be properly trained. The necessity for this training has been felt in the Bell System for some time and consequently there has been given and will continue to be given supervisory training courses to all of our foremen.

These courses require approximately two weeks for a group of eight to ten foremen. They are held at the headquarters building in a cool, comfortable room, high enough to be away from the city noises, and where distractions are at a minimum. The courses are guided by a conference leader and cross-table discussions are encouraged with every foreman taking part in them.

Throughout this course of training it is stressed that planning of work and accident prevention are one and the same thing and also the fact that accident

prevention is purely the foremen's responsibility and not one of an outside safety organization. Our aim is to convince the foremen that they are of vital importance in any safety program and without their assistance it would be impossible to cope with the situation.

At the completion of the course they have returned to their duties with a better understanding of their responsibilities and with instructions to further pass on the information that they have received, to the employees working for them.

In order to assist the foreman in having a handy check up on all the men working for him a "Quality of Safety Report" has been prepared with the aim of making accident prevention the direct responsibility of the foreman and every individual workman. This report is to be made on each workman by the foreman, and also on the foreman by his immediate superior. It is the supervisor's responsibility to observe all the conditions, tools and equipment with which each man works, on every visit to a gang or individual workman. All work performed must be strictly in accordance with the Safety Code. A demerit system has been prepared whereby the offender will be rated for all violations of safe practices, and furthermore he shall be immediately instructed in the safe manner to do his particular assignment and again impress upon him the necessity of studying the Safety Code and carrying out to the full extent the practices contained therein.

By the continual use of this report an unsafe worker should be found before he has an accident and immediate corrective steps taken. If the man does not respond, then just and proper disciplinary measures are taken.

Moreover management must be on the alert to adopt new methods and equipment which will alleviate the heavy muscular labor necessary in some phases of our work. The most serious accidents and no doubt the highest frequency occurs where the physical labor is the heaviest. The development of devices which reduce physical effort and increase production and safety, improves the efficiency of the business as well as introduces better working conditions for the employee.

Our Safety Code, although not new, is the foreman's "Safety Hoyle", his accident prevention "Bible".

It was written and approved by the employees and management.

It describes the precautions to be observed by all employees in preventing accidents to themselves, their fellow employees and the Public, and also in avoiding damage to property. While it is impracticable to include all safety details pertaining to all classes of work, it does comprise the fundamental principles which shall be applied in all phases of the work.

First Aid is also nothing new. In fact, of late it is being spoken of as being something after the fact; that prevention of accidents is far better than the cure. However, it is well known that accidents occur less frequently, and, as a rule, are less severe among people trained in first aid. This can be readily understood when it is realized that people so trained better understand the seriousness of all injuries and naturally have in mind at all times their possible causes and what should be done to prevent them. They also appreciate that minor injuries may become major injuries if not cared for properly.

Safety so dovetails in with training that it is hard to draw a line between them. In fact, training has almost become a synonym for safety.

Training has always been a part of our lives, either at home, in school or in business. It has been found necessary in order to have any kind of work performed in the most satisfactory manner, and the more complicated and intricate the job the more urgent the training. Training is the foundation on which all work rests, and the purpose of vocational training is to bring each individual, in the shortest period of time, to the point where he can do a safe and satisfactory job.

For telephone purposes training on the job is more practical, eliminates false conditions which exist in the schools, makes for a better morale and respect for the supervisor and makes it possible for the student to produce while he is learning.

Of course the foremen have to be taught some of the "tricks of the trade" of teaching, which not only makes for a higher quality of job but improves the selection of employees by introducing an improved manner of measuring them.

With this in mind a very practical course has been developed for each craft. We have not the time to go into the details of how the course is developed but it completely ties in the proper way to do each particular assignment with all possible hazards stressed in order to avoid accidents.

By having a definite setup of job assignments in easy learning order, the possibility of introducing unsafe conditions will be lessened, for an inexperienced man will not be called on for more skill than he possesses, or expected to have judgment which can come only with experience, or asked to think of too many things simultaneously, or for more knowledge than he possesses, or asked for more speed and accuracy than he has attained.

By careful direction and assignment of work, skill and safe practice are promoted. Properly done, the workman's performance is second nature and almost automatic, becoming almost instinctive. This is accomplished by repeated practice and careful supervision, never letting him learn the wrong method; the aim being to impress the correct practice at each stage so that there is no room for wrong or unsafe practices to enter. Learn to do it right the first time and by properly supervised methods set the habit. The matter of placing the hand wrong or even the choice of fingers might mean the difference between a safe and a dangerous job.

Unsafe work habits formed by accidental learning require expensive corrective measures. The faculty of the human mind for association of ideas has long been recognized and on this basis the safe methods of doing a job can be tied in with each step of the job itself.

By these corrective measures the safety phases of the job are taught along with the very first conception the workman has of the particular assignment, the foreman demonstrating by using actual tools, material and working conditions.

There is also supplied to the foreman a suitable method to keep a record of just how much each man has been trained and when the training was given him. The foreman is enabled to assure himself that his men are properly trained regarding their work and also that they have been instructed to do the job in a safe manner.

Leadership, safety and production are the outstanding qualities which control payroll recommendations for the foreman. Of these the Safety factor, which carries the most weight is divided as follows:

- 1—By personal example on the job.
- 2—Directing methods of work and use of safety devices.
- 3—Condition of tools and equipment.
- 4—First Aid instruction and practice.

The foreman must realize the necessity to run the business on a safe basis, which is the profitable one. He should not only gain the confidence and goodwill of his group but he should also understand that we are all being paid to carry out instructions and desires of management, and without full cooperation from each and every individual in his group he cannot carry on in a successful manner.

By reason of the magnitude of present-day business and the remote contact between manager and men, the foreman has become more and more important. In consequence, he must have far greater qualifications than were ever necessary before.

The staff organization coordinates all studies and reduces them to figures, rules and instructions, but the actual contact must be made through the regular line of authority, and the first line supervisor is the neck of the bottle.

In this we are not taking a new step but recognizing a fact that has always existed to bring about the most effective manner for the prevention of accidents.

CHAIRMAN VANDEGRIFT: That paper speaks well for itself. We have operators in the Bell Telephone Company who literally sit at the feet of the Bell Telephone Com-

pany of Pennsylvania and drink in wells of wisdom. They started in the safety game long before the rest of us and acquired a proficiency before we did. They have long led the Bell System, and what they say about safety is pretty nearly gospel for the rest of us. Our discussion leader is Mr. R. Y. Hyde of the Northwestern Bell Telephone Company.

The Foreman and His Part in Safety

By R. Y. HYDE

Construction Superintendent, Northwestern Bell Telephone Co., Omaha, Neb.

Any discussion of safety in any line of industry, where groups of men are employed under a foreman or first line supervisor, eventually centers on the foreman or other supervisor in charge.

It is not difficult for me to discuss the subject from this standpoint as the foreman seems to be the fellow who *does* or *does not* do everything. There may be some who do not agree with me, but in my opinion he is, in our business, one of the most important and hardest working individuals on the payroll. When you tabulate his responsibilities you will find that you have a real job on your hands with a very good chance of missing some of the important items which we from day to day expect him to remember. If we are unable to think of all the things that we want him to do, what are we going to do about it?

Who is this fellow, the "foreman" we talk so much about? Where did he come from? Who is responsible for him being given this very important assignment? Who trained him? Did we, when making our selection of the man, have in our mind as comprehensive a perspective of the job as we did after the selection was made?

The selection of the foreman is one of the most important jobs the management assumes, and he becomes, as I have said before, a most important factor in the organization the day he accepts this responsibility.

There are too many things to be taken into consideration in dealing with selection to permit a full discussion here. The management must assume the responsibility for all but one of these, the one exception being character or honesty of purpose. If the man selected is lacking in education, ability, experience, knowledge, or judgment, the manager making the selection surely must accept the responsibility for each deficiency, and immediately make plans for such training as is necessary to enable him to perform his job in the way we want, or accept the kind of job we would get without any alibi for final results.

All we can expect from any man is the best he has, and if that is not good enough it is our next move. We have either to make plans for training the foreman already selected or select a new foreman.

The average man, if we permit, will readily accept promotion to foremanship and the wage increase incident thereto without much discussion on his part as to the responsibility to be accepted with the promotion. The factors to be considered in selecting a foreman are the same, regardless of who is making the selection, but the uniform evaluation of the candidate with respect to these factors by different management methods presents a problem. As applied to safety work our methods are nearer in accord today than at any time in the past, and I am sure that a great many organizations have duplicated our experience in safety work. It took years for our management to reach the point where something was done to avoid accidents, besides telling the foreman to be careful and then going out and talking to him about an accident after it had occurred.

The kind of job any management gets is the kind of job they demand, and the man on the job is thinking about the same thing as the man in the office, providing the man in the office leaves his office often enough to let the man on the

job know what he thinking about; and he has to think out loud, loud enough and often enough to let the man in the field know that his attitude is based on constructive thinking, definite in character, but sufficiently susceptible to change to allow for the use of the knowledge of the other fellow to the fullest extent of its value. We then accept full responsibility for the use of such knowledge, even though it be the result of suggestions from the foreman to us, or from the workman to the foreman, giving credit to the employee if the idea is a good one and accepting the responsibility ourselves if the results are not satisfactory.

Unless sufficient information is available to permit of an analysis of individual accidents, accident statistics are of little value to the foreman in safety work except to indicate how good or how poor a job the management has done.

Safety rules have little value if the man in the field doesn't know how to apply them. If every man on the job knows what he has to do and how to do it properly, then the question of safety takes its proper place with production and quality and becomes an item of administration, dealing with the knowledge of the job, mental and physical ability, carelessness, lack of cooperation, inattention, and insubordination. If the foreman *does not* know how to administer his job with safe methods as a primary requirement, whose fault is it? Who selected him? Did he go out to run the job without instructions? If we have arrived at the point where we are getting some degree of satisfaction from the results being obtained in safety work, we must also be frank enough to look at the job from an over-all basis and agree that it will still require years of satisfactory accomplishment to overcome the results of years of unsatisfactory management. In the past the results obtained were what we planned for rather than what we wished, and this rule will apply from here on.

What of the Future?

Present employment conditions, I presume, permit all of us to rest slightly on our oars, due to the fact that our present work-loads permit of their handling by foremen of known ability and records of satisfactory accomplishment. If reverse conditions arise in the future, what plans are we making to meet them? Have we full appreciation of the importance of developing the men who will become our future foremen, and the volume of knowledge and natural ability we will require of them? Are we going to permit them to accept all this responsibility, knowing that they are not capable of carrying it out, and then attempt to shift the responsibility for unsatisfactory results; or are we going to be liberal enough to look at their job from an over-all basis, making due allowance and dealing with them on the same basis we expect them to deal with their men, training them to meet the requirements of their jobs, and we to accept the responsibility for the things they do not know and give them credit for being able to carry out their jobs in so far as we know their knowledge permits?

The safety man has not, up to this point, been mentioned in this discussion, but my personal opinion is that he has had more to do with reference to improved safety results than any other individual. This accomplishment has been the result of the effect he has had on the management's ideas regarding the importance of safety work and through the management transmission of these ideas into the field.

In addition to this, in most cases, the safety man's association with the foreman and men in the field has been helpful, this being particularly true if he has been in a position to make allowances for whatever shortcomings the foreman may have had, and dealing with such deficiencies from a training standpoint, leaving the administration factors to be dealt with by someone else.

The whole safety problem is controlled by three factors—all of them a large order—selection, training, and administration. If a passive attitude is applied to any one of them, results will depend on what good luck we have in our

selection. If mistakes are made they are yours and mine, and by us should be corrected, whether it be in selection, training, or administration. Do not assign responsibility unless you know the man wants it, knows *what* you want him to do, and knows *how* to do it; then deal with the results the way you would like to have your boss deal with you.

Do not expect too much of the foreman even though we may think he knows what we want him to know. For him always to know what we want him to know would be an ideal situation, and if he has reached that stage of development our management should be such as would permit further promotion for qualified men, or enable us to recognize in some beneficial manner the reduction effected by this type of foreman in our costs for general supervision. We right-fully never fail to discuss unsatisfactory results with the foreman, providing they appear of sufficient importance in the conduct of the job and we are of the opinion that he has failed to profit from his own observation. If we consider him capable of handling the job, we surely must give him credit for being able to ordinarily observe the good or bad results of his own efforts and profit by them. If we do not have this confidence in him we should eliminate him from the job before we assume his responsibilities and kill his initiative by continuing to tell him what he should have done instead of what he did do.

A basis preferable to either of the foregoing would be to know what he is going to do before he does it; then we do not allow him to get himself in trouble. He has a lot of planning to do to carry on the job and it will not help the situation any if he worries about what we are going to say to him if we happen to be there and things do not suit us.

Analysis Essential

The basis of any progress is the proper analysis of the things to be accomplished together with a plan of procedure to follow in their accomplishment, also a thorough analysis of the man who is to accomplish them.

If some particular plan of procedure is the only one acceptable it is then necessary to make sure that the foreman receives whatever training is necessary to qualify him to carry out this plan of procedure.

Have we as representatives of the management always taken a broad view of safety work? Are we at this time doing all of the things which should be done to make the foreman's job free from conditions which require him to supervise hazardous accomplishments, and which require the analysis of methods beyond his capacity, and jeopardize his position in the organization in the event of failure of judgment? We recognize the necessity for maintaining a sound balance between safety and good economic management; however, if we now think that everything necessary has been done to eliminate hazardous conditions, perhaps further analysis might show at this time that in some cases we have let our desire for too economic management carry too much weight in rendering our decision.

Perhaps the most important cause for accidents is failure in judgment on the part of the workman or the foreman when he tries to draw a line between production and safety, this condition being a development of his or their observation of the management's handling of hazardous conditions. The foreman and the workman are in the same position from an economic standpoint as the management, except that they have to make their decisions many times daily, balancing man-hours against the safety factor. Do you know of any business wherein the management objects to a workman speeding up his production, providing the quality is good and no one is injured? Does not the foreman have to make a decision in economics, when he lays out his work and determines the man-hours he will spend on a specific job, on the same basis that the management does in connection with the procedure it should follow in the elimination

of non-standard clearances, deteriorated plant, and electrical hazards? But in the event of something happening, it is an economic problem in one case and excused on that basis.

In the other case when an accident happens to one of the workmen through failure in judgment of the foreman or the workman, should we take any different view of the problem? In the one case we learn that the chance we were taking in leaving these conditions for economic reasons constituted an error in judgment. We then immediately start corrective action where similar conditions are known to exist. Should our dealings with the foreman be on any different basis? If he is the kind of man we thought he was when we gave him the job he will be a better man after having had this experience. He is a product of our creation and if we cannot support him in time of faulty judgment, we should not load him with the multitude of responsibility we expect him to carry out.

The foreman in industry has long been the "key" man in relation to the quantity and quality of the product. He has looked upon these two things as about 99 per cent of his job.

From time immemorial he has been learning how to recognize and properly correlate the factors which have to do with increasing the volume and bettering the quality of his product.

In comparatively recent years we have introduced another requirement in industry by demanding that our production methods be safe for human life and limb, and our foreman again holds the strategic or key position with regard to our new objective. In some cases he does not yet fully recognize his new responsibility for safety as a distinct and mandatory specification for the performance of the work incident to production.

When we progress to the point where foremen, as a class, do so recognize safe methods and put their responsibility for safety on a par basis with their responsibility for production and quality, then, in my opinion, the battle for safety will be won.

CHAIRMAN VANDEGRIFT: Thank you Mr. Hyde. We haven't started yet to plumb the depths of foremanship. We have an old-timer with us, a man who presented a wonderful paper at the last Congress and he is going to give us his reaction on the paper which was given. It is a pleasure to introduce our friend, Mr. Sherman B. Orwig, of the Illinois Bell Telephone Company, of Chicago.

Management's Responsibility for Safety

By SHERMAN B. ORWIG

Employment Supervisor, Construction and Plant Engineering Division,
Illinois Bell Telephone Company, Chicago

I was impressed by the point made by Mr. De Revere, that the responsibility for accident prevention rests with management, and in this function, as in any other, the foreman is the agent of management. In fact, in the minds of his men, the foreman is management.

However, in this discussion I should like to go into the realm of management beyond the foreman. Quantity and quality of product has always been recognized and accepted as the definite responsibility of higher management. Both have been appreciably improved by constant analysis, by better selection and better training of foremen and workmen, by better and more efficient tools and machinery, and by the introduction of more efficient methods; all management functions. In no case has management been able, nor have they attempted, to increase volume or quality of product by means of orders or more requests for those things. They have had to find out how and show their people how to get them.

The foreman's training has, for years, been largely along the line of volume and quality. He has been thinking "Production First." Now, in the last few years, along comes management with the injection of a new idea, "Safety First." The foreman wonders whether management really means this. In his mind, in many cases, safer work means slower work. Does management really mean that they are willing to accept some sacrifice in production in the interest of safety? How far can he go with this safety business? He is not entirely sure. He is out on a limb.

Unquestionably the greatest responsibility for accident prevention does rest with management and constructive forward-looking management recognizes it as good business, knowing that in the broad over-all picture the safest job is the cheapest job.

How can management discharge and fulfill this responsibility? It seems to me that management must demand safe performance just as they were obliged to demand volume and quality, but again they can not secure this merely by means of orders and requests. They must apply the same processes that were applied before, namely, constant analysis, better selection and training, safer tools and machinery, and safe methods. They must again find out *how* and teach their people *how* with the same definite follow-up that applies to quantity and quality.

One of the greatest contributors to accidents is the fact that such a large number of chances can be taken without resulting in injury. If an injury followed every time a chance was taken I believe that the chance taking would stop today, and this brings us to the "Quality of Safety" report referred to by Mr. De Revere.

As I understand it, this is an effort to get down on paper an analysis of every man in their forces to determine his tendency toward accidents, if he has such tendencies, to discover the accident prone employee and advise him, correct him, and train him in safe practices, or, if he does not respond as he should, to remove him before his unsafe practices result in injury to himself or others. This would appear to be a sound and constructive practice. It has been tried and proven in other phases of the work. It should eliminate, or greatly reduce, the chance taking, and is certainly an attempt at prevention rather than cure. Probably, in many cases, too much has been done in the way of collection of data and statistics after the fact and too little real preventive work. As I take it, this "Quality of Safety" report, or this "Safety Personnel Analysis", is an efficient tool which the Bell Telephone Company of Pennsylvania has designed and placed in the hands of the Foreman and his superior and taught them how to use, and I understand that it plays a very large part in their safety program. In view of the splendid work they are doing in accident prevention some such plan may well be worthy of our serious consideration.

At any rate, when the higher management insists upon safe performance, sets out to get it, and indicates in no uncertain way that they are sincere and mean business, when the Foreman's boss and his boss's boss, in connection with their regular supervisory work, talk and teach safety to the same extent that they do volume and quality, when the Foreman learns that he will be fully supported in his safety effort, and, more than that, that his salary and progress will depend upon this as much as any other factor, then he will be able to come in off that limb and "Safety First" will become a reality instead of merely a slogan.

CHAIRMAN VANDEGRIFT: We will all agree that there are quite a few original thoughts there and quite a few significant developments of thoughts already expressed.

Our next speaker is a man who is rather new to a National Safety Congress. He has been sufficiently long on the safety job to know whereof he speaks. I take pleasure in introducing Mr. W. C. Gill of the Chesapeake & Potomac Telephone Company of Virginia.

The Foreman and the Safety Supervisor

By W. C. GILL

Safety Inspector, Chesapeake & Potomac Telephone Company of Virginia,
Richmond, Va.

In the organization with which I am associated there is one man who is responsible for accident prevention activities and who is entirely dependent upon the foreman for the results which he achieves through these activities. This man is the safety supervisor, in our company a member of the staff organization. The safety supervisor must rely so entirely upon the foreman for accident prevention accomplishments that I would like to discuss a few of his functions in an effort to point out some of the things he is doing to assist the foreman in discharging his accident prevention responsibilities.

The aim and purpose of the safety supervisor is to develop and assist in the administration of a series of safety programs, progressively improved and refined, which ultimately will enable every man to judge for himself what will secure or endanger his own safety, the safety of his fellow workman, and the public. As a step in this direction, he must first convince the foreman and through the foreman every employee, that the management is sincere in its efforts to eliminate accidents. For unless every employee has a full realization and appreciation of management's sincerity, it is certain that accident prevention activities will fall short of their objectives.

The safety supervisor is responsible for the supervision of accident reports to insure that they are promptly and properly prepared and that they represent an accurate picture of the accident. In this connection he personally investigates all accidents involving lost time and assists in the preparation of the reports. These investigations are conducted in collaboration with the line supervisor and in no sense relieve the line organization of its duty to determine accident causes. The sole purpose of the safety supervisor's participation in the investigation is to give to the line organization the benefit of his specialized safety knowledge and experience. He also assists the line supervisors in assigning responsibility for accidents. The foreman is only required to furnish the data from which the accident report is prepared. While it is believed that it would be desirable for the safety supervisor to investigate personally all accidents this procedure is not feasible due to the fact that the 700 plant employees in our company are scattered over an area of 42,000 square miles.

It is a responsibility of the foreman to provide first aid treatment and to secure professional medical assistance when necessary, immediately after an accident involving personal injury has occurred. However, as soon as an injured employee is turned over to a doctor for treatment it becomes the duty of the safety supervisor to follow the progress of the case until the employee has returned to his regular work. This follow-up involves contacts with the attending physician and with the company medical department. It also involves periodic visits to the injured employee. These visits, however, do not relieve the foreman of the duty of making similar calls.

One of the accident prevention problems which confronts the foreman is that of securing and sustaining the interest of his employees in safety. The safety supervisor renders the foreman real assistance in this phase of his job. He arranges periodic group safety meetings and provides discussion leaders and subject matter for discussion at these meetings.

He also selects and arranges for the dissemination among employees and the posting on bulletin boards of accident prevention posters and literature. This necessitates his maintaining a record of bulletin board locations and making occasional field checks of the boards to insure that they are properly maintained

and are suitably located. A recent development along these lines, which may be of interest, is a small detachable leatherette bulletin board with an window face which is mounted in the cabs of all trucks carrying crews of two or more men. This board has proven very effective in reaching a number of employees who, under normal circumstances, see the larger stationary bulletin boards only occasionally.

It is realized that the foreman is not only expected to see that his workmen have the proper tools to perform their work but is also required to see that these tools are in such condition that the work can be done in a safe and satisfactory manner. Notwithstanding the fact that the foreman knows that this is one of his many responsibilities, now and then reports of accidents resulting from the use of improper or defective tools are received. Our experience indicates that an occasional field check by the safety supervisor is an effective means of keeping the foreman conscious of this responsibility. This field check consists of a visit by the safety supervisor to the working crew and a request that the foreman go through the routine tests and inspections of tools and equipment set up in his instructions. The safety supervisor stands by and observes the check which includes such items as visual inspection of rubber protective equipment and air tests of rubber gloves, visual inspection and bending tests of body belts, safety straps and climber straps, inspection and measurement of climber gaffs, the inspection of ladders, pike poles and other tools. It also includes a check of the first aid kit to insure that the kit is fully equipped and that the first aid materials are properly arranged. The safety supervisor offers advice and suggestions in the course of the check but under no circumstances are the actual tests and inspections made by him. For, if the foreman is to be held responsible for the safety of his men he must have control over those functions which insure safety. If he does not have this control the divided responsibility is bound to result, sooner or later, in "buck passing."

Mr. De Revere has discussed the procedure for training both foremen and workmen which is generally followed throughout the Bell System. In our company several foremen who attended the Foremen's Conferences suggested that a list of the important principles of safety supervision be furnished them as an aid in directing their men so that accidents might be avoided. As a result of that suggestion a pamphlet was compiled which describes the important principles of supervision from the viewpoint of safety. We believe that this pamphlet, which has been placed in the hands of every foreman and on which periodic review training is based, has been a real factor in reducing accidents.

The primary effort of the safety supervisor is directed toward creating in the foreman a sense of responsibility for the safety of his men and in equipping the foreman to discharge adequately this responsibility. In the final analysis the safety supervisor recognizes the fact that the foreman is the real safety man and that success or failure in accident prevention work is dependent upon the ability of the foreman to apply to the job the safety principles which he has learned.

CHAIRMAN VANDERBILT: There are many things raised in my mind by the papers presented and I hope there have been questions raised in your minds. To me, it is rather a long cry from the time we used to say that eighty per cent of the accidents were due to carelessness and we thereby very deftly placed the responsibility on the man. I wonder if we are very far removed from that opinion yet. In these discussions we seem to have placed a lot of responsibility on the foreman and, after outlining the foreman's responsibility, we also say, "You know the management has the job of training the foreman."

It seems to work something like this, if you will pardon a more or less personal comment. A few years ago we had a rather serious accident. They probably got the man back to the job the next day, however, as one of these disability assignment cases. He had only a broken back. (Laughter) It seems that this man was just following a

natural law of physics, that the shortest distance between two points was a straight line, which most of us try to follow to save time. That shortest distance in this case, however, took the man under a derrick, and just as he got under the derrick, it collapsed. The report came in that it was due to carelessness, that he had been cautioned not to go under derricks. That was final. Then this thought developed. What precautions had the foreman taken in setting up that derrick? Was it properly erected? Investigation showed that it had not been erected properly, for if it had been, the derrick would not have collapsed. Then some bright mind in the organization decided to find out if the foreman knew how to set up derricks. Here was this new device, and we had a number on the job, foisted upon the foremen. We simply gave them those derricks and said, "Here, use these, use them efficiently so as to save time and save money."

We made a personal check of every derrick and we didn't find one that was being properly used. Not one foreman knew how to use those derricks!

Was it the fault, then, of the supervising foreman, of the superintendents, for there were lots of superintendents involved? Where was the responsibility? That was one question raised.

We call this man, the foreman, the pivotal point, the key man, the top sergeant. We have a lot of terms for him, but is he that, can he function as such? Where is that help supposed to come from? Is it his responsibility? That is the question that is No. 1 in my mind.

Question No. 2 is this: We use the terms safety and accident prevention. Those are pretty broad terms. What do they mean? I don't know. I have been attending these Congresses for a long time, and the longer I attend, the more I attend, the more I think about safety, the more confusing a lot of this stuff becomes. I can't dissociate safety or accident prevention from good, well established production methods. I don't want to cast any reflections on these excellent papers. They are fine, the best I have ever heard, but they seem to agree that selection, training, placement of individuals, and supervision are the basic safety methods. Aren't they the basic production methods?

Mr. Gill, in his paper, said that they send the safety supervisor on the job to check upon the methods used. What methods? Safety methods? If safety methods, aren't they saying what the maximum production is as to quantity and quality? Those are questions I should like to hear answered.

Another one that was brought out in the splendid paper of Mr. De Revere was that they use a check, a proneness-to-accident check, on their people. They check the individual employees, then the foremen. I want Mr. De Revere later on, if he will, to explain just how that differs from a check on correct methods. If they determine a man accident-prone, there are two things to be done. He is placed on other work or given further training. What kind of training? Not just how to remove a finger from a saw; not that, surely.

G. V. De REVERE (Bell Telephone Company of Pennsylvania, Philadelphia, Pa.): I think we will all agree that our inspections in installations and production work have put production work and quality up pretty high. For instance, in the Bell Telephone Company of Pennsylvania, our installation of quality was not so good but our production was, so they started an inspection by means of which the men were rated. There was an inspection by districts, too, by an installation inspector, so we had a comparison report of what the districts thought and what the area thought we were doing.

We found a lot of discrepancies. The district men, however, thought they were 100 per cent pure. Naturally the foremen thought that was a reflection on them, that they were doing a pretty poor job, and it wasn't long before they began to come up. The inspections showed a difference of four or five points.

We couldn't tell you why, though, it won't work with safety. If you had a safety man in the field, the foreman was prone to shift things to the safety man. The foreman wasn't safety conscious, he wanted to produce. He didn't care how many chances the fellows took so long as they took them when the safety men were not around. Now

we put accident prevention up to the foremen, breaking them into safety, and we will compare our results with those of the staff or with those in the field. We expect wide discrepancies, of course, but we hope to bring them closer together in the near future.

I went to the conferences and explained this program to them and told them they were the safety men thereafter, and about a month later several of them approached me and asked me for more information. I told them not to get excited, that we didn't expect it to work perfectly right away, but they replied, "You needn't expect to come out and find our men working wrong, and they won't be average."

"How can you work it," I asked.

"Well," they said, "we have our men working just as you said." I asked them how they did it and they described how each of the men under them had received a copy of the instructions and how they checked up on the men and warned them to follow those instructions. One man told his men, "You had better not let me catch you working in any way not in accordance with the instructions or you will hear from me, for I won't lose my job and standing because you won't work safely."

So I think in that way the foremen will certainly make safety a matter of time only, and I firmly believe it is only a matter of time when safety and quality and quantity will be thought out side by side.

CHAIRMAN VANDERCAUF: I accept the information. That is fine.

Up in the frozen North, in the New England Company, they have made tremendous improvements in the last few years in their safety performance records. We have two men here who ought to be able to explain how they did it, just what importance the foremen assumed in that company. I think probably the senior of that pair would take the responsibility for explaining.

J. F. McCURRY (New England Telephone & Telegraph Company, Boston, Mass.): The problem we face today is a serious one in the New England Company, although perhaps some of you folks who might have read the last report on major accidents may not think so on account of the position that the two areas of the New England Company hold in that summary.

Our problem was to get the foremen who had been trained, and they had all been trained to follow up that training. The secret of success in any endeavor is not your initial effort, it is the follow-up. Now the foreman is the man who must start the follow up. If he doesn't follow up it is up to somebody to see he does follow up.

When our safety organization was first set up, we had a lot of safety people scattered all over the lot and we found that foremen, on account of that, were shifting the responsibility of the prevention of accidents and other things—production, of course, included—in the safety man. Now, the safety man's job was only advisory, and his efforts, or the bigger part of them, should have been directed to helping the foreman help the men in safety, and, if he does that, he helps the management.

I think a lot of foremen feel they have been saddled with unnecessary work, but the safety part of the job dovetails so closely with production and standard methods that you can't get away from it, and if you do the job as it is set up to be done, and follow up, you are bound to have production on a safety basis.

PAUL R. KUHN (Safety Eng., Penn Central Light & Power Company, Altoona, Pa.): This is a pretty big subject, the responsibility of the foremen. The unfortunate thing about the change is that when you start to have accidents, and you see some weakness in the supervisory chain and attempt to correct it before another such accident occurs, you may go to some manager and talk to him. You may talk to him a long time and still not be able to convince him on your side of the picture. You may talk to the superintendents and they may have a vague idea of what you are trying to tell them, and then when you get down to the foremen, having been unable to convince the manager and the superintendents, your position is somewhat unfair if you blame it on the foreman.

This is mostly due to the fact that safety work is a work where the safety engineers are given a lot of intangible figures, so they are up in the air, and the managers get the impression that these fellows are dangerous. The big job the safety man has is

to try to translate these visions that he has to convince the manager, the superintendent and the foreman.

Without casting any reflection on the manager, the superintendent or the foreman it is a great problem, to translate the thoughts of the safety engineer, or any safety thoughts you might have, to the minds of supervising officials. There is only one thing to do and that is to try to get to earth and convince these men. If you can't do it the first time, try it the second or third time. The big thing is to follow through. I don't think you will get anywhere in safety work, unless you do.

CHAIRMAN VANDERGRIFT: I should like to get an expression from you, Mr. McCurdy, as to your experience in having foremen investigate minor accidents.

Mr. McCURDY: We started that practice about eighteen months ago, and every minor accident we have is recorded. We ask the foreman to put his comments on the back of that slip. We also ask him to put there his recommendation as to what could or should be done, to prevent similar accidents happening in the future. We have had a wonderful reaction in that the foreman takes a greater interest in accident prevention.

G. R. HARR (Safety Engineer, Management & Engineering Corporation, St. Louis, Mo.): We have an investigation sheet that we use. It has one side for recording points dealing with who was responsible, what caused the accident and what happened. Sometimes the report claims it was due to disobedience of orders, sometimes inattention, haste, or similar reasons, and then we ask the foreman or the man about these causes. The foreman, being responsible, sometimes will evade answering, but usually after talking with him a while, he will tell more.

When we have gotten an idea of the real cause of the accident, we find on the other side of the sheet, a statement of what needs to be done to correct this, what will be done in similar circumstances again.

We find by this that we can analyze our accidents and can prevent such accidents in the future. We make the corrections, or, if they don't make the corrections and a similar accident occurs, we take this up with the foreman to find out why these corrections were not made.

I am between the man at the top and the man at the bottom. If the man at the top spends at least five or ten minutes each week, or if only that much during a month, with the men below him, and carries that on down the line, the safety idea will be carried out all through any company that employs that method and eventually it will be unnecessary to spend that five minutes, for safety will then be instilled in the hearts of all the men and they will forget safety is anything but a part of their every-day business.

CHAIRMAN VANDERGRIFT: After all, the attitude of the men at the bottom is but a reflection of the attitude of the man at the top, and if you have the right, aggressive attitude at the top, it is bound to show up along down the line and there is not much chance of its being lost. If there is only a passive acquiescence, it gives a broken link to the chain.

K. W. LAUTENBACH (Safety Supervisor, Chesapeake & Potomac Telephone Company of Maryland, Baltimore, Md.): I think Mr. De Revere's plan is a good one. We use a system of checking up on places where accidents might occur through failure of things operating properly, such as electrical contacts, anything that might be potentially a cause of accident. The foremen make notes of those things. By making a study of several months' reports of accidents we found out where these potential accidents occurred and in what class of work, so we can correct them before they cause further accidents. We had one foreman in particular who inside of a month found three or four hundred potential accidents in a gang. We had other foremen who turned in four, five or six potential accidents. That proved how observant the first foreman was.

C. J. DAVIS (Employment Supervisor, Illinois Bell Telephone Company, Chicago, Ill.): I think reference to potential accident is incorrect. To my mind it is an injury that we are talking about when we talk about accidents. If we really tried to compile

the accidents, as some attempts have been made, the result would be staggering. It is true we all know what is meant when we say accidents, that we mean injuries, but the more we refer to accidents as injuries the less likely we shall think of accidents as being injuries. If we think of accidents in the light of preventing incorrect practices, I think that will help us.

CHAIRMAN VANDERGRIFT: This has been an interesting meeting. There have been many important thoughts developed.

ADJOURNMENT

**Wednesday Morning Session
October 14, 1931**

**E. S. BEAUMONT, Chairman
The Peoples Gas Light and Coke Company, Chicago, Ill.**

The session convened with General Chairman Beaumont presiding.

CHAIRMAN BEAUMONT: The general subject this morning is one of particular interest, "The Individual's Responsibility for Safety." There has been a lot of discussion about the responsibility of the management and the employee and the individual, and since the management and the employees are both collections of individuals, perhaps the very elementary thing of the whole question is the individual man's responsibility.

I take pleasure in presenting Mr. Marcus Dow, of the Greyhound Management Company, of Cleveland, who will talk to us.

The Individual's Responsibility for Safety

**By MARCUS DOW
Manager, Department of Safety and Personnel, Greyhound Management
Company, Cleveland, O.**

The matter of individual responsibility of the employee is of utmost importance in considering the safety activity of any industrial concern. While there is an individual responsibility that rests upon the individual employee, there is, too, the primary responsibility of the management to take those steps that may be necessary to impress upon the individual employee his responsibility. Not only is there the responsibility of the management to do those things that may be required and necessary to keep the matter of individual responsibility continually impressed upon the minds of the employees, but there is also an individual responsibility that rests upon the shoulders of the foreman, in the establishment, to do his duty in creating this interest in individual responsibility on the part of the men who are directly working under him.

There are two very important elements that enter into safety anywhere. One of these might be called the mechanical element, which would consist of the proper guarding of machinery, the correction of unsafe physical conditions that might contribute to an accident if left uncorrected. The other element is the human element, and my long experience in safety work has rather convinced me that all the safety devices that can be invented and applied will not eliminate the human element from the accident problem.

Let me illustrate this point. When I first entered the safety field, some twenty years ago, one of the first cases that came to my attention, and which left quite an indelible impression, was one where an employee in a certain railroad repair shop stepped out of a doorway to cross the yard tracks. As he emerged from this doorway, he stepped on a track on which an engine was moving back and forth throughout the day conveying material from one part of the plant to another. He was struck by this engine and quite severely injured. He had depended upon an electric bell, located in the doorway, to warn him of the approach of the engine. In this case, it failed to ring. It was a mechanical device and was out of order because of not having had constant inspection, as such things do, and, as a result, this accident occurred. Here was a man who depended upon a mechanical device to save his life, whereas the human precaution of looking right and left would have saved him from injury; but he had not been trained to think about personal safety.

Up to that time there had been no safety committees in the plant. There had been no organized effort to impress upon each individual employee his responsibility for the prevention of accidents resulting in injury to himself or to his fellow employees.

I remember another case where an employee ascended a stairway, slipped on the stairs and sustained an injury. After the accident, as frequently happens, they attempted to lock the barn door after the horse was stolen and, upon a recommendation of a Safety Committee, metallic safety treads were placed upon the stairs to prevent slipping.

I am not stating an argument for the necessity of practical safety devices, but merely to point out that mechanical safety devices alone will not prevent all accidents. There must be an organized, systematic, constructive effort made to teach employees those things that they must guard themselves against, but most of all that they must constantly bear in mind the fact that every man employed in their establishment has an individual responsibility in the matter of safety, in the matter of eliminating those unsafe practices which contribute to personal injuries. There should be a campaign or a constructive educational program instituted that will teach employees to avoid taking unnecessary chances.

What is, "taking an unnecessary chance?" It is a form of gambling. If a man goes to a racetrack and bets on a horse to win a race, what does he do? He simply puts up a few dollars and takes a chance on the horse he picks. If lucky, if he is a good guesser, he may gain a few dollars. That is gambling. On the other hand, if a man drives an automobile over a railroad crossing and fails to come to a stop and look carefully in both directions, if he fails to do that, he puts up his life as a stake and he takes a chance that no train will happen to come along and strike him. That he might win or gain what? Nothing more valuable than a few seconds of time. He gambles for time, and human life is at stake!

It is because there are thousands of people throughout the country who have no idea of personal and individual responsibility in a situation of that kind that hundreds of people are killed and seriously injured in grade crossing accidents every year.

It seems to me if we are going to get anywhere in the prevention of accidents after steps have been taken to provide the necessary mechanical safeguards, after everything has been done to make the vehicle operated on the highway a safe vehicle so far as the construction of it is concerned, that our next step is to impress upon the individual operating the vehicle that he has an individual responsibility in the elimination of those practices, or taking precautions that will protect him in any accident that might occur in spite of all safety devices.

We find in our industrial plants, in our railroad yards, in our motor vehicle fleets particularly, men who, by their very carelessness breed carelessness, breed thoughtlessness, indifference to safety, simply because they themselves are thoughtless or ignorant or indifferent to safety. Therefore, in the conduct of a safety effort, just as in the control of an epidemic of contagious disease, we must first isolate the germ carrier, the habitually reckless employee. We must vaccinate the entire personnel by inculcating into their hearts and minds a spirit of safety, an enthusiasm for safety, that will drive the accident germs out of business entirely.

Through the organization of your safety committee, by carrying on a constructive educational campaign, using posters, holding periodical safety rallies and all of those things, you are in a great measure able to successfully create this atmosphere of safety.

One of the first things that will result from such constructive effort will be to teach the average employee in the establishment that his personal and individual responsibility for safety goes even beyond protection of his own individual life and limb.

I remember a case in a certain factory where a man had to locate a steam valve

under the floor. He took the cover off the opening, hardly big enough to admit a man's foot, and after finishing, went away and forgot to replace the cover. Within an hour perhaps a hundred men passed that opening and not one thought to stoop down and put that cover back in place. Then along came another employee, walk-ink backward, dragging a piece of piping. He stepped into the opening. Two employees lifted him out, took him into the first-aid room where, after a hasty examination, it was discovered he had sustained internal injuries. He was removed to a hospital where a serious operation was performed and, within an hour or so, that man died.

It was a small thing, leaving that cover off the opening on the floor. The man who originally failed to replace it did not realize his individual responsibility for the protection of the lives of his fellow men. A hundred other employees, who passed by that unsafe condition and did not correct it, also failed to realize their individual and personal responsibility for safety in that industrial plant.

The matter of personal and individual responsibility does extend beyond the mere protection of the life and limb of the one individual employee; his responsibility does and must of necessity extend to that point where he will do those obvious things that may be necessary to bring about the maximum degree of safety in the location where he is at work. Individual responsibility for safety might well extend to that point where the average employee in an establishment will by word of mouth attempt to correct unsafe practices on the part of his fellow employees.

Personal and individual responsibility also rests upon the shoulders of a foreman, in any industrial establishment where safety has been properly and energetically carried on by a safety program. It has been said that the foreman is the key man in safety. There is no question about that.

Eternal vigilance, it has been said, is the price of safety. So far as the foreman in charge of a gang of men is concerned, his vigilance must be extended so far as to see that the men under him are not only taught how to work safely, but continuously, day by day, hour by hour, that they are closely watched and supervised to see that they perform their work in only the safest possible way. That is the individual's responsibility.

We look to the man in the rank and file in our industries to wield the weapons that will destroy the habits and the practices that are unsafe, that are inimical to the safety of themselves and others, but how much more important is the duty and individual responsibility of the men who are in charge of those men, to make, to forge, and to emblazon into the hearts and minds of the men under them those weapons of knowledge with which their unsafe practices may be successfully overcome.

So there we have the individual responsibility not only of the men of the rank and file to protect themselves and their fellow men, but the individual responsibility of the man directly over those men, to inculcate into their hearts and minds this spirit and enthusiasm for safety that will automatically bring about this whole-hearted and cooperative effort.

The same principles, the same ideas, extend out of the manufacturing plant to the men who are operating our fleets of commercial vehicles. During my experience in the Police Department of New York City, I recall a case where a lad about twelve years old, in a borough up in the Bronx, started to cross the street one morning. The boy did a careless thing, crossing the street in the middle of the block instead of going to the street corner where there was traffic protection, where his life might have been protected. Perhaps this boy, not being of an age where he fully realized his individual responsibility for safety, had not been instructed by his parents or his school teachers on the fundamental principles of self-protection by self-caution. He stepped down between two trucks parked along the curb, with a distance of about two feet between them, and just when he got into this perilous position, the driver of the truck ahead backed up and, without

warning, this young lad was caught between the end of the first truck and the radiator of the rear truck so that his back and thighs were so badly twisted and crushed that today, years later, he lies on his back, his entire body from his arms to his knees in plaster casts, hopelessly paralyzed for life. And all because of the failure of one man to realize his individual responsibility for safety. Had the driver of this truck looked behind before making the back-up movement, while he might not have seen the boy, he could have gauged the distance between his truck and the next and backed up slowly and carefully. Had he done that, the boy would have had time to get out and the tragedy would not have occurred.

Take the matter of rear-end collisions on the highways; it is one of the most frequent types of highway accidents. The average driver of a motor truck, if he gives any thought to this particular type of accident, takes the general attitude that it is a very trivial kind of accident, never resulting in anything serious. He fails to realize that he has upon himself an individual and personal responsibility for eliminating even that particular type of accident.

Rear-end collisions are due to a very common fault on the part of the motor vehicle operator; that is, of following too closely upon the driver ahead so that he fails to have a good braking distance. That may depend upon two things: The speed in which the traffic is moving, for we all know that at a speed of twenty-five or thirty miles per hour there must be a greater distance between than if the speed is only ten miles per hour, and we know that the condition of the pavement is important, that is whether wet or slippery. The average motor operator fails to take these things into consideration, because he has not been sufficiently impressed that he has an individual and personal responsibility in the prevention of even these so-called trivial types of accidents.

Another case occurred during my New York Police Department experience. The driver of a coal truck was behind a light sedan on a main thoroughfare. The sedan suddenly stopped and the driver of the coal truck plowed into this light car and crushed the rear end like an egg shell. There was a woman sitting in the rear seat of this sedan and she was killed.

The driver of that coal truck thought it was a bad break. He had had three previous accidents of that kind that same year because he had formed the habit of following too closely the vehicle in front to allow himself a safe braking distance. Three times, and the worst he had done was to break the bumper on a car ahead. But the fourth time, when he hit harder than he thought, he caused the death of an innocent person. Why? Because he had not been trained, educated and instructed and impressed by the fact that he had a personal and individual responsibility for the prevention of that very type of accident in the operation of his own vehicle.

Now, statistics show that we have a very high frequency, upon the highways, in the type of accidents we call in our operations, diagonal collisions, occurring at highway intersections. Almost all these accidents at intersections are due to the fact that the operators of these vehicles do not have a sense of personal responsibility for the prevention of accidents. One man will put the responsibility on the man operating the other car. As a matter of fact, I feel that practically all the accidents that occur throughout the country each year, which result in this great toll of some 32,000 killed and some three-quarters of a million injured, are due to the fact that the drivers of automobiles try to put the responsibility for safety upon the shoulders of the other drivers and the other drivers refuse to accept the responsibility.

In the conduct of our safety work, in order to impress the employee, the driver of this safety fleet, with the responsibility he must take, our instruction must take on a very constructive and educational phase if it is going to be successful.

Let's take, as an illustration, this one type of accident: The collisions at intersections. You are not going to get the results you desire, if you simply put up posters

on that subject and simply say to your employees, "Now be careful and see that you don't have accidents; we don't want any more of these collisions at intersections." You must go farther than that to impress the individual driver with his individual and personal responsibility, and so, working on this theory, I should say, from my own experience, the way to impress employees at a safety meeting on this particular type of caution would be to say to them: "As you approach a highway intersection, you must operate your vehicle on a very fundamental and practical safety rule. In other words, you must be prepared to come to a stop within the distance of your range of vision." Then I would go on and say, "When you approach an intersection, let's assume there is a building on your right side, an obstruction to your view as you approach that crossing. Let's assume by way of further illustration that this building stands ten feet back from the curb line and your vehicle is four feet from the curb line, out toward the center of the highway. That would mean, Mr. Driver, as you approach the intersection, your range of vision from the point directly in front of you to the corner of that building is only fourteen feet. Therefore, to operate that vehicle upon the side of positive safety, you must approach that intersection prepared to come to a stop within a distance of fourteen feet, should some reckless operator come out of that side street and cut off directly in front of you."

Now of course there is not one automobile driver in a thousand, in ten thousand, that ever approaches a point in a highway with any such definite rule in his mind. If there were we would not have so many collisions during the year.

Then, to further impress the drivers of your fleet, I would say, so they will not forget what I meant by taking these precautions, "You must remember, Mr. Driver, that there are many thousands of people operating private automobiles on the highways who have not been trained in safety, who have never been instructed as to the outstanding causes and types of accidents. They have never been impressed or cautioned as to what they must do to prevent accidents at intersections. They have never been made to realize their own individual and personal responsibility, and therefore you as an operator in the employ of this company must assume that responsibility, and to a greater degree than the average, because these private automobile drivers give no thought at all to safety; all they consider is whether they are within the limits of speed for that neighborhood."

"Suppose you are approaching one of these intersections and operating at a speed of 35 miles an hour, which is within the limit of the community or state in which you are traveling. Suppose as you travel toward that intersection at that rate of speed, somebody comes out of the obscurity of that building at the same rate of speed, and you discover each other when 80 or 90 feet from the point of intersection. You must take into consideration the number of feet that your vehicle travels per second, and all you need to do is to multiply your speedometer reading by one and a half. At a rate of thirty or forty miles an hour, those figures multiplied by one and one-half give you 45 and 60. At 45 or 60 feet a second, then, Mr. Driver, you are approaching this intersection, when this other driver comes out and you both discover each other within 90 feet, which means, at the rate per second you are traveling, that you would be together on that crossing in exactly two seconds of time. It is not a matter of forty miles per hour, or whether you are traveling at a safe rate of speed, but just a couple of short, infinitesimal seconds of time lie between you and the possibility of a serious accident on that intersection. What is the answer?"

We lay down as a rule in our company that in the operation of a vehicle the driver must approach intersections prepared to come to a stop within the distance of his vision, that he must reduce speed and get under complete control before approaching dangerous places upon the highway.

Now, by carrying out your instructions along these lines, making them very clear, putting up the arguments as to why certain precautions are necessary to pro-

tect your vehicle from accident, you will go a long way toward impressing your employees with their personal and individual responsibility for safety. You will give them something to think about and something to work upon, so let's remember, then, that employees certainly do have a personal and individual responsibility for safety, but it rests upon the management, upon the supervising force in that company, in that fleet, or in that establishment, to constructively, intelligently educate and supervise their men to make them realize to the fullest possible degree their personal and individual responsibility.

There is an old slogan, "Safety First," and they are simply two words which stand for a principle, a great idea, and if we believe that by carrying on a constructive safety educational program, if we believe that by close and intelligent supervision, if we believe that by talking safety, by inculcating this spirit of safety and enthusiasm in the hearts and minds of our employees, we can make them realize their personal and individual responsibility, we will go a long way towards creating this maximum degree of care and caution that we all so desire in the operation of our plants and our fleets of motor vehicles. And that can best perhaps be accomplished by every man in a supervisory capacity, talking, talking, talking safety, correcting the unsafe practices coming to his attention, and by leadership and his own enthusiastic efforts inculcating in the minds and hearts of men that spirit and enthusiasm in the saving of human life that will make them realize that each man, no matter what his job may be, indeed has a personal and individual responsibility for safety.

CHAIRMAN BEAUMONT: I am sure you all enjoyed this discussion by Mr. Dow. Are there any questions?

W. F. NORRIS (Gen. Safety Supervisor, American Telephone & Telegraph Company, New York City): We have been very much concerned over the rule at railroad crossings. Our rule is very emphatic. It says, "Stop at all railroad crossings," and it might apply to intersections, too.

We had one case where a man brought his car to a full stop at an arterial highway and got under way again with his whole line of vision clear in both directions. A fire engine smashed into his car, upset it, seriously injuring his boy who happened to be with him. The fire engine was wrecked and a number of acid tanks on it were spilled, badly burning many of the firemen.

That was one instance. In another case I was traveling through Philadelphia with my safety supervisor. The supervisor, without my being conscious of any reason why he should stop, brought his car rather suddenly to a standstill where there was a sidetrack into a yard. There were gates and no engine could possibly cross the highway without being noticed. The entire line of traffic had no intimation of his stopping. I was very much concerned as to whether I would be killed or not by that stop, so it seems to me there should be some medium, some lesser degree of accident prevention that we ought to put into our rule. Can you give us any thoughts on that, Mr. Dow?

Mr. Dow: So far as the railroad crossings are concerned, of course we operate our own fleets carrying passengers for hire, so we must take the very extreme precaution of requiring the drivers to stop at every railroad track regardless of whether it is an industrial track, an abandoned track, or what, and we do that because we feel that if we gave them leeway or let down the bars in any way they might use bad judgment. We can't let down the bars and we must maintain this rule strictly, that every railroad crossing, steam, industrial, interurban or electric, requires our vehicles to stop.

I don't think that rule need be so rigidly enforced by vehicles not carrying passengers for hire, but it is essential. I think the rule should be to stop at every railroad crossing, but the application of that rule should be intelligent and educational.

When one of our drivers comes to a double track, he follows instructions and,

if a train is running on the other track, he is not to cross behind the rear car but must wait until the train has passed a considerable distance to give him a clear and unobstructed view of the other track. Our rules require that in case of a severe fog or snowstorm, where it is impossible to see whether a train is approaching, the driver must get out of the bus, get someone to help him, and make the necessary observation to determine without any doubt that it is safe for him to proceed.

I speak of course from the standpoint of a concern operating vehicles for carrying passengers to whom we owe a responsibility for safety.

CHAIRMAN BEAUMONT: That seems to answer the question and is an assurance to all of us who ride on buses.

You will remember that Mr. Dow had a motion picture, entitled Bulletin No. 70. It comes to my mind especially at this time as an attractive example of the way in which Mr. Dow at that time undertook to present the facts that he gleaned from statistics in a manner much more effective than mere numbers on a printed page could ever present. I know that those of you who have seen that picture agree with me that it was a much more effective presentation, one which would certainly tend toward increasing the individual responsibility on the part of the employees having to do with the specific operations.

Before proceeding with the next paper we will elect our officers for next year. Mr. Opp, as chairman of the Nominating Committee, with his fellow members, Mr. Vandegrift and Mr. McCulloch, prepared a slate of officers that is very fully representative. The names which you heard yesterday represent men active in the affairs of this section.

(Mr. Opp again read the report of the Nominating Committee.)

CHAIRMAN BEAUMONT: Are there at this time any nominations from the floor? Hearing none, I will entertain a motion to the effect that the secretary cast a unanimous ballot for the slate as presented.

(A motion was made, seconded and carried that the Secretary cast a unanimous ballot electing the officers and the Secretary cast the ballot.)

CHAIRMAN BEAUMONT: A debate usually brings out the best in a meeting. Some people say there never was a good meeting unless it ended in a fight, and two of our members seem particularly qualified today to argue. The topic of the debate is "Resolved, That Accident Prevention Contests Have No Place in an Industrial Safety Program." The gentleman who is to take the affirmative side of that question has long been a member of the section, has often expressed his opinion as to his attitude and I am sure he will leave no doubts as to his being right.

It gives me great pleasure to present Mr. A. A. Oldfield, of the Wisconsin Power and Light Company, of Madison.

Resolved: That Accident Prevention Contests Have No Place in an Industrial Safety Program

Affirmative Side

By A. A. OLDFIELD

Director of Safety, Wisconsin Power and Light Company, Madison, Wis.

I am quite sure as I look over this audience today, my task of proving that accident prevention contests are out of place in an industrial safety program is by no means an easy one.

My worthy but misguided opponent, Mr. Oartel, whom we recognize as a leader in this great work of accident prevention, has served notice upon me that he will have huge supplies of ammunition to set up an efficient barrage against anything I might say. Undoubtedly he will quote to you statements from

executives of many companies, supporting his contention. The names of some of these executives will cause you to gasp at the thought that I, in my complete insignificance, would dare to question anything they might say in regard to utility operation.

May I suggest that occasionally, not frequently to be sure, they are in error, as was proven at the time of the stock market crash?

There is no question in my mind regarding Mr. Oartel's ability to submit to you statistics which, in his opinion, will definitely decide the question. Even these are questionable, which is proved by the mass of figures prepared by economists who have shown innumerable times during 1930 and 1931 that prosperity returned to the United States on each of the days recorded on the calendar during that period.

I believe it is Mr. Oartel's intention to outline for you the rules and regulations governing these safety contests, and by some form of magic, (legerdemain I believe is a better word) if you follow these rules and regulations carefully, there will be eliminated forever from your operations the sad things we call "accidents"; and it is unfortunate that, because you undoubtedly will decide to eliminate "contests" after this discussion, these rules and regulations will be of no use to you. They can, however, be filed in order that statisticians and historians of the future can use them, when referring to the present period in accident prevention work during which "Contests" were in vogue, and when "ballyhoo" was used in an effort to persuade otherwise perfectly normal men and women that they should perform all their operations safely in order to prevent accidents.

Those historians will write pages about the "Rules and Regulations" which their predecessors had used to govern these "Contests", and how they had come to false conclusions in regard to their effect upon accident records.

They will write another chapter regarding the evils of these contests, outlining specific cases where personal animosities had arisen by reason of them; how department had quarreled and worked in opposite directions to each other because of the ballyhooing they had engendered; yes, they will speak of antagonism between whole organizations as a direct result of them. They will even refer to personal encounters between safety engineers as another result, and they will definitely show to industry that, summing up, the benefits were completely overshadowed by the harm they did.

They will refer to accident prevention work as something on a higher scale than athletics, selling campaigns, etc.

The company I represent has taken part in accident prevention contests; during the first eight months of this year we continuously headed the list in the Mid West Safety Contest; and may I at this point request my listeners not to ask me about the ninth month?

Personally I am of the opinion (and I sincerely believe the majority of our 1800 employees will substantiate it) that the reason we headed that list was not because of the contest. It was because my predecessors and myself, with the united assistance of our whole supervisory force, have inculcated our employees with safety. It was because in our organization the safety department is looked upon as a sort of sanctum by our employees—a retreat, as it were, where they relieve themselves of their burdens, regardless of what they might be. It is because the executives of our company, both by word and deed, assist in our accident prevention work, and possibly, if I may add this without boastfulness, because the safety department recognizes the duties of other departments and does not usurp their duties. The result of this has been that other department heads, as a matter of course, give consideration to the safety department with mutual consequential cooperation.

If there had been no Mid West Safety Contest, the safety record of the Wisconsin Power and Light Company would not have differed in the least.

To me, it is ridiculous to ask men and women to sign pledges in reference to safety work. The worst drunks I have seen (and I have met many) had previously signed pledges. Of course the ones I saw were not in accident prevention work.

Gentlemen, there should be but one contest in accident prevention work, and that is—the competition between the individual's self-control and his carelessness.

All our efforts should be devoted to that particular contest.

The best approach in my opinion is the one we are using on our property. A constant repetition that accident prevention is a personal matter primarily. An unbroken state of safety mindedness is the goal. When each employee reaches that goal we have little to worry about. The safety minded man automatically cares for the safety of others in equal measure as he cares for his own.

It is not necessary to place him in the position of contesting his safety mind against the mind of another.

You avoid the intermittent states of enthusiasm and despondency which are ever present in contests. The winners glory in their ascendancy, the losers give up the fight as hopeless. You may not agree with this, but unless you accomplish what Soviet Russia is unsuccessfully trying to do, namely—"remake man"—you can not avoid those two states of mind—they are natural to the human being.

And so, gentlemen, having placed before you axioms which my esteemed opponent cannot disprove, I feel very sure that you will agree that "Accident Prevention Contests have no place in an Industrial Safety Program."

CHAIRMAN BEAUMONT: So much for the affirmative, and now Mr. John A. Oartel, Carnegie Steel Company, Pittsburgh, will defend the negative side of this question. It gives me great pleasure to present Mr. Oartel.

Resolved, That Accident Prevention Contests Have No Place in an Industrial Safety Program

Negative Side

By JOHN A. OARTEL

Chief of Safety Bureau, Carnegie Steel Company, Pittsburgh, Pa.

Many speakers like to fall back on the Bible or Shakespeare to prove their assertions, so in looking up these two authorities, I find that a statement by Shakespeare fits the case exactly; it is as follows:

"Thrice is he armed who hath his quarrel just."

meaning, that if a man is on the right side of the question or argument he is assured of victory.

Therefore, I will first call to my assistance, Mr. Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, who has had a wide experience in conducting safety drives and contests. I will quote a paragraph from a letter he wrote me, in answer to a request for material to help make up this talk. Mr. Kearns wrote:

"I am only too glad to supply you with material for your argument that safety drives are beneficial. I think you have, at the start, the best of the argument, for there is not the slightest doubt in my own mind that the results of safety can be achieved by such means more extensively and with less effort than by any other means. I do not mean that these alone will achieve permanent results; they must be followed up by surveys and individual inspections and individual application of the spirit aroused by these affairs."

In further support of my argument I shall mention the campaigns sponsored by

the states of Ohio and Pennsylvania, by the United States Bureau of Mines, the Portland Cement Association, the Western Pennsylvania Safety Council, and one in a large steel mill.

The campaigns or contests in Ohio were sponsored by the Industrial Commission of the State through its division of safety and hygiene. They were conducted in several of the industrial counties and were directly supervised by local bodies, such as Chambers of Commerce and Employers' Associations in cooperation with the Industrial Commission. The most outstanding were those conducted in Trumbull and Stark Counties. The one in Trumbull County was first conducted in 1929 and repeated in 1930 and 1931. A short description of it, and the results obtained will be typical of the ones in other counties.

Rules of Contest

A comprehensive outline of definitions and rules governing the contest, in which 52 plants have been formally entered, and which might be of value to others contemplating contests of a similar nature, are given as follows:

1. PURPOSE—The purpose of this contest is to stimulate a greater interest in industrial safety throughout the county.

2. CONTROL—The contest will be controlled by the Safety Committee of the Trumbull County Manufacturers' Association.

3. NATURE OF THE CONTEST—The participating industrial plants are divided into five groups according to their hazard and location. The contest will last three months beginning at 12:01 a.m. Monday, April 1, and closing 12:00 p.m., Sunday, June 30. The Manufacturers' Association will award a suitable trophy to the industrial plant in each group having the best score on a lost-time accident, man hour basis. In case two or more plants in any group have perfect scores, the trophy will be awarded to the plant having the largest number of man-hours during the contest.

4. REPORTS—Each competing company has designated one of their executives to represent the company in this contest and to make the necessary reports. Reports will be made to A. L. Bulton, secretary, 604 Second National Bank Building, Warren, on blanks furnished for the purpose. The entire success of the contest depends upon the accuracy and sportsmanship used in making these reports. Two separate sets of reports will be made:

Lost-Time Accidents will be reported once a week, giving the names of the employees injured and the nature of the injuries. These reports will cover the previous week 12:01 a.m., Sunday, to 12:00 p.m., Saturday and should be made on the following Monday and reach the secretary's office on Tuesday. A report should be made for each week even when there has been no accident.

Man Hours worked will be reported according to the payroll practice of each company, either once a week, once in two weeks, twice a month, or once a month. These reports should reach the secretary's office as soon as possible after the pay period closes.

5. LOST-TIME ACCIDENTS—The following definition of a lost-time accident, which is a slight modification of the National Safety Council's latest definition, will apply in this contest: "A lost-time accident shall be any accidental injury arising out of and in the course of employment, causing death, permanent injury, or loss of time other than the remainder of the day or shift on which the accident occurred. No matter what time of the day the employee is injured, if he returns to his job or any other regular established job, at the beginning of the next regular shift and with no permanent disability, the accident shall not be counted a lost-time accident. If he returns after the beginning of the next regular shift or if his injury has resulted in any permanent disability, the accident is counted as a lost time accident unless the delay is due to stopping at the doctor's office in which event the doctor's decision should be obtained as to whether the injured employee was able to return to work at

the beginning of the shift." Lost-time accidents reported shall include lost-time accidents to any employees working in Trumbull County including accidents in course of employment to executives and office employees in Trumbull County.

6. **MAN-HOURS**—Man-hours, for the purpose of this contest, shall consist of the total number of hours worked in Trumbull County by the employees of any plant entered in the contest. It shall include the man hours of executives and office employees in Trumbull County. Executives and Office employees shall be assumed to work fifty hours per week. Man hours reported shall not include the time of construction crews and other employees working outside the county.

7. **SPECIAL PROVISIONS**—Employees of the Warren Telephone Company, for the purpose of this contest, shall not include telephone operators. Employees of the Penn-Ohio System shall not include operators of street cars, busses, or railway maintenance crews.

In connection with the campaign, The Industrial Commission of Ohio is offering first prize of \$25, second prize of \$10 and ten prizes of \$1 each for the best slogans for June. The contest is open to all workers of the industrial plants of Trumbull County, exclusive of foremen, superintendents and officials. The judging will be done by competent representatives of the Commission.

Results of Contest

	1929	1930	1931
Lost-Time Accidents	326	128	95
Frequency	22.57	11.28	12.08

The experience of Pennsylvania in conducting safety drives or contests has been somewhat different. This State conducted its first drive in 1929. The principal feature of the drive was the endeavor to get each employee in industry to sign a pledge card reading as follows:

"I pledge myself to do my best in Pennsylvania's Safety Campaign. To be responsible for no accident to myself or any one so that life may be happier and labor more profitable for me and my fellowman."

Approximately two and one-half million of these pledge cards were signed in the State. After the pledge had been signed a button was given to the worker to wear. Our own company had 30,000 employees in the state of Pennsylvania at that time, all of whom signed the cards except one man; when questioned as to his refusal to sign the safety pledge, he replied that he had received strict orders from his wife not to sign his name to anything unless she was first consulted. The matter was taken up with her and she agreed to permit him to sign his name to the safety pledge.

Posters were distributed by the Department of Labor and Industry of the state to all establishments which desired to use them. Our own company issued two posters in connection with the drive. The illustration on the first poster consisted of two workmen holding up a steel beam, which is one of our products, on which rested the seal of the state; the wording was as follows:

"THE GREAT STATE OF PENNSYLVANIA CALLS US TO ITS AID! CARNEGIE STEEL COMPANY ASKS ITS 30,000 MEN TO LINE UP 100 PER CENT FOR NO ACCIDENTS IN 1929. LET US MAKE THE CAMPAIGN OF THE DEPARTMENT OF LABOR AND INDUSTRY THE OUTSTANDING FEATURE OF THE YEAR IN SAFETY."

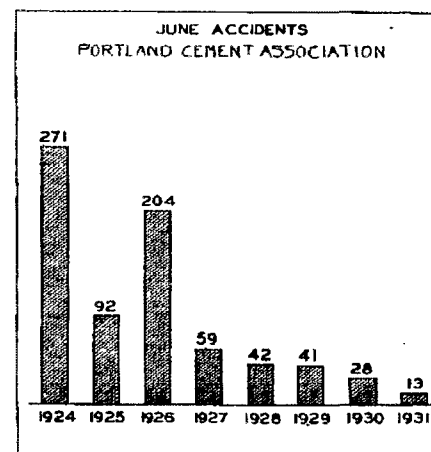
The other poster was issued after all the pledges had been signed, and portrayed an executive and a workman signing the safety pledge; the wording was as follows:

"THE SOLID VOTE! 30,000 CARNEGIE MEN VOTE 'YES' ON DEPARTMENT OF LABOR AND INDUSTRY'S PLEDGE FOR SAFETY."

In addition to these two posters issued by our company, several of our plants issued their own posters. I will mention only one which came from our Duquesne

Plant. It bore a photo of the general superintendent with his signed pledge card and also a photo of each department superintendent; the wording was as follows: "PLEDGED TO PENNSYLVANIA'S SAFETY! PENNSYLVANIA'S STATE-WIDE CAMPAIGN FOR ACCIDENT PREVENTION. EVERY DUQUESNE WORKS' EMPLOYEE HAS SIGNED THE SAFETY PLEDGE."

Another, and more effective, feature in connection with the Pennsylvania Drive during 1929 was a series of safety rallies in the industrial cities and towns throughout the state. These rallies were sponsored by the Department of Labor and Industry of the state with the cooperation of the manufacturers, civic bodies and service clubs. By means of these rallies the safety message was carried to communities never reached before, and manufacturers who had been indifferent or lukewarm up to this time



were induced to form safety organizations in their plants and to start safety work in an organized way.

The 1929 drive in Pennsylvania resulted in a decrease in accidents in thirteen counties. The drive was continued during 1930 and is still running in 1931.

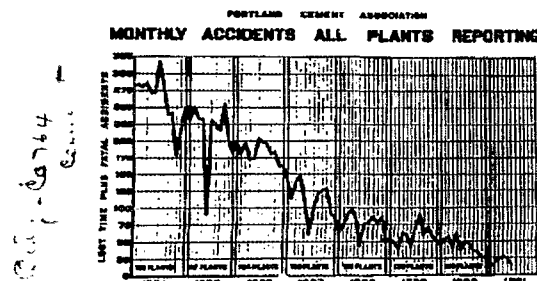
In 1930 the Department of Labor and Industry issued a booklet to be given to all employees entitled, "Safety Over Pennsylvania", containing accident statistics for 1929 and helpful safety hints. A bulletin was also issued and a proclamation by the Governor of Pennsylvania calling attention to the importance of safety. Roll of Honor Certificates were given to plants in the State which went through the year without a lost-time accident, and Merit Certificates to the plants whose lost-time accident rate was lower than that of the average for the State, which was 3.5 per one hundred workers.

A fair estimate of the result of the drive in Pennsylvania during 1930, is arrived at by comparing the reduction in accidents with the reduction in wage payments

in the manufacturing industries. The reduction in lost-time accidents was 24.9 per cent; in wage payments 15.1 per cent, leaving 9.8 per cent in favor of accident reduction.

During 1931 the effort is being focused on two months, March and October; which were found by an analysis of the accident statistics of the State, for the previous ten years, to be the peak months. A card showing an outline map of Pennsylvania with the peak months accentuated, was issued to be given to all employees, and the slogan:—"HELP KNOCK OFF THE PEAKS" was adopted. Posters were issued for the March drive by the Carnegie Steel Company and the Western Pennsylvania Safety Council. The Carnegie poster portrayed a workman knocking off the peak with a sledge hammer, and the Western Pennsylvania Safety Council poster was entitled, "WAR DECLARED", with the March and October peaks accentuated.

The record for the month in the state showed a reduction of 24 per cent in lost-time accidents, compared with March, 1930. The total lost-time accidents for March,



1930 was lower than the total for the corresponding month in any previous year since 1916, and is the second lowest industrial total in Pennsylvania since January, 1916.

National Safety Competition of U. S. Bureau of Mines

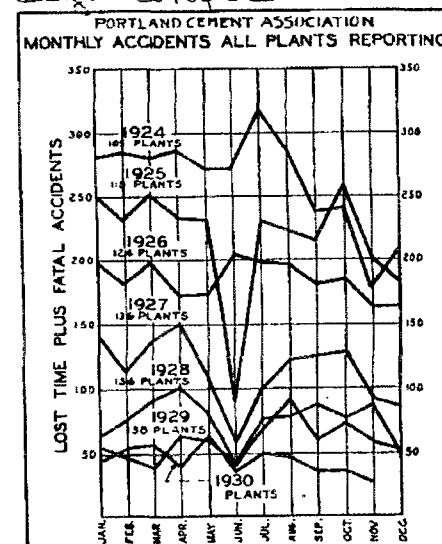
The year 1930 was the sixth year in which the United States Bureau of Mines promoted a National Safety Competition for mines and quarries. There were five classifications as follows:—anthracite, bituminous, metal, non-metal, and quarry and open cut. In 1930 three hundred thirty-seven plants were in the contest with 6,533,706 hours worked. Comparing 1930 with 1925, the first year of the contest, shows a reduction in frequency from 100.090 to 61.854.

Portland Cement Association

Since the year 1925 the Portland Cement Association, through its Bureau of Accident Prevention and Insurance, has maintained yearly accident prevention campaigns on a competitive basis between all member companies. Also, each month of June has been set aside as a no-accident month in which a carefully, previously prepared campaign is conducted for the purpose of operating the entire industry for this 30-day period without a lost time accident. The attached charts showing the results of these June campaigns since 1925 graphically portray the value of such contests, especial attention being called to the year 1924 in which no campaign was

held, and the year 1926 in which no campaign was held, which graphically measures the value of the contests.

The month of June was selected for the campaign for several reasons. Primarily, it is the month in which production of cement and consequent mill activity is at its height; the month in which all of the quarries are in operation; the month in which, if not having already been completed, rebuilding and reconstruction work and repairs are being rushed to completion; the month in which many new employees having just been employed two or three months previous in order to supply labor for operating the plants at maximum capacity, are present with the attendant hazards of the new



employee; and the month in which all the narrow gauge quarry railways as well as plant-owned switching facilities are in full operation, any accidents occurring in connection with their operating being charged against the plant's safety record.

It will be seen that June is the month in which it is most necessary to conduct a campaign and a month in which the potential possibilities for the largest reduction in accidents in the cement industry is possible. A safety drive should be conducted, not for the purpose of showing the best percentage record, but for showing the largest possible gross reduction in accidents.

A successful safety drive for a 30-day period or for any other period should be first of all very well planned sufficiently ahead of time that it will perform a triple purpose: first, announcement of the campaign having been made previous to the period in which it is going to be held, the men at the mills will be thinking of the

approaching campaign, and in such a spirit of mind will be attempting to operate through similar periods just prior to the campaign without a lost-time accident in order to gain their stride for the actual campaign; and second, a hang-over effect which will result in the two or three periods subsequent to the campaign having the value of the momentum of the training of the campaign itself with a consequent reduction in accidents for these subsequent periods.

Western Pennsylvania Safety Council

The Western Pennsylvania Safety Council has conducted a Thanksgiving No-Accident Month in the eleven counties under its jurisdiction since 1925. Twenty thousand posters, along with a plan of campaign, are distributed during these drives to manufacturing establishments, schools and stores. Rallies are held in manufacturing establishments, schools and churches and speakers furnished. During one of these months seventy talks were given at rallies in the district; forty in the schools and thirty in industrial establishments. In addition many talks were given in industrial plants of which no record was kept.

Accident reduction as a result of these drives is as follows:

The reduction in 1925 over 1924 was 50 per cent in lost-time accidents with a 6 per cent increase in employment. Sixty-four firms reported with an employment of 120,470.

In 1926, ninety-five firms, employing 186,496 people, reported a reduction of 18 per cent in lost-time accidents and 50 per cent in fatalities, with an increase of 2 per cent in employment.

In 1927 one hundred twenty-five firms, employing 171,697 people, reported a reduction of 50 per cent in lost-time accidents over 1926.

Figures for the three succeeding years are not available.

Carnegie Steel Company Trophy Plan

Safety ranks with production in Carnegie Steel Company plants, and a highly efficient organization is maintained for the study of the subject. This organization through general and sub-committees reaches out into every department of eleven manufacturing plants, an extensive railroad system, and a great tonnage carrying river transportation system. Every employee is made to feel himself a vital part in the campaign that interests him, and soon he is imparting that spirit to his neighbor.

The work has just begun when all hazardous machinery has been guarded. Safety work is never finished. With the human element, the greatest results of safety work are met. It is the educational side of safety work that interests and holds men, and it is the educational features that make a safe workman; the best safety device in all industry.

And it is the educational phase that inspired these trophies. In 1920 the idea was conceived that men strive in contests when there is something at stake. The spirit of sportsmanship is inherent in every man. Therefore why not make the safety work a game? Put it on a competitive basis? The idea took root, and after much thought and search for a suitable goal or award, the bronze trophy was decided upon.

Mr. Giuseppe Moretti, of Florence, Italy, an eminent sculptor who was in Pittsburgh at that time, became interested in what he termed the opening of a new field in art, and he undertook to design a trophy. This required much study on Mr. Moretti's part for no attempt ever had been made to symbolize Safety. Mr. Moretti spent a year in study of this abstract subject and finally produced the trophy for 1922.

Immediately the spirit of competition manifested itself in the attitude of the men in the plants, and in the safety records with their reductions. So keenly did

some men feel over their department records that it was taken as a personal affront when a comrade sustained the slightest injury. It readily was demonstrated that the idea of competition was a success, and with each year it grew. In the meantime Mr. Moretti continued his studies so that annually thereafter he presented a composition covering a new phase of safety.

The trophies are not won on a flash record. The plant that wins it has to work for it over a whole year. The best record for one month entitles a plant to hold the trophy for the succeeding month, but at the end of the year, the year's complete record is taken into consideration in determining the winner in perpetuum, so that a plant may hold the trophy for three months of the year on a monthly record and yet lose out on the yearly record. This sustains interest throughout the year and is a stimulus to safety work unequalled by any other factor.

In the early years of the trophy contests several plants reduced their accidents from 82 to 86 per cent, while the reduction in lost time accidents in 1930 in all the plants of the Carnegie Steel Company as compared with the year 1920, before the trophy idea was adopted, was 87 per cent.

The first five trophies were based upon symbolic subjects, but with the completion of this group more materialistic ideas were adopted, and trophies more expressive of the steel industry and closer to the men's daily atmosphere were developed. These latter are designed and wrought by one of the foremost silversmiths in the country, and are of a high type of the silversmith's art.

The method or basis for awarding the trophy was changed twice in ten years on account of the increase in interest and the desire to be as fair as possible in the award. At the beginning it was awarded to the plant having the best record in lost time accidents compared to average force. This was later changed to the best record in lost time accidents compared to hours worked. It is now awarded to the plant having the best record in accumulated hours worked without a lost time accident, after a factor has been set up from their previous best experience. By this plan a plant must continue to show improvement in order to keep winning the trophy.

No Accident Month at Duquesne Works

As my last contribution to the negative side of this question I desire to give the experience of a large steel plant, employing 6,500 men, in conducting a No-Accident Month, the plant in question being the Duquesne Plant of the Carnegie Steel Company.

The drive was held in the month of May, 1925. During the month of April at the regular safety meetings and special meetings of groups in the various departments, talks were given by the safety director of the company and the safety engineer and assistant general superintendent of the plant. The speakers outlined the program for the drive, and solicited support it.

On the last payday in April each employee received in his pay envelope notice of the drive, asking for his personal interest and cooperation. This request was sent out by General Superintendent Worton, as follows:

To All Employees of the Duquesne Works, Carnegie Steel Company

A special drive will be made to prevent accidents in this plant during the month of May. With your help we can go through the month without a lost time accident. We ask you to do your part by being careful of yourself and your fellow-workmen.

Injuries result in loss of time and suffering to those who are injured, and cause suffering and sadness in the homes.

We want to stop accidents. We ask and expect your help in this drive.

S. G. WORTON
General Superintendent.

On the evening of April 30, a mass meeting of superintendents, assistant superintendents, foremen and men directing work in the plant was held in the Duquesne Carnegie Library, with an inspirational speaker.

Month of May—No Accidents

The publicity features were ready for the drive start-off. Large streamers had been erected at all entrances to Upper and Lower Works. These streamers bore the following notice and appeal:

We are asking every employee of the Duquesne Plant to work for the prevention of accidents during the month of May. Your part is to think safety and act safely. Every employee must help in order to make a clean record. Do not have it said that you failed in your duty to yourself or a fellow-workman. We ask for and will appreciate your earnest efforts for safety.

S. G. WORTON

General Superintendent.

Publicity matters, such as posters, slogans, and photographs were displayed on all general bulletin boards.

Departmental publicity was delegated to each department for its own ideas and promotion. It consisted of meetings at which impromptu orchestras participated; displays of safety appliances; special posters and prints pertaining to particular department hazards; talks by superintendents; talks by foremen at beginning of each turn; stickers, bearing messages, pasted daily in conspicuous places; and slogans worked out in white-washed stone placed on grass plots. One superintendent used cards similar to those of a political candidate. On the face of the card was the photograph and name of the superintendent, and words as follows:

"Not a candidate for any office—But your support for Safety is earnestly solicited.

The back of the card was as follows: "I take the liberty of placing this card in your pay envelope. Even a slight injury to you may cause a shortage in your pay. Won't you help me, as superintendent of Bar Mills 5-6-7 to make this campaign for safety 100%—with no lost time caused by an accident?"

Plant Mass Meetings

Starting May 1st, plant mass meetings were held at three designated places. The first at 10:00 o'clock a. m. in the building near the Rolling Department. This meeting was attended by all employees from the South section of Upper Steel Works; attendance about 1,800. The second meeting at 11:00 o'clock a.m. in the main machine shop; attended by all employees in the north section of Upper Steel Works; attendance 1,200. The third meeting at 2:30 o'clock in No. 3 merchant mill, Lower Works; attendance about 1,000. During the period of these meetings, which were of thirty minutes duration, work was suspended in all departments affected, the orchestra played while the men assembled, the special speaker talked twenty minutes, and S. G. Worton ten minutes. All department superintendents and assistants, as well as every employee in the plant, attended these meetings, thereby attesting their support throughout the plant.

These plant rallies were held on Thursday of each week and were addressed by the best speakers obtainable. All the plant rallies were attended and addressed by general superintendent S. G. Worton. On May 7, in addition to the special speaker and General Superintendent Worton, meetings were addressed by President Homer D. Williams of the Carnegie Steel Company.

Results

These activities resulted in a period of 26 days without a lost time accident with a working force of from 6,500 to 6,700 men. The first lost time accident occurred on May 27th. On the 29th day another accident occurred making a total of two for

the period of the drive,—showing a reduction of 76.35 per cent over the month of April, 1925, and a reduction of 85.34 per cent over May, 1924. Of the two accidents occurring during this month one was unpreventable and not due to man failure. The second was caused by a man dropping a billet on his toes, attributable to his own carelessness.

At the conclusion of the drive General Superintendent Worton sent out a card of thanks to each employee as follows:

To All Employees of the Duquesne Works, Carnegie Steel Company

Thank you for your assistance during the No-accident Drive in May. Only two lost time accidents occurred, and I want to commend you for the part you took in reducing accidents.

This drive was for the purpose of bringing home to each man the realization of the suffering and sadness that follows accidents; what it means to you as an individual; what it means to your family; your fellow workman and his family. I consider it the most worth-while thing we can do for one another, so I ask that you continue looking out for your safety and the safety of the men with whom you work.

If you will continue to cooperate for safety, I am sure it will make you a better and safer man, make your mill a safer place in which to work, and our town a happier place in which to live.

S. G. WORTON

General Superintendent.

In concluding, I desire to quote again from Mr. Thomas P. Kearns of Ohio, as follows:

"The eminent success which has invariably attended these contests has convinced us that they are not only valuable in the conservation of the life and limb and economic resources of workers participating, but they have evidenced a strong tendency to create community safety consciousness outside of industry as well as stimulating interest in making safety work a permanent institution in many plants that had previously been only casually interested."

Discussion

CHAIRMAN BEAUMONT: We have about five minutes for rebuttal from each side of the question, and it seems to me that the time for rebuttal is the time for real fireworks. I shall call first on Mr. Oldfield.

A. A. OLDFIELD (Wisconsin Power and Light Company, Madison, Wis.): Mr. Chairman, Gentlemen: It took John a long time to prove to you that contests have no place in safety work. He gave you a lot of figures, and one good thought—and I think, only one. That was that you can do your safety work with less safety effort and make the boss think you are working by having safety contests.

He gave rules that on Monday you must have a report at the Secretary's office and on Tuesday you must have a report somewhere else and you must make sure that none of the departments shall have accidents. If they do they mustn't be considered as in the contest. I am sorry you won't need his figures, because there probably won't be any more contests after this discussion today. Mr. Oartel made one big point in favor of not having contests and that is that the educational features in accident prevention work are the things that bring you safety, not a lot of prizes, not a game between the men, but a consistent teaching of the individuals, as Mr. Dow said, that safety is an individual matter.

CHAIRMAN BEAUMONT: Mr. Oartel!

JOHN A. OARTEL (Carnegie Steel Company, Pittsburgh, Pa.): I rest my case with the jury.

CHAIRMAN BEAUMONT: I think we will leave the decision with the applause which seemed very even. Possibly we shall have further discussion of this subject with the participants in the debate, after the session.

ADJOURNMENT

Wednesday Luncheon Session

October 14, 1931

Joint Meeting of the Electric Railway and Public Utilities Sections

E. S. BEAUMONT, Chairman

The Peoples Gas Light and Coke Company, Chicago, Ill.

The joint meeting of the Public Utilities and Electric Railway Sections was called to order by E. S. Beaumont, The Peoples Gas Light and Coke Co., Chicago, general chairman of the Public Utilities Section.

CHAIRMAN BEAUMONT: The joint luncheon of the two Sections is an occasion of pleasant anticipation because it is at this time that certain rewards are given winning companies for records established during the past year in the accident prevention contests of the National Safety Council.

Mr. E. J. Kreh, manager of the accident prevention department of the Philadelphia Company of Pittsburgh, will tell us about the accident statistics in the Public Utilities Section. He will also award the certificates to the winners in the several groups. It is a pleasure to present Mr. Kreh.

Discussion of Public Utilities Contest

By E. J. KREH

Manager, Accident Prevention, The Philadelphia Co., Pittsburgh, Pa.

The Public Utilities Safety Contest has been in operation for several years. It was originally a six months contest but last year it began on July first and ended June 30 of this year, making it a full year contest. The participants have been divided into three primary and three secondary groups.

The first group is composed of the combination gas and electric companies with more than 500 employees. The second is combination gas and electric companies with less than 500 employees. The third is electric light and power companies with more than 500 employees. The fourth is electric light and power companies with less than 500 employees. The fifth is gas companies with more than 500 employees and the sixth is gas companies with less than 500 employees.

It is always difficult to present statistics and for that reason I have prepared several slides to show the trends in frequency and severity rates in the public utility industry. These also compare the frequency rate of the entire public utility industry with the frequency of those companies entered in this contest. I hope to prove to you that these contests really have value, and to ask those not participating in these public utility contests to really consider entering. Our company does get considerable value out of them, principally because it inspires the active enthusiasm and interest of the management and the supervisory forces. If it is true that accident rates are a true measuring stick for men and management, then no management wants to see itself in the back row. If you can show your management that you are behind the average that would be a great stimulus to give them more interest in accident prevention.

(Mr. Kreh then showed several lantern slides and explained them, as follows.)

(Slide) This shows the comparative frequency rate by years, of the contest entries, and the entire public utility industry. The rates for companies reporting to the National Safety Council in 1928, 1929, and 1930 are: 25.97, 22.58, and 18.76. For contestants during the same years the rates are: 19.57, 16.40, and 14.41. The rate

for entries in the contest just closed was 11.7. Those figures are the average rates for the competing companies and also the average figures for the entire industry.

(Slide) This shows a comparison of the average frequency between the competing groups. There are six groups. For the contest just ended, group A of the combination gas and electric had a frequency rate of 11.5 while group B had a rate of 9.14. Electric light and power in group A show a frequency rate of 11.8 while group B averaged 15.0. The winner in the first group had a rate of 4.8. Gas companies had the highest frequency rate, group A averaging 12.0 and group B 9.88. The winner, in group A, had 1.1. In the smaller companies, with less than 500 employees, (group B) you will notice that the frequency rates were lower than the larger companies, with one exception, and that is the electric light and power group.

(Slide) This slide shows the frequency rates for the public utility industry from 1926 to 1930, in comparison with all industries reporting to the National Safety Council. For 1930 our rate was 18.76 while the average for all industries was 18.47. The cement industry had the lowest rate of any industry, 6.30, and the construction industry the highest with 51.57.

(Slide) This shows the severity rate trend, public utilities compared with all industries. For 1930 our rate was 2.95 while the rate for all industries was 1.98.

(Slide) This shows the frequency rate comparison of public utilities, split into different operations. You will notice that the manufactured gas operations have the highest frequency rate which is 24.93; natural gas comes next with 20.15; electric light and power with 18.40 and the combination companies with 18.36. The telephone and telegraph companies have the lowest frequency rate, 7.20. The average for all public utilities is 18.76. The average for all industries reporting to the Council is slightly less being 18.47.

(Slide) This shows that electric light and power companies have the highest severity, 3.78; gas and electric companies are next with 2.87; followed by natural gas with 2.14; then manufactured gas operation with 1.85. The telephone and telegraph have an exceptionally low rate of .98.

All this should encourage us to consult our industrial accident statistics and find just where we stand. Sometimes that booklet published by the National Safety Council and known as "Industrial Accident Statistics" is sadly neglected.

We should study those accident statistics.

The pleasant part of my job this afternoon is to award the certificates to the companies that have made splendid records during the past year in our sectional accident prevention contests. Certificates are to be awarded those companies which finished in second and third places in each of the groups. On Monday morning the first prize awards were presented to the winning companies by President Bergquist of the National Safety Council. The second and third prize awards will be presented here this afternoon.

That you may know the companies that have earned first, second and third prizes, I will read the names of the first, then the second and third, and also give you the frequency ratings of the companies. Unfortunately we cannot have the men and women of the organizations here who earned these recognitions, but we hope that every representative here will carry these certificates and awards back and that they will provide an additional stimulus for each of them to continue their splendid work. It is now my pleasure to present the certificates.

(Mr. Kreh then awarded certificates to the winning companies, as follows):

Combination Gas & Electric Group-A

1. Penn Central Light & Power Co., Altoona, Penn. (2,382,511 man-hours worked—9 lost time accidents—frequency rate 3.778.)
2. Southwestern Gas & Electric Co., Dallas, Tex. (2,503,260 hours worked, 12 lost time accidents with a frequency rate of 4.794.)

3. Wisconsin Public Service Corp., Milwaukee, Wis. (3,056,055 hours worked, 18 lost time accidents with a frequency rate of 5.890.)

Group-B

1. Lake Superior District Power Co., Ashland, Wis. (653,730 man-hours worked—1 lost time accident—frequency rate 1.530.)
2. Menominee & Marinette Light & Traction Co., Milwaukee, Wis. (367,455 hours worked, 1 lost time accident, 2.722 frequency rate.)
3. Blackstone Valley Gas & Electric Co., Pawtucket, R. I. (1,196,310 hours worked, 5 lost time accidents, with a frequency rate of 4.180.)

Electric Group-A

1. Duquesne Light Co., Pittsburgh, Penn. (7,367,890 man-hours worked—36 lost time accidents—frequency rate 4.886.)
2. Commonwealth Edison Co., Chicago, Ill. (24,673,251 hours worked, 124 lost time accidents with a frequency rate of 5.026.)
3. Indianapolis Power & Light Co., Indianapolis, Ind. (3,474,739 hours worked, 19 lost time accidents with a frequency rate of 5.468.)

Group-B

1. Fall River Electric Light Co., Fall River, Mass. (511,288 man-hours worked—no lost time accidents.)
2. Keystone Public Service Co., Oil City, Penn. (429,692 hours worked with no lost time accidents.)
3. Kaministiquia Power Co., Fort William, Ont., Can. (101,085 hours worked with no lost time accident.)

Gas Group-A

1. Hope Natural Gas Co., Pittsburgh, Penn. (4,428,432 man-hours worked—5 lost time accidents—frequency rate 1.129.)
2. The Peoples Natural Gas Co., Pittsburgh, Penn. (3,003,328 hours worked with 8 lost time accidents, with a frequency rate of 2.664.)
3. Equitable Gas Co., Pittsburgh, Penn. (2,466,017 hours worked with 10 lost time accidents with a frequency rate of 4.055.)

Group-B

1. Reserve Gas Co., Pittsburgh, Penn. (424,008 man-hours worked—1 lost time accident—frequency rate 2.358.)
2. Columbia Natural Gas Co., Pittsburgh, Penn. (777,128 hours worked, 3 lost time accidents with a frequency rate of 3.860.)
3. Pittsburgh & West Virginia Gas Co., Pittsburgh, Penn. (867,531 hours worked, 5 lost time accidents with a frequency rate of 5.763.)

CHAIRMAN BEAUMONT: We congratulate the winners and runners-up in the several divisions of this contest. This meeting is a fitting one in which to honor a worker who has passed on. You all know that Homer E. Niesz of the Commonwealth Edison Company of Chicago died in August of this year. Mr. Niesz was long a member of the Public Utilities Section, was always a faithful worker and a mighty good friend. It is fitting that we stand at this time in silent reverence to Mr. Homer E. Niesz.

(The audience stood as a tribute to Mr. Homer E. Niesz.)

CHAIRMAN BEAUMONT: When I met our next speaker I wasn't aware that he was formerly a pastor of one of the leading churches in Toledo. His experience in the line of saving souls, rather than saving life, should make him eminently qualified

to bring to us a message of interest. He now is interested in the public relations and safety work of the Toledo Edison Company. It is a pleasure to present Dr. Stephen K. Mahon, Assistant to the Vice President, The Toledo Edison Company, Toledo, Ohio.

Safety to Life

By STEPHEN K. MAHON

Assistant to the Vice-President, The Toledo Edison Company, Toledo, O.

I was reading this morning that H. G. Wells, who had reached New York, expected civilization to go on the rocks; that it would probably be worse than the fall of Rome and Greece because we are crazier than they were then. He said a few years ago that every age was a crisis, and as I tried to analyze that statement I found out that probably what he meant was that whenever you make progress you are always running into crises. The crisis is always out in the big world where there are a lot of progressive things being said and done. That is why we are gathered in this meeting. You must work mighty hard to keep ahead of the progress of the world today.

I remember a story about two boys raised in Ohio. One became a sea captain; the other a preacher. Each had a parrot, and the one parrot was raised on shipboard and learned the vernacular of the sea; the other was raised in the parsonage and learned the vernacular of the parsonage.

The sea captain went back to visit his old friend, and took his parrot with him. He put it on the roost with the other parrot. The preacher's parrot said, "What must we do to be saved?" The other one replied, "Pump like hell or we will go to the bottom."

Whenever you get into the midst of progress you have to do a lot of pumping. You have to pump and pump, just to stay even with the game.

The other day a group of men were talking and a young fellow asked, "How far can a dog run into the woods?" No one seemed to have an answer, so he said, "Well, a dog can run half-way into the woods; from then on he is running out."

While that can be applied to depression it can also be applied to an age that is a going age. You are running into problems, darkness, and you begin to get hold of things and then you begin to run out. That is the way of facing and working with problems.

I have observed in all our American history that emphasis has been placed on the development of the individual for the good of society. Observing the conditions under which we live today, we are reversing the process and attempting to develop society now for the good of the individual. I do not know of any better illustration of this than the National Safety Council. This great organization is working as a group for the safety of the individual. If you will take that in all its "slants" I think you will find it will work out in a very large section of your life.

May I call your attention to two factors that are working a change in this country? One is natural law, which never changes. Whenever my mother used to make bread it was always an adventure, she never knew how it was going to come out. If there were two cold potatoes she put them in; if there were five cold potatoes she put them in, and three cold potatoes make a difference. Nowadays it is always the same. In all bakings of bread it always comes out just alike. That is the scientific method, natural law, if you please. If we are going to make any progress we must find out what those natural laws and methods are and follow them. That is the beginning of the scientific age.

I once received a letter from Elbert Hubbard in which he said, "I am greater than Socrates, Plato or Paul." He followed that by saying, "Because I live after them."

That is, he was living in a new era and in a greater age. It was the scientific age, the age of following the methods and laws and habits of nature.

It was in 1876 that the telephone was given to us. Now we have the telephone, wire and wireless, and we have our communication systems that have bound us so closely and quickly together that you actually know things that happen in this country before they take place. I had a friend in India who was taken sick, and they thought he was going to die. He got better. They cabled the family in England. They sent the cablegram on the fourteenth of March, and on the thirteenth day of March they knew he was better. We are living in an age like that.

We are thinking a good deal these days about Thomas A. Edison. One time he wanted to enter an engineering society in New York City and they asked him to write down his qualifications. He said, "I have built a machine shop and other things." We have in this era a lot of "other things."

I was impressed by one of the men from the General Electric Company talking about men getting a fever working with those high frequency tubes. They discovered they had something, something unusual, something powerful. Then they had to find a new unit of measurement, one hundred-billionth of an ampere. If you want to find out how small that is, think of Niagara Falls, and reduce that to one drop of water going over the falls in a year.

First of all I want to give you this idea of natural law we are now using, following, unfolding, discovering and using. It has led us into an accidental world; from birth until death we are accident in the main. We are living in an accidental world. There is the new speed, and there is the new power, from the high tension wires all over the country to the enormous powerful things that we have around us. There is the new fatigue that we are encountering. When you go out in the automobile in the morning your eyes notice all the things, the speedometer, motor meter, oil gage. Through the day, as fatigue comes upon you, you notice them less, and accidents may happen.

You remember the old fellow who was examining the buzz saw, and he put his finger against it. Somebody asked him how he lost his finger and he said, "Just this way," and put another finger against it and lost a second finger.

It is all new. We are living in an accidental world. Last year there were about 100,000 deaths from accidents. And there are all those lost-time accidents that we know about, where men are just out part of the time—not deaths. You know the tremendous toll they have taken. What is this tremendous factor, the human nature factor? There is something peculiar about it that I sort of admire. It never changes, fundamentally. It is always on the side of endeavor. It is eternally tearing down and building up. It is never satisfied with things as they are.

I remember they had a Chicago fire back here about 1872, and after weeping over the ashes a little while they rebuilt the city. It is a fact that this city has been rebuilt twice since then, without any Chicago fire. That is because the people are always striving, always going forward. We are not going back to the hand loom, we are going to keep the power loom, but we are going to keep the safety devices so that life itself may be safe in the use of it.

There are two facts that enter in here. One is self-preservation. We have the airplane but we put a parachute on the pilot so he will be more safe. Along with the coming of these powerful things that are around us, there has been the development of safeguards for self-preservation.

There is a second fact: in the final analysis we have always more or less appreciated the sacredness of human personality. Whenever it has been disregarded there has been collapse and failure of civilization. There have been nine civilizations that have gone the way of dust and ashes. All of them have resulted from a failure to appreciate human personality. If we move forward and forget the other fellow, there is certain failure and desolation and collapse of the system to follow. There is no other way for it.

We are faced with a safety effort that has gone out in three directions to solve these problems. The first one has been on the physical side. It has been an attempt to solve the element of safety on the physical side. In other words, the forces of drive must equal the forces of control. That is, the force of control must equal the force of the drive. For all the power that you put in the back axle in driving forward you must have a braking power on the wheels so you can stop. Otherwise we would be involved only with the quick and the dead.

There is another element that enters and that is the mental side. There is a tremendous phase of this whole matter of safety that just lies in the consciousness of responsibility and of duty, to make people conscious of safety. You know that idea of making people conscious of something is a great idea. I remember hearing a story one time about an old grand-dad who had a long beard. His grandson was on his lap one evening, and the boy said, "Grand-dad, what do you do with your beard at night? Do you put it under the covers or outside the covers? Do you put it inside your nightshirt or outside your nightshirt? Do you put it in your pocket, or what?"

The old man said, "Go to bed and don't ask so many questions."

The old man went to bed. He put his beard outside the covers, under the covers, inside his nightshirt, outside his nightshirt, and in his pocket. The next morning he went down and had his beard cut off.

It was Dean Peterson of the Extension School who said only a few days ago that the problems of life are three. The first problem is making a living, the second is the problem of living together with others, and the third is living with yourself. This second problem of living together with others is the one that interests you in that subtle subconscious thought of your duty and responsibility toward others.

I was interested in some advertising of a great steam railroad recently, in which they told how their 70,000 employees were interested, consciously interested, in you as passengers. First of all for your safety, then for your comfort and your arrival on time. That is the idea, getting it into the consciousness of the people.

The Simonds Saw Company of Pittsfield, Massachusetts, have built a new factory without any windows. It is lighted, heated, and ventilated to make for the largest possible degree of safety. Mr. Swope comes with his plan for men and the employment of men to take away fear, to put into their lives and living the largest possible element of safety. Last spring I made an address before a company that was celebrating the eleven-hundred-and-forty-eighth day that had passed without a lost-time accident in their works. That is getting down to the consciousness of the men with the feeling of responsibility and duty. In the final analysis, the great test of life in all these things is the character test.

In that new book by James Truslow Adams, "The Epic of America," he remarks that the thing that enabled George Washington to make his accomplishments and that thing that made him independent was not his military genius but his character. That was the character test, that was the final test. By and large, the test of any age and every age is the character test. There is that something in human nature that makes a man willing to make sacrifices for the saving of life. In the final analysis that is the supreme challenge that comes to the National Safety Council, and that is something fine.

I remember seeing two pictures of the sinking of the Titanic. One showed the great iceberg and the Titanic, and underneath were the words, "The Supremacy of Nature; the Weakness of Man." Then there was a companion picture with the iceberg and the sinking Titanic. On the deck of the Titanic, as it sank, was a man by the name of William T. Stead, that great journalist of London. When they heard the screams of a woman who had been left, he gave orders to put back to the ship. He stepped back onto the deck of the vessel and gave his place in the lifeboat to this woman. Underneath that picture were the words, "The Weakness of Nature; the Supremacy of Man." That is, after all, the big appeal.

I am reminded of the policeman's little girl who found a pocketbook, and without

opening it, ran to the nearest policeman and said, "I found it, it is not mine," and gave it to him. When we finally catch something of that slant and courage and esprit de corps and validity that makes us say, "It is not mine to take a life; it is not mine to endanger others; it is not mine to make life harder or harsher for others," then this thing will grip our hearts and minds and actions, and you will carry to greater success your national safety work.

A little girl in Evanston heard that her pastor was going to have a birthday, and she asked her mother if she couldn't send him a remembrance. Her mother said, "Yes, dear, surely. I will get you a card." The mother got the card and told the girl to write her own message. The little girl wrote: "My dear Dr. Stewart: I hope you live all your life."

I hope you do.

ADJOURNMENT

Wednesday Afternoon Session

October 14, 1931

Gas Group

E. S. BEAUMONT, Chairman

The Peoples Gas Light and Coke Company, Chicago, Ill.

The session convened with General Chairman Beaumont presiding.

CHAIRMAN BEAUMONT: This arrangement of having separate Telephone and Telegraph, Gas, and Electric sessions is a result of rather a persistent demand on the part of some members of the executive committee to split up the sessions, for one of the days at least, so that the various members could get more out of a meeting devoted exclusively to their individual problems. This year's sessions are an experiment to ascertain the value of the idea. I hope the discussion will be lively and indicative of greater interest in this way. If it is, we will continue the arrangement perhaps; or, if it is not, we will probably go back to the former plan which consisted of three general sessions.

The first topic is of particular interest to the Chicago people at this time because of the fact that a thousand-mile natural gas pipe line from Texas to Chicago has just been completed and at the present moment arrangements are being made to turn the gas into the system by mixing it with manufactured gas.

The gentleman speaking on this subject comes from a territory where a similar change has been made, so he speaks from knowledge and experience in that line. I am sure that what he will have to say will be valuable to us who make such changes. Mr. A. A. Klinge, of the Public Service Company of Colorado, will talk to you.

The Safe Utilization of Natural Gas

By A. A. KLINGE

Manager Safety & Claims, Public Service Company of Colorado

Since the phenomenal growth of natural gas usage during the past decade is of itself proof that natural gas can be used safely, the question at hand must be simply one of *how* this safe utilization has been achieved and of how the safety factor can be increased. And before we consider how the work is being done, we must have some picture of the gas industry as it was only a few years ago.

Just prior to and during the World War, the gas industry found itself in difficulties. Few indeed were those who foresaw any great future for it. Density of population at that time showed a tendency to decrease; material and labor costs were rising rapidly with no corresponding increase in gas rates. The extension of street railway systems had introduced a serious problem of electrolysis of gas mains and services; street paving was beginning to spread an impermeable covering over any gas leaks which might occur and force leakage gas into lawns or basements.

Even more important than these physical handicaps were the problems in human relationships. The customers were accustomed only to the simplest of gas burning equipment; the gas fitters and troubleshooters were rule-of-thumb workmen, with fixed ideas of how work should be done and little patience with new ideas. The industry was moving at the top; beginning to stir with new ideas and the beginnings of great progress. But in the ranks of its employees there was stagnation, and the bare idea of educating the consumer in safe operation of new and complex devices was considered absurd.

Men Most Important

If I were to select two factors which have done most to promote the safe utilization of gas, they would be:

- (1) The careful selection of employees able to understand and operate new devices, and capable of passing on their knowledge to the consumers.
- (2) The effective training of these employees and, through them, of the consumers.

The problem is as simple as that. There are special hazards to be encountered in the use of natural gas. There is constant change and improvement in the design of gas using equipment; new conditions must be met in transmission and distribution. But given a trained, efficient, personnel these problems can be met steadily, economically, and safely.

The matter of selection in our own company has not proved specially difficult. Obviously unfit individuals are weeded out at the first interview, and a system of close and constant supervision, plus a readiness to eliminate promptly any individual unable or unwilling to adapt himself to our practices, has done the rest. The important factor has been the knowledge on the part of those hiring or supervising employees of the qualifications necessary for the job. In other words, each supervisor has constantly in mind a set of specifications covering the kind of man needed in his work.

The training program has been rather more elaborate, ranging from conference meetings and shop experiments to "dummy" calls designed to test an employee's ability to impart the necessary information to the consumer. Fortunately, we were able to install natural gas in several smaller towns before attempting to change over a metropolitan area to natural gas, thus having opportunity to select competent and reliable supervisors.

The Big Six in Gas Safety

Turning to the physical conditions necessary to the safe utilization of natural gas, there are six essential factors:

- (1) The supply must be continuous and reliable, both as to quantity and quality.
- (2) The pressure must be adequate and uniform.
- (3) Leakage must be kept at a minimum.
- (4) Appliances and their accessories must be capable of proper adjustment so that correct combustion may be obtained.
- (5) These appliances must be correctly installed.
- (6) Both employees and customers must understand the correct use of these appliances.

These six cardinal points cover a multitude of activities, some of which must perhaps be observed in all cases, others being dependent on local conditions. There can be no hard and fast rules, equally suitable in every city, town or village. However, a knowledge of what has been and is now being done elsewhere is unquestionably an aid toward correct solution, and it is for this reason that I offer some experiences of the Public Service Company of Colorado.

A Multiple Source of Supply

Practical application of these basic rules begins long before the natural gas reaches its destination at the appliance. Every effort must be made to insure continuity of supply and uniform quality. A sufficient gas reserve must be developed, enough wells must be drilled to supply the load. Adequate compressor station equipment must be provided. On the Denver-Anaconda line, a telephone system extends from Denver to the field, and hourly reports of pressures, wells in use, and similar operating data are supplied to a central dispatching point. The United States Weather Bureau at important load centers along the line are consulted three times a day

and a prediction of storm or cold weather calls additional equipment into service so that increasing demands can be met.

The line itself is designed to insure a continuous supply of gas. For instance, extra compressors are standing by to maintain pressure if others fail. When the line crosses rivers, as many as seven individual parallels are used, so arranged that any one may supply an uninterrupted and ample flow of gas. Men on foot patrol the line, watching not only for existing trouble, but for conditions which later might impair service. At the town border station where the natural gas enters the city distribution system, every precaution is taken to prevent the pressure regulating devices from failure.

It is true that many of these precautions are taken in the interests of continuity of service, but they are nevertheless safety essentials. When service stops, even for a second, pilot lights are extinguished, thermostatic devices open main valves, and the stage is set for tragedy.

Leakage—The Great Distribution Problem

Inside the city limits, the local company carries on equally intensive work. While the practical application of this work is toward the same end, the methods are somewhat more complex than those used in operating the transmission line. The explosion hazard in particular is of much greater importance in a thickly populated community than along the barren stretches traversed by the pipe line.

Much research has been carried on with the object of reducing distribution leakage. Always a matter of major importance to the gas fraternity, it becomes infinitely more so in instances where natural gas is introduced into a distribution system formerly supplying manufactured gas. The absence of moisture in the natural gas makes it "vapor hungry," and in satisfying this hunger moisture and oil are drawn from the joint packings of cast-iron mains, from meter washers and union gaskets. A shrinkage results and the volume of leakage mounts at a tremendous rate. Pits and cracks in the pipe, once sealed by the impurities present in manufactured gas, are opened, further increasing the leakage.

Fortunately, these possibilities of increased leakage were foreseen long before natural gas was brought to Denver in 1928. It was decided that the simplest solution was to saturate the natural gas with water vapor and oil to duplicate as nearly as possible the relative humidity which prevailed in manufactured gas. Provision was made to install saturating equipment at the major points of delivery to the low pressure distribution network, and this equipment was placed in operation at the time natural gas was introduced. The effect of this procedure on main leakage has been remarkable. No leakage increase has occurred despite a tremendous increase in load. In other situations where saturation was not employed, leakages have increased as much as ten times that normally prevailing with manufactured gas.

Leather meter washers and union gaskets were supplanted by composition rubber gaskets which do not shrink. In Denver, this change in material was started more than a year before natural gas was introduced, and during the past three years an inspection program plus response to leak complaints has eliminated almost all of the leather gaskets and washers.

A Rose by any Other Name

Despite every effort, all leaks cannot be eliminated. We had every reason to believe that there was no radical change in our procedure or equipment during the year 1928, when natural gas came to Denver—yet immediately following the change, leak complaints decreased by half. The cause was obvious—the almost complete absence of odor in the natural gas. The equally obvious remedy was to supply an odor—of equal intensity and as similar to that of the manufactured gas as possible.

Several materials were used in early trials but all had one or more drawbacks.

Some were erratic; some produced odors in no way resembling that of manufactured gas; some were too high in price. Finally a liquid was found which had the proper odor, was reasonable in price, and could easily be introduced into the gas stream. The necessary equipment was constructed and placed in service, and an immediate increase in leak complaints was traced to minor leaks indistinguishable with the nearly odorless natural gas but immediately apparent when the odor intensity returned to the old level. These being corrected, the leak complaints returned to the falling curve existing before the introduction of natural gas.

Electrolysis Survey

In addition to these two programs, the gas distribution department inaugurated a number of less extensive activities in the interests of safety. Considerable time and thought were given to electrolysis surveys, and a joint committee of gas, telephone and street railway men worked on this problem. This appears to be the only possible way of attacking this problem, the street railway men cooperating to secure the rail-bonding necessary to reduce electrolytic action, and the telephone company entering the picture because of underground conduits and manholes which may become filled with leakage gas. Study of this feature of the problem will immediately show that while the gas company has an obligation to hunt out and repair leaks, the telephone company and others having underground conduits or manholes also have a distinct obligation to carry on such tests of the air in their manholes as will serve to prevent asphyxiation or explosions.

Fortunately, adequate means of testing are available and if reasonable precautions are taken the danger from this source can be overcome. Several combustible gas detectors were purchased, and a periodic inspection procedure established where valve boxes, pits, and similar locations were tested for leakage. In parts of town where main leakage was suspected, a bar was driven into the street, opening a free path from the main to the surface, and the leak detectors were again employed. Gas service files were gone over and all old services listed, to be inspected and renewed if in bad condition.

Soil surveys were made to determine the relative degree of corrosive action in various parts of the city, and very close attention was given to mains and services in the bad areas. All gas services entering drug stores were inspected and it was found that the practice of dumping brine from ice-cream cans at the curb had caused much service pipe corrosion. As a remedy, all gas services now installed at such locations are protected by a casing of scrap pipe extending through the corrosive area. Use of coated or wrapped pipe has been adopted at an ever increasing rate.

Parallel to this program of hunting out and correcting conditions which may cause leakage, is the second main safety activity of the distribution department—that of maintaining adequate and uniform pressure. This necessitates frequent and extensive load and pressure surveys and a system of dispatching. As an example of the care taken in this regard, I might mention that whenever any district, however small, is shut off from gas service, every customer in that district is visited and every gas-burning appliance is tested before the return to service is considered complete.

On the Customer's Premises

Under the organization used in the Public Service Company of Colorado, the work of the gas distribution department ends at the wall of the consumer's premises, and from this point on all work is handled by the utilization department. This work includes such items as the installation of meters and regulators, connecting gas appliances sold by the company, and servicing all gas equipment in the customers' homes irrespective of make or agent. Since the fitters and trouble men of this

group have closer contact with the consumer than any other group, it is only logical to expect to find there a decided emphasis on the educational feature of safe utilization. If the distribution workman requires a Doctor's degree in safe practice, the utilization man needs a Master's—plus exceptional ability as a teacher.

A complete and detailed description of utilization activities would require more time than is available. Only the high spots can be touched, and these but briefly.

House Heating

One of the most important phases is that of residence heating. Since Denver is not an industrial center in the accepted sense, there were few opportunities for load building along these lines. It early became apparent, then, that the financial success of Denver's gas business hinged upon the possibilities of load building through residence heating. An intensive campaign was started in 1928 and is still in operation, a campaign which has increased the load from one gas-heated house in 125 in 1928 to one in five at the present time (1931).

Not least among the items contributing to such a growth was the development of residence-heating equipment which would provide safety. All the sales arguments which can be gathered together will have little effect if the service rendered is not safe as well as convenient. This was fully appreciated at the start of our residential heating program and the efforts to provide safety have never been relaxed. It has been extended to take in requirements at first unpopular with the customer but welcomed once they are understood. Among such items are requirements for chimney linings which protect brickwork from condensate, standards for piping which are slightly more expensive but once adopted insure highly reliable service, and flat refusals to connect improper or inadequate equipment.

Customer Education

Hand in hand with the program of safe equipment, there has been carried on a system of customer education. The real test in this case was not whether the equipment could be operated safely but whether the customer using it could operate it safely. Many old ideas and practices had to be eliminated. For instance, it is common practice to turn on the top burner of a range, reach for a match and then finally ignite the gas. A house-heating burner, operating within the confining walls of a furnace or boiler, using gas in vastly greater quantity, cannot be operated in such a nonchalant manner. A definite procedure must be followed or disaster may result.

Tracing through the steps involved in the installation of residential heating, we find the safety idea predominant in nearly every one. When the salesman completes the sale and the installation reaches the fitting shop, a measure man visits the customer's home, carefully inspects the furnace to see that no cracks or holes exist which might allow products of combustion to foul the circulating air, investigates the flue to see that it is adequate. Often the cemented joints in the furnace coating are not tight, and the furnace must be re-cemented before gas burning equipment can be installed. By the time the measure man leaves, the customer is usually in possession of expert knowledge as to the actual condition of his heating plant as it stands.

After the measure man has completed his inspection and made his report, the actual installation begins. The heat-absorbing surfaces of the boiler are scrubbed with a wire brush and washed down with a hose, a procedure which not only improves the efficiency of operation but sometimes uncovers defects previously overlooked. The smoke pipe is taken down and cleaned. The chimney flue is inspected by means of mirrors and lights, and loose scale, soot, etc. removed from its walls. Where no soot pocket is provided at the base of the flue, one is made and a chimney cleanout installed so that mortar, leaves, etc. which may accumulate in the chimney can be removed. The importance of the chimney clean-out as a safety factor

cannot be overestimated; there are people alive today who owe their lives to this simple precaution.

When the installation is complete and adjustments made, the damper is wired in the correct position and a small tag attached advising the customer that no change should be made. An instruction sheet is fastened to the basement wall close to the furnace and in a conspicuous position. This card explains in simple language the proper method of lighting the furnace. Every effort is made to prevent any misunderstanding. The three valves which control the burner equipment—pilot, main burner shut-off, and thermostat-controlled valve—are tagged with brass numbers corresponding with those given on the instruction card. A lighter tube is included in the installation to further eliminate hazard in lighting the pilot. An enameled sign is placed on the fire door, warning the customer that the main burner must be turned off before pilot light is lighted. The instruction card further advises the customer to inspect the pilot daily and the chimney clean-out weekly. Instructions relating to the chimney clean-out are repeated on a linen tag attached to the clean-out handle.

Follow-up Instruction

Shortly after the installation is completed, an inspector visits the job and checks the installation and adjustments. He then learns which member or members of the household will operate the plant. If the man of the family assumes this responsibility, the inspector frequently makes another call in the evening.

The instruction given may be divided into three steps. First, there is a general explanation of how the system works, the inspector explaining how the valves are numbered for identification and the reasons for a set routine in operating. Next, the actual starting procedure is carried out by the inspector as often as necessary until the customer has learned the proper sequence. The third step is that of having the customer run through the sequence until he is fully familiar with it and confident of his ability.

When the inspector is convinced that the customer can turn on and off the equipment and understands the necessary precautions for pilot and clean-out, he secures the customer's signature on a form acknowledging the instruction and accepting certain responsibilities in regard to pilot and chimney. Then, two or three days later, the customer is called by telephone and questioned to see if further instruction is desired and the installation satisfactory.

Finally, perhaps ten days later, a form letter is sent out welcoming the new customer into the ranks of satisfied gas users. The name of the person who has received instruction is quoted in this letter, with the request that if further instruction is desired or some other person is to operate the equipment, the company be called at once. The rules for safe operation are again referred to in this letter.

While this procedure may seem unnecessarily complicated and expensive, it has paid handsome dividends. The customer becomes self-reliant—sometimes a trifle boastful—and this not only makes for a more finished, reliable operation of the equipment but is a distinct sales asset. It is also a vital factor in reducing the expense of future free service, since less assistance is needed and since the customer is apt to detect minor trouble and have it corrected before it becomes serious. In September 1930, only one customer in five asked for turn-on assistance as compared to almost 100 per cent requests four years before. I can hardly emphasize this educational feature too strongly. Safety is a matter of men rather than material, and the customer's thorough understanding of his equipment is a safety essential.

The Teacher Taught

Since the education of our customers must be given primarily by our workmen, it was necessary to start the program with them. It was essential that a common understanding of the various problems exist among these men and that a common

method of instructing the customer be used. This was accomplished largely by conferences with groups of eight or less. During these meetings each type and class of appliance was studied, a diagnosing technique developed, and a routine of customer instruction agreed upon and adopted. These conferences were supplemented with practice on test cases and by a "sampling" with "dummy" calls.

Leak Survey

Serious as is a leak in the main or service outside the house, it becomes even more important if gas escapes into a closed space. An extensive leak survey was carried on by the utilization department in conjunction with that already mentioned for the distribution department. Every building in the business district was visited, the basement carefully tested with combustible gas detectors, and special attention paid to basement walls adjacent to the main and service pipe. Show window bulkheads, small rooms and closets and other places where gas might collect were investigated. At the same time all long-screw fittings were replaced by dresser-type couplings.

Where the service pipe entering a building appeared to be in questionable condition, the distribution department was called in for assistance. All service entrances were inspected and if not properly and tightly sealed into the wall were made gas tight. There were, of course, many minor corrections such as relocating meters or removing unused house piping.

Following the inspection of the business district, all community centers in the residential districts were visited. After the city was finally covered, a routine schedule was developed so that inspections could be assured at reasonable intervals. For example, public buildings such as lodge halls, picture houses, stores, telephone exchanges and other buildings where large numbers of people congregate, are now inspected at least once a month. These inspections are very thorough, and while usually barren of direct result the potential stakes are so large that we consider the slight cost of this safety precaution well warranted.

Cooperation with Local Authorities

Comparatively stringent rules have been drawn up to cover gas appliance installation. The use of gas appliances in bath or toilet rooms is prohibited. Flexible tubing may not be used except as pilot or lighter tubes or to supply mobile appliances. Hot plates and space heaters are definitely excluded from classification as "mobile."

Close cooperation is maintained with the City Inspection Department and the Fire Prevention Bureau of the Denver Fire Department. Before any new company rules are introduced or old ones amended, they are discussed with these groups so that the resultant practice is mutually satisfactory. These civic agencies are of great value in helping to satisfy consumers that safety precautions are really necessary and not merely a whim of the company or a device to secure additional revenue. We have always found the city authorities more than anxious to protect the lives and property of the citizens and always willing to keep abreast of any new discovery or development.

One factor which is always present is that of the unscrupulous or at best irresponsible dealer or workman who sells or installs improper, often unsafe appliances which the company is later expected to service. Our cooperation with city authorities is very useful in mitigating the consequences of such installations. Where any such appliance is found and our men consider the conditions dangerous, the city inspector is notified and almost always directs the company to discontinue service until the hazard is corrected. Generally speaking, the city inspectors have required other agencies to install appliances of a quality and in a manner comparable to the standards set up for our company.

Testing New Appliances

All gas appliances sold by the company are subject to test by the utilization department test laboratory. Every new type of gas appliance is carefully scrutinized to see that it is satisfactory from an operating viewpoint. Various tests are made to determine the relative safety of operation, and in some cases appliances are rejected because of pilots hard to light or some similar feature which might make operation difficult for the customer. Insofar as possible, only those appliances carrying the blue star of the American Gas Association are recommended. Even some of these are not suited to our needs, since the high altitude of Denver has a material effect on capacities and we frequently find that safe operation can not be obtained with sea-level rating.

First-Aid

Very detailed attention has been given to the matter of instructing employees in first-aid. A definite plan of instruction has been developed whereby every man in the gas department has been trained in first-aid work, carries a card to show that he has proved himself a safe man to work with, and is regularly re-examined to maintain his standing. Our company has been fortunate in obtaining the assistance of the U. S. Bureau of Mines in carrying on this training. Credit was given on the company plan to those employees who successfully completed the Bureau of Mines training course, and a large proportion of our men now hold the Bureau of Mines certificate in addition to that awarded by the company.

Perhaps it may seem a rather far step from the subject of this paper to discuss first-aid training. Actually, we find that the study of first-aid is closely allied to that of accident prevention, and it is a short step from the employee protecting himself from accident to his assumption of responsibility for preventing accidents to fellow workmen and the public generally. It is noteworthy that the frequency of public injury and damage claims appears to vary directly with the employee accidents in the department concerned.

A Set of Specifications

With these facts in mind, perhaps we can draw up a set of specifications for the safe utilization of natural gas. The first of these must be a willingness to face facts. Under certain conditions natural gas is a high explosive and must be treated as such. Carbon monoxide is almost always present in the products of combustion, and asphyxiation may result unless adequate vents are installed and maintained. Condensate does form from flue gases and will damage brick work and mortar, possibly causing flue stoppages unless precautions are taken. These facts cannot be met by closing the eyes and hoping for the best. They can be met by proper installation, operation and maintenance. We are working with powerful forces, dangerous when uncontrolled but safe and useful so long as they are controlled.

The second specification must be a policy of frankness toward the customer from the time of first contact with our salesman. It is his right to understand the hazards to which he and his family will be exposed and the routine he must follow to operate his plant or his appliances safely. This does not mean frightening the customer, and need not make him hesitate to use gas service. The known hazards of motoring are far greater—without keeping people off the highway.

And, since the principal point of contact is through the company's employees, our third specification must be the careful selection and thorough training of these employees. In selecting them, I would look for thoroughness, active curiosity, and the man's ability to convey his thoughts accurately in every-day language; these in addition to the usual neatness, health, and unfailing courtesy. In training, I consider the conference method invaluable, since each employee thus comes to understand the problems himself and at the same time develops the ability to convey the knowledge to others.

The fourth specification is a constant war against leakage. Modern devices such as the combustible gas detector and the use of an odorant in the gas, permit us to locate the leakage. The rest of the story is continuous vigilance and maintenance. I know of no single action that will solve this problem; it is a matter of keeping constantly at it.

The fifth specification is controlled and reliable operation of the transmission and distribution lines. This requires adequate regulating stations and continuous vigilance. It is largely a matter of organization and of high service standards.

The sixth specification is correct appliances, correctly connected and adjusted. It requires experiment and testing; engineering skill must be employed in many installations. It requires cooperation with civic agencies and underwriters. It requires inspections and quick handling of service calls.

Given these six specifications, plus initiative and interest on the part of supervisors, natural gas can be utilized safely as well as economically and conveniently. It is a big job, sometimes a hard job. But it is an interesting one, and in my opinion, one well worth doing.

CHAIRMAN BEAUMONT: I am sure the very detailed explanation of your experience in Denver has been helpful. It seems to bear out the thought that some of us have, that while there are certain problems in the utilization of natural gas, or even of manufactured gas for that matter, if the management of the companies realize the difficulties that may be encountered, take an intelligent attitude toward them, and lay a definite course of action to see that the public uses it properly, much good can be accomplished.

One remark was surprising, that from one house heated by gas in 1928, the number in Denver has been increased to one in five in 1931. That certainly is an indication of the distance we can go in this field.

I am sure that some of you have questions or comments to put to Mr. Klinge. S. M. HOFFMAN (Safety Director, Derby Gas & Electric Company, Derby, Conn.): Do you find an accumulation of oil in the meter after natural gas is used? Is it explosive?

MR. KLINGE: Accumulation of oil in the gas meters? No, you find a complete absence; if the natural gas is left in its proper state, it dries everything. But we introduce, as I said, oil and vapor, that is, water in its vaporized form, atomized, which picks it up.

CHAIRMAN BEAUMONT: You use the straight natural gas?

MR. KLINGE: Yes, we use it from Texas.

CHARLES L. MEE (Safety Engineer, Public Service Co. of No. Illinois, Chicago, Ill.): Mr. Klinge spoke about the use of precision instruments such as the combustible gas indicator for making surveys of manholes in determining concentration of gas present. I wonder if there are any people here associated with electric utilities or with combination gas and electric utilities who have the problem of inspecting their manholes and who have tried the use of something similar to the miner's safety lamp for that purpose.

CHAIRMAN BEAUMONT: Mr. Scott, do you run into anything like that in your properties?

FRANK SCOTT (Supt. Inspection, Hamlin & Company, New York City): We have just the gas companies, but the chemical plants are working on ten thousand manholes, using a device, not a detector lamp, but a device like several on exhibit downstairs.

CHAIRMAN BEAUMONT: Sort of quantitative detectors by chemical or explosive means.

MR. SCOTT: They have been conducting a series of tests in large open spaces to determine just what would happen under certain conditions, but I have not been personally concerned in it. I just know that it has been experimented upon.

MR. MEE: I am familiar with the device that Mr. Klinge mentioned, a precision

instrument which is rather expensive. I think the companies in Pittsburgh are using such an instrument for routine survey, but they also use a safety lamp where a man makes simply a casual inspection of a manhole, where he makes an inspection without doing any work, and the question is whether it is advisable to get some small and handy, relatively inexpensive device for that kind of a check.

MR. KLINGE: You speak of a casual inspection. There is no such thing in natural gas.

MR. MEE: I mean by casual inspection, when you send a man out to determine whether there is, for instance, one or two cables in a manhole.

MR. KLINGE: My experience has been (and it has been based on some litigation) that to prove that to the courts the responsibility is that of the gas companies. When they have been definitely informed there is a leak existing in that gas company's or telephone company's manhole, then the responsibility is equal. The telephone company, knowing that the gas is in the community, knowing the possibilities of leakage and that it will follow the line of least resistance and accumulate in a manhole, are responsible for reporting it.

The particular device you mentioned costs about \$200. The old safety lamp, it has been my experience although I may be wrong, is not worth a continental when introduced to find natural gas which goes into a pocket.

PAUL R. KUHN (Penn Central Light & Power Company, Altoona, Penn.): How do you test your combustible gases, those gases obnoxious to workmen, and injurious.

MR. KLINGE: Well, in natural gas we say that raw gas has no carbon monoxide in it. We don't test it to see if it is injurious to the workmen for these leaks are injurious to everybody.

MR. KUHN: Isn't it possible for an amount of combustible gas to exist that would be explosive and you wouldn't have an indication of it on the indicator?

MR. KLINGE: It may be possible but it has not proved so. It is a very sensitive instrument. The gas is given an odor by which it can be detected; a combination of wet linoleum, rotten eggs and manufactured gas is what it smells like.

JOHN J. BARADA (Safety Director, Laclede Gas Light Co., St. Louis, Mo.): Just to clarify a point that has been brought up here, I don't think any of the appliance companies would ever attempt to sell any type of safety lamp for the detection of explosive gases. That is out of the question, and I don't think any of the indicators on the market will indicate anything but explosive gas. You can get gas that will knock you out, make you sick, that won't explode but will put you to sleep. I see Mr. Glidden of the Bullard Company. He may be able to tell us something.

G. M. GRIMMER (District Manager, E. D. Bullard Co., Chicago, Ill.): There are, I think, five different kinds of indicators that have been developed for that one purpose, the detection of explosive mixtures, the various hydrocarbons, and, of course, natural gas is one of those as is also manufactured gas. These indicators will detect all of the gas in fair quantities.

There are some gases which can be smelled before detection equipment will indicate it. However, when we speak of a mixture of gases such as is used in the Chicago area, or manufactured gases such as most of us are familiar with, we then have the introduction of carbon monoxide, which is toxic, and in that case equipment for the detection of it is not necessary.

As for the use of the safety lamp, the question was brought up of its use for the detection of other than explosive gases. Where you have a deficiency of oxygen, the presence of carbon monoxide, or a large quantity of hydrogen, the lamp goes out and gives you an indication of those conditions.

Whenever a problem comes up to determine what should be used, all the variables must be taken into consideration and the types of devices to be used should be investigated before an inspection is made. As has been mentioned, the manufacturers are very careful in investigating what should be used and the experiences of

companies who have used the equipment of various types mentioned are probably of greater value than the theoretical ideas of many of us not using them.

CHAIRMAN BEAUMONT: Are there any other questions?

C. HOWARD STEWART (Ass't. Treasurer, Laclede Gas Light Co., St. Louis, Mo.): I was interested very much in Mr. Klinge's article which went into considerable detail and was very complete.

There is one question and that is in connection with finding appliances unvented, installed by some outsider, a plumber, for instance. I refer to such appliances as water heaters. We have even found automatic heaters without vent pipes. We have used certain measures to correct this, and in cases where the service was cut off we have got into such trouble that we had to restore the service.

I know you referred to that in your article. Are you protected by any ordinance in Denver under such conditions?

MR. KLINGE: I noticed those conditions some years ago in St. Louis, with your Mr. Gallagher with whom I had the pleasure of going around when we originally started our housing plan in 1921. We found the conditions in St. Louis surprising, as they are in other cities. We found them so in Denver. There were accidents reported, three or four found dead in bathrooms, with litigations of all kinds. We set out and cut off the gas. We let them howl. They howled so much that when they took it up with the authorities a test case was asked for. The city inspector usually comes up from the ranks of a tinner or a plumber or something else and is labeled an inspector. If you can get to him first, there is no doubt in my mind that you can get somewhere. We in no case will admit an apparatus into a bathroom. We will cut it out if we find one and make them howl. If they install it again, the inspector will report it, and then we take it up with the authorities, or have their insurance cancelled.

MR. STEWART: Some cities are protected with a city ordinance that gives them that privilege, but that is not our situation. I remember distinctly a case where we cut off a service and we were threatened with so much litigation if it was not restored at once that, after consultation, we decided it was better to restore it.

MR. KLINGE: The law distinctly states that where a hazard exists, it is to be removed. The customer is a layman, the inspector an expert, and the law so holds him, regardless of what the layman wants to do. I would cut it off and test the case. We had to test cases.

JOHN M. SANDEL (Eng., Employers Liability Assurance Corporation, New York City): One of the gas companies that we insure is a distributor of natural gas. Some time ago, pressure regulators of the producing company's lines failed at the point where they connected with the lines of our insured, and the result was that the increased pressure caused explosions in two buildings. In one case the property was damaged and in the other case they had property damaged in addition to fire.

Since then, our company has placed men on the job of inspecting and checking up on the pressure regulators hourly, with the hope that a similar thing will be prevented.

I am wondering if Mr. Klinge has found the same thing necessary, or is there something else that his company uses that will prevent this, something more reliable and more satisfactory.

MR. KLINGE: We have individual regulators, high pressure lines circling the city that feed in at given points, with a regulator at every point and at every place of business. It goes around the city with a 50-pound pressure, down to six.

Denver is rather a peculiar city, with a brick industry here and probably a small house or domicile right next to it, each demanding different pressures, so we don't depend on that.

CHAIRMAN BEAUMONT: Mr. Buswell, haven't you something to contribute?

J. M. BUSWELL (Safety Eng., San Joaquin Light & Power Corp., Fresno, California): In regard to the testing of manholes, it becomes incumbent upon the com-

panies, all of them, wherever they are, to watch their manholes and make frequent enough tests to determine whether they are getting gas in them or not. When I say gas, I mean any kind of gas, because there are localities where you may get sewer gas as well as localities where you may get marsh gas and gas from the company's mains. Obviously enough, in a community operating on artificial gas for a good many years, switching over to natural gas dries out the mains as the speaker has said, and the service meters, with the result that leaks develop, which is one of the biggest problems you have—to tighten up the mains.

As has been said, there are several instruments for testing manholes, but you must look out for the different kinds of gas, not only explosive gas, but maybe gas injurious to the workmen going into the manholes. It has been our practice for a good many years to test all manholes, not only for explosive gas, but for non-explosive gas that does not contain oxygen for respiration.

Next, the manholes are always blown out, first, purged, and kept purged, kept ventilated while the men are working. If any of the men have to go into a manhole immediately, because of some serious emergency, they go into it with gas masks of two types, the canister type or the wind-blown type supplied with a pump.

In regard to the last subject brought up here, we have no trouble at all in any of our communities getting the authorities to establish ordinances that require proper ventilation and proper installation. We simply go to the city authorities and lay the case before them and show exactly what the consequences are in a large proportion of cases of such violations and we say how serious the results can be on even a small percentage of improper installations. We have no trouble in convincing them that these ordinances should be passed requiring any plumber or contractor or dealer to make the installation in a manner we consider proper. Some of those ordinances even go so far as to prohibit the installations to be made by other than licensed or certified dealers or contractors in the community.

CHAIRMAN BEAUMONT: I think you did say you do test for noxious gases, but you didn't say how.

MR. BUSWELL: There is a detector put out by one company that is very satisfactory, and then we use the safety lamp test. The lamp, as this gentleman said, will be extinguished if there isn't oxygen.

CHAIRMAN BEAUMONT: Are there any other questions?

CHARLES L. MEE (Public Service Co. of No. Illinois, Chicago, Ill.): Probably Mr. Kuhn's question about the use of something better to determine whether you have noxious gases present has not been quite answered, and I don't know the answer, myself, except I do know that there is on the market such a thing as a carbon monoxide detector ampoule which may be broken and suspended in the atmosphere for a period of time after which it will acquire a color the depth of which is dependent upon the concentration of carbon monoxide in the atmosphere. That color then may be compared with a color chart which tells what the concentration is and how long it is possible for a man to work in that atmosphere.

MR. BUSWELL: The color detector has not been entirely satisfactory, for sometimes it doesn't work. The comparison of colors is not always true. We have experimented with that method and have discarded it, or at least we never took it up. We tried it and found such unsatisfactory results we never did accept it.

CHAIRMAN BEAUMONT: I am sure that is of interest to everybody.

THOMAS E. GIBSON (Safety Director, United Gas System, Houston, Texas): Our conditions down south are somewhat different than those in the northern part of the country. Most of the public utilities down there regardless of whether it is a telephone company, a light company or a gas company, in working in their manholes, instead of using an indicator use blowers, unless they are looking for some leaky, gaseous condition that has perhaps been called to their attention. Before they allow a man to go into a manhole, they use an air-blower, the kind of blower the light companies use on motor light fans. The other companies that don't have electric

connections in their manholes use a hand tippie, with two-inch holes or exhausts, and they drop this into the bottom of the manhole, holding it there for about two minutes before they let the men go down. Most of the men work in gangs and if they have any suspicion, they tie a rope or a safety belt on the man entering the manhole. They always have another man directly outside, watching this fellow working below.

We have quite a problem regarding leaks. We have the combustible gas indicator to detect most of those leaks that are associated with manholes. Of course along streets where mains are located we make what is called the bar test.

As a further illustration, all of our meters are placed on the outside; all our piping is also placed on the outside. We have taken over several old distributors who formerly used the manufactured type of gas and found they had pipes running through floors, through basements, and because of that we had some disastrous experiences due to electrolysis and other corroding conditions, by the piping being so laid. We are making it a rule in our organization to check up on conditions of that kind and take out all piping and put it on the outside of the buildings, to relieve us of as much responsibility as possible.

MR. KLINGE: In connection with the practises down south, I originally came from Alabama. I went back there last year when they put in natural gas. It is quite true, you have different conditions; different labor conditions, too.

CHAIRMAN BEAUMONT: I am glad Mr. Gibson made his remarks, because I confess the piping on the outside of the house would be a new feature to me.

MR. GIBSON's reference to blowing out the manholes was right along the lines mentioned by Mr. Buswell, but possibly we are taking too much for granted and that is the reason for this discussion.

MR. BUSWELL: It is a fact that all of our trucks are equipped with blowers. I didn't mention the life-line proposition. No man out our way ever goes into a manhole without a life-line and a man to watch him from the top.

ROBERT L. BROWN (Safety Inspector, Commonwealth Edison Company, Chicago, Ill.): I should like Mr. Klinge's opinion of the proper procedure when another utility company reports the presence of gas in their manhole.

MR. KLINGE: The telephone companies make regular inspections. Our telephone companies turn in a list of ten or fifteen manholes every month and we immediately proceed to find the leak. It may be a mile away and it may be difficult to find, particularly if it is winter time. We ferret out the leaks, however, as quickly as possible and repair them. We work with the telephone company officials.

R. F. HEALEY (Safety Eng., Commonwealth Edison Company, Chicago, Ill.): Our company tried some of those ampoules several years ago through a chemist who took an analysis of the contents of the manhole. We found after a number of experiments that it was not satisfactory. The discoloration wasn't sufficient to guarantee any degree of success in using that particular indicator. We also used a canister indicator which was not successful.

We have in Chicago a number of toxic gases other than the natural and manufactured gas, and these, while not explosive, are dangerous to workmen who must necessarily work under those conditions to keep the servicing of the community in order. That is one of the chief hazards we have. The introduction of gasoline through leakage of tanks in the filling stations, and the failure more or less of some of the dry-cleaning establishments to keep the safety valves closed in their tanks and so allow only a certain amount of their naphtha to escape into the sewer at a given time, have also introduced another hazard into the underground system, that must be considered and dealt with because it presents a serious hazard.

CHAIRMAN BEAUMONT: What test do you make for noxious gases?

MR. HEALEY: We are trying to find something that is satisfactory. The only ventilation we found satisfactory in a case of that nature is to use what we call a six-inch blower, which is a gasoline-driven pump which introduces into the manhole a

constant stream from a six-inch pipe, giving a great deal more air than you would otherwise get through just the ordinary ventilation. Here in the north, where we have thousands of manholes, it would be impossible to put a fan in every hole, as Mr. Gibson does.

At each of these manholes we place a sign which forbids the men to enter the holes without first consulting the men at the office who are in a better degree informed as to the chemical content of those manholes.

R. P. PRIEST (Supervisor of Safety, Charles H. Tenney & Company, Boston, Mass.): In connection with this inspection of manholes, I thought I might give the results of some recent tests that we made.

You may know that in 1930 the Bureau of Mines, in cooperation with the Edison Company of Boston and also the gas company there, made a thorough survey of all the manholes in Boston. There is a report of the Bureau of Mines on that survey, which is available to anyone who asks for it. Also, the Massachusetts Safety Council recently appointed a special committee to investigate this very question, and the report of that committee is also available.

MR. HEALEY: With the introduction of natural gas mixed with the manufactured gas, will there be a greater hazard or a lesser hazard from gas leaks? I mean by that, is it going to lighten the present manufactured gas so it will remain in the bottom of the manhole or will it serve to lighten it so that it will present less of a hazard by thinning out the gas.

MR. KLINGE: The old manufactured gas had a troublesome feature for men working in it. It had a strong odor, characteristic of coal tar gas.

As I said, in the introduction of natural gas, we introduced it into various sections of the city, into segregated areas of, say, 61,000, 10,000, 20,000, cut off and isolated entirely from the artificial gas sections. We bled the pipes and it was quite a publicity stunt. We attached a ten-foot pipe to the main and set fire to it at night and bled it till the natural gas came off. We do not use a mixture.

THOMAS E. GIBSON (Safety Director, United Gas System, Houston, Texas): I understand that they are going to combine the natural gas and the manufactured gas in the mains. I wonder if that is being done by any company with representatives here?

CHARLES L. MEE (Public Service Co. of No. Illinois, Chicago, Ill.): I can't tell you much about the process of mixing. I believe the process of mixing is being held by the Peoples Gas Company and our company.

MR. GIBSON: What proportion?

MR. MEE: Forty-five artificial gas; fifty-five natural gas.

MR. GIBSON: Is there any process?

MR. MEE: I understand there is a special mixing process, but I don't know anything about it. I think probably you could get the information from the Peoples Gas Company, probably from Mr. Bowman.

W. O. HINCKLEY (Supt. of Transportation, Peoples Gas Light and Coke Company, Chicago, Ill.): Mr. Chairman, I don't know what the process is, but the Distribution Department is the department from which it can be secured. They have special machines for the mix.

MR. BUSWELL: On account of the interest taken in this manhole ventilation proposition, I should like to sum up what we believe to be a safe practice. You are interested in knowing if you have a toxic gas in your manhole—only interested—but you are very much interested in knowing whether there is an explosive gas in it or not, particularly from your gas mains, and so you test for that, as an explorative matter, but so far as working in the manhole is concerned, you blow it out and purge it and keep it well ventilated and the man down in the manhole has a life line.

CHAIRMAN BEAUMONT: One of the gentlemen asked how far away the blower is placed.

MR. HEALEY: We take an extra length of pipe and set the blower one length of

You are naturally interested in the manufacture and care of tools in the fields and in storage. The nature of live line maintenance work is such that the greatest safety precautions must be observed in the manufacture of live line tools. Obviously, great care must be exercised in choosing a suitable wood for use in the handles of live line tools. Maximum tensile and compressive strength combined with minimum weight are usually the deciding factors. Other factors are the ability of the wood to absorb the oil treatment, the straightness of the grain and the susceptibility of the wood to kiln drying without deterioration. Naturally only hard woods can be considered. The use of soft or sap woods presents a special problem of kiln drying to effectively eliminate sap. The tools proper should be made of either high grade commercial brass or bronze, depending on the strength required. They should be designed to include a factor of safety between four and five to remove the possibility of failure.

Sitka spruce has been found to be very desirable for use in live line tool poles as the ultimate tensile and compressive strength is comparable to that of white oak. The weight per cubic foot is approximately one-half that of oak. Sitka spruce is usually straight grained, is practically free of knots and it responds very well to kiln drying and to the oil treatment. It is easily procured in either vertical or flat grain lumber.

The poles should first be cut to size after which they should be kiln dried. It is particularly desirable to laminate poles for live line work because of the added strength, stiffness and freedom from warping, which this gives.

For maximum strength and stiffness, the most desirable procedure would be to glue a vertical grain section and a flat grain section together, which will insure equal resistance to bending in all directions.

Care must be taken in the selection of a suitable glue. Only such glues as are derived from animal matter are acceptable since any mineral matter contained in the glue would act as a conductor.

After the poles have been properly laminated, they should again be kiln dried to extract any moisture which has accumulated from the gluing operation. The last kiln drying operation will require from one to two hundred hours at a temperature of approximately 100 degrees F. The length of time being governed entirely by the size of the pole. They should then be immersed in a hot bath of vegetable oil for a period which will insure complete penetration of the oil.

The pole should then be coated with a good quality pole preservative, immediately after being removed from the oil bath.

The desired tools should then be fitted to the poles, after which two additional coats of pole preservative should be applied.

It is highly desirable to have a completely equipped high voltage laboratory for testing all poles before shipping. Poles treated in the manner described above should be capable of withstanding a test of 75,000 volts per foot for a period of five minutes. For the greater part, carefully prepared poles should be capable of withstanding voltages ranging between 75,000 and 100,000.

Poles showing any indication of fuzziness should be rejected because of the tendency of the fuzziness to increase with use in the field. While a fuzzy condition of a live line pole can be satisfactorily detected by feeling, it is recommended that a suitable millimeter be used to record the actual amount of leakage.

Where special crews are assigned to live line maintenance work only, it is necessary that careful thought be given to the selection of design of the truck to be used for transportation. The first consideration is the number of men that will probably be used in the crew. Second, the weight and number of tools to be carried. Third, the precautionary measures in properly protecting the tools from road vibrations, contact abrasion and exposure to dampness.

Ordinarily, the live line maintenance crew will consist of a minimum of two linemen, two groundmen and one foreman. The crew is isolated most of the time and a great distance from headquarters, and comfortable seats should be provided for use

enroute. A space should be allowed for men to properly store their valuables while at work, with proper space for lunches and other necessary refreshments to be used in the field. Proper space should be provided for rain coats, rubber boots, rain hats and other emergency clothing that may be used when the crew is some distance from its base. Each man should be allowed a definite place to hang his personal tools, such as climbers, belts and other tools for which he is directly responsible.

The truck should be a minimum of two tons beyond the body allowance weight and designed for at least a maximum speed of 40 miles per hour. This speed is sometimes necessary in getting to an emergency job to maintain service. The construction of the body should be quite similar to the standard transmission and distribution line crew construction trucks, with proper facilities on each side for storing and segregating the material necessary for the majority of jobs encountered.

Separate compartments should be provided for all rubber goods with a space especially designed, either in the roof of the cab or under the roof of the body, to store blankets, flattened out and not rolled. Over the roof of the truck should be six aluminum tubes, a minimum of four inches in diameter, with plugged removal cap in one end of each tube, of a proper length to store the longest and heaviest link sticks and poles. Aluminum is specified because of its light weight and durability.

Great care should be exercised in the proper protection of tools while in the field against dampness and abrasions. Waterproof bags should be provided when tools are removed from the truck, but not in use. This prevents the collection of moisture and dirt, which if not removed, may cause a serious flashover. Periodic examination of all equipment should be made in order that no unsafe, unreliable tools will be allowed on the truck. When in storage for any length of time, tools should be kept in a horizontal position, properly supported, to prevent warping in dry storage where constant air circulation and temperature are maintained.

In the selection of a crew for live line maintenance work, the average well trained lineman can be easily developed for this special work, but special effort and care should be given to the selection of a foreman. He should be chosen with high rating in the following:

- (a) Experience.
- (b) Temperament and general fitness.
- (c) Habits and judgment.
- (d) Appreciation of responsibility for the safety of the men under his supervision.
- (e) Be of proper age.
- (f) Be mentally and physically fit for the work.
- (g) Be experienced and qualified.
- (h) Have a good reputation for carefulness and sobriety.

In conclusion, the use of live line tools has assisted us in improving our public relations in that we can maintain continuous service. It has protected our men, as has been stated by many prominent engineers, in that with live line maintenance tools the lineman working with such tools, regardless of voltage, has more protection than he does on the lower voltages with our present rubber goods. With live line maintenance tools, the lineman is never in contact with the conductor. All chances of puncturing are eliminated, serious and minor outages are eliminated, the hazards of working with artificial lights are eliminated. Also, in the hazard of working on supposedly dead lines, the man using hot line maintenance tools is always protected. There have been more men injured on supposedly dead lines than there ever were on energized so-called high tension lines.

Personally, in fifteen years of active utility work, I know of but one fatal accident to a workman while using these tools, and then he was at fault in using the wrong equipment.

CHAIRMAN DOELLER: Thank you, Mr. Webb. I think you will all agree it is a very excellent and thorough paper. We are ready for discussion.

G. E. BILWIRTH (Safety Director, Twin State Gas & Electric Company, Bennington, Vt.): We are using live line maintenance tools on 33,000. Is it necessary for the workers to wear rubber gloves while doing this work. The reason I am asking this is that a short time ago we put a new rule into effect governing the use of rubber gloves, that the linemen shall wear rubber gloves while on this work.

A. A. OLDFIELD (Safety Director, Wisconsin Power and Light Co., Madison, Wis.): The answer to that question would be, no. Perhaps it would be interesting to the members to hear that we have been using hot line tools for some time. We don't give credit to the manufacturers entirely for the development of hot line tools. We feel the linemen as well as the foremen are to be credited as much as the manufacturers in developing the tools.

In regard to instructing the men in the use of these tools, we feel it is a matter that must be gone into thoroughly. Our procedure is as follows: First, the men should use the tools on straightway work on low voltage lines. Then we feel the next step should be in the use of taut lines depending upon low voltage lines. We feel they should practice on such lines as 66, 113 pounds, and then as soon as they become proficient on those, we put them to work on the 33,000 volt carriers, where we feel they should be well supervised and where the work should be okayed by a supervisor.

We also think it a wise thing to develop small crews of 15 or 20. As a general proposition, we found that with just one crew of this size developed they became so proficient that the other men became jealous of them, which put them in rather a peculiar hole.

When we first started the use of hot line tools, we continued the rule that the men should use gloves. To begin with, the gloves are not supposed to protect you against the things that the hot line tools protect you against, and second, they are a great detriment to the men. You have more protection on the stick, so why use the gloves? We find they are detrimental when using the stick.

CHARLES S. BOWDEN (General Safety Chairman, Ohio Public Service Company, Ashland, Ohio): I agree with everything Mr. Oldfield has said, but when you change medium voltage lines during wet weather, conditions may be such that without gloves you begin to feel the leaking current. I feel that then you should use the gloves.

JOSEPH D. HOWMAN (Electrical Engineer, James R. Kearney Corporation, St. Louis, Mo.): I might tell you the manufacturers' slant on the use of rubber gloves with tools. We don't recommend the use of the gloves when you are using tools, as a safety precaution.

If the tools are not inspected frequently, they may become fuzzy in time and, if they do, you want to know it and, in using rubber gloves, the chances are you won't discover it. Otherwise you won't get that warning of a little leakage of current which, while it doesn't hurt you at all with the use of the glove can't be felt.

C. E. BOUTLER (Safety Director, Wisconsin Public Service Company, Madison, Wis.): I know of one or two companies that are trying to get away from the hot stick work, and the trend in our own company is to come down to 4000 and even lower, possibly 3300 although the trend in some companies is to go up, isn't it?

H. E. SMITH (Safety Director, Appalachian Electric Power Co., Bluefield, West Va.): We refuse absolutely to let our men work on lines as 6000 with gloves, and naturally, on the question of gloves and sticks, we have found that sticks are liable in damp weather to get so leaky that with gloves on the men who have the job would have no protection, while with bare hands they know the condition of the stick and refuse to work.

CHAIRMAN BOUTLER: Part of Mr. Boutler's question was whether the trend was up or down. Your trend is down, then?

MR. SMITH: Yes.

R. A. BLOOMSBURG (Safety Engineer, New York Power & Light Company, Albany, N. Y.): I wonder if we can get a little light onto this argument by looking

at the other side of the question. I think we should keep in mind that circumstances alter cases.

At the present time we are not enthusiastic about getting into hot stick work. We discontinued using them in places where we had used them previously. That again has been a question of circumstances altering cases. We have certain conditions to contend with and certain restrictions by reason of the nature of our system, which possibly you don't get in other places.

The danger that struck us in connection with the use of hot line tools on some points of the property was this; although I think it is psychological, it should be kept in mind. There is something dramatic about hot line tool work; something that appeals to the imagination of the men. They think a lot of it. They like to think of their doing something of this nature; they don't consider it risky, perhaps, but they like to do it because it is exciting.

To come back to a familiar example, every company in doing hot line work knows the operation of the treated stick, a very simple phase of hot line work, and the hot line tools simply carry those principles to further extremes. The problem is that you can do something else with a reasonable degree of safety, but if the other thing is not done carefully and supervised carefully, you find a temptation, particularly in a company that is scattered and not centralized and where you depend upon local crews, to get into jobs not easily handled. If the type of construction has been pretty well standardized in your company, you do not have so many complications, but if you have 2200 volt lines with all kinds of spaces, if you have 13,000 volt lines of heavy construction, it is far different. There have been in New York State several accidents and one fatality chargeable to this.

The opposing opinion on this hot line tool business was this, and we found it worked out pretty well, that if you throw aside the hot line tool solution and devote that same amount of ingenuity, and possibly spend a little money, you can find other ways of accomplishing the same results.

W. H. MULLIGAN (Hydro Electric Power Commission, Toronto, Ont., Canada): I agree with Mr. Bloomsburg that if we devote the same amount of energy to the distribution of problems, by loop circuits, duplicate lines and the like, we can eliminate a lot of hot stick work.

PAUL KERR (Safety Engineer, Penn. Central Light & Power Company): I don't know anything about Mr. Oldfield's operations in Wisconsin. I don't know if they need rubber gloves there or not, but my opinion has been, when it comes to using protecting equipment, the thing to do is to insist that they use that equipment. There has been no man killed while wearing gloves, but plenty killed for not wearing them.

There is just one other question, about this fuzzy effect that you get on the sticks, due to the fact that the oil and shellac have worked out. It seems to me that we surely ought to have some better method of telling whether we are getting this fuzzy effect. That is the job of the maintenance department and should not be left up to the man who is using them to find out.

CHAIRMAN BOUTLER: Mr. Kerr's company is a prize-winner and so is Mr. Oldfield's.

MR. BLOOMSBURG: For the first time in the history of these Congresses, I find myself in accord with Mr. Boutler. We shall presumably go both ways, both up and down, in connection with hot line work.

MR. BOUTLER: I should like to ask how many companies using the hot line sticks are putting periodic tests on them? (About five)

Do you make any other tests?

MR. SMITH: They are tested every time they are used.

MR. BOUTLER: I meant whether you use a special man for the work. We have one who does nothing else but that.

J. R. STREE (Supt. of Safety, Oklahoma Gas & Electric Co., Oklahoma City, Okla.): My question has very little to do with the argument, but I should like to know how many have had personal experience with hot line work. (About a dozen.) I should like to know how many companies here are not using hot line tools. (About six.)

CHAIRMAN DOELLER: Let's see how many are using hot line tools? (About thirty.) Mr. Bloomsburg suggests that we find out how many duplications there are? The people who are using hot line tools, stand up? If you represent more than one company, stand up? (About thirty.)

MR. BOULET: In view of the interest in hot stick work, I wonder if it would be in order to ask the N. E. L. A. committee to prepare a paper on that subject.

MR. SHEPP: I am chairman of the committee. I can't say when the report will be out because it is only a preliminary report, but it should be out in the next month or six weeks. That is all I can say.

CHAIRMAN DOELLER: One other question before we proceed. One of the members has asked me to raise this question, in connection with the topic we just discussed. The question is with reference to transportation problems and accidents. How many companies have any rules whereby they discipline drivers for having accidents? (About a dozen.)

How many of you go to the extreme of suspension and discharge for the second or third offense? (About a dozen.)

The subject of grounding is one in which every operating company is interested, and the safety aspect of it is one in which our speaker this afternoon has made a special study. I take pleasure in introducing Mr. Wills MacLachlan.

Protective Ground Connections

By WILLS MACLACHLAN

Electrical Engineer, Toronto, Ontario, Canada

A young boy is in bed with a cold. It is late in the afternoon and darkness is falling. He reaches up with one hand to the iron rods at the head of the bed and with the other hand reaches to snap on a light. There is a flash and a roar and the boy is badly burned. Facts found later showed that a limb of a tree had pressed a primary wire down on a secondary, putting close to 2,200 volts on the house wiring and the bed was against a radiator.

A young man in an industrial plant places his hand on a motor frame and receives a severe electrical shock, and only by the prompt action of fellow employees is he resuscitated. It is found later that the insulation of the motor has broken down, placing live potential on the motor frame, and the wire connecting the motor frame to the ground has been removed by an unskilled worker, who had removed the motor and on replacing it in position had not replaced the ground connection.

A workman has been removing forms from around concrete piles recently placed under an old seed house. In crawling out from under the seed house, he takes hold of a ground pipe and is found dead beside it. A test of potential from a chisel in the earth, where he was found, to the ground pipe, showed 300 volts. The service was 550 volts and entered in a conduit that was supposedly grounded by the pipe. The insulation on the wire in the conduit was defective.

Two linemen are working on a line that has been made dead. An operator in an industrial plant makes a mistake and closes the wrong switch, making alive the line upon which the linemen are at work. Both men received shocks and burns.

This is the problem that I wish to discuss with you: (i. e. permanent and temporary protective grounds). It is an old problem and one upon which many papers have been written, but as yet no real answer has appeared. There are many angles to this broad problem. Many relay connections depend upon ground connections; the

radio and communication circuits are affected for better or worse by grounds; street railway circuits depend in many instances on ground connections. The effective protection from lightning arresters is dependent on effective grounds. This partial list can very easily be added to. It is, however, my intention to very much limit the problem and to discuss only:

1. The actual ground connection or electrode
2. Means used in grounding circuits temporarily dead.

In certain primary systems of wiring, it is the common practice to ground the neutral to stabilize the system and in certain systems it is the practice to tie the primary neutral and secondary neutral together and ground these, for the same purpose. In practically all systems, it is the practice to ground the secondary neutral to prevent primary potential, reaching the consumers' wiring should there be a cross between primary and neutral due to the limb of a tree or other causes, or should the insulation between primary and secondary in the transformer break down. The efficiency of all of these methods depends upon an effective ground.

In the installation of electrical apparatus, it is becoming a growing practice to ground the non-current carrying metal parts such as frame, case, handle, etc. This is to make provision so that should the insulation between the wiring of the apparatus and the frame, etc. break down, provision shall be made to open the fuse or switch controlling the circuit feeding the apparatus and prevent dangerous potential appearing on the frame, etc. This ground of non-current carrying metal parts also provides that where the operator stands and where he places his hands are at the same potential. In grounding transformer cases and hardware on poles while protecting against one hazard, there is introduced another in that it brings in close proximity to primary wires, a grounded surface. These methods of grounding are also based on the presumption that an effective and sure ground is provided.

The ground connection must be of low resistance and capable of carrying the current. It is designed to carry without dangerous heating on account of increase in resistance. The most effective ground connection is usually the piping system of an extensive waterworks. Where excessive currents are required to be carried by such a system, a hazard to the employees of the waterworks is introduced. In any well designed and operated electrical public utility this is prevented by limiting the current carried by the piping system. There are some waterworks systems which have a considerable resistance to ground, one coming to my notice having a resistance of 40 ohms to ground. This was in a very sandy district. Also in some cases, material other than lead is used in joints and raises the resistance of joints. The fact remains, however, that the water piping system provides the most effective means of obtaining an effective ground. Where a water system is not available or as an additional ground, the ground connections are made by means of driven rods, plates, wire mesh, etc. These are usually covered by the name artificial grounds, although the British name of "earth electrode" is more exact. It would be less confusing if we on this side of the Atlantic would use the words "earth electrode" and "earthing" for this specific problem. There are so many shades of meaning placed on the word ground that it becomes confusing.

The usual form of an earth electrode is a rod or pipe of from six feet up in length and from one-half inch up in diameter. These are of various metals and some are copper clad. After an extensive examination, one large organization has standardized upon three-fourths inch black iron rod, ten feet in length, galvanized eighteen inches from the top. The connection to the rod is made by wire solidly connected to the rod and extending above the ground to the apparatus to be grounded.

The resistance to earth of an earth electrode or series of electrodes is one of the most important points to establish. The resistance of the electrode to earth falls as it is driven into the earth until little or no improvement in resistance is obtained by further driving. This resistance for the same type of electrode varies with the type of soil in which it is driven and with the dampness of the soil, hence it varies

with the seasons of the year. The testing of the earth electrode is carried out by various means; those coming under my notice being carried out by the groundometer and the meg earth tester.

After the resistance of a single electrode is obtained the problem usually before one is to devise ways and means to improve it. This can be done by salting, using a salt of calcium or sodium. This, however, entails maintenance and for this reason is to be avoided if possible. The usual procedure is to drive present rod deeper, replace with longer rod or drive additional rods. In view of the fact that the connection between the earth electrode and earth is the cone of earth surrounding the electrode with the apex at the bottom, the second rod must not be driven close to the first or the effect of the second rod will not be gained. For instance in the case of a 10 foot rod the second rod should be driven not less than 12 feet from the first. At times a number of rods must be driven to provide a satisfactory ground for a station or substation; in which case driving rods close together although desirable from space consideration yet sufficient distance between rods must be maintained to reduce the resistance.

Much has been written as to the desirable resistance to ground for a single earth electrode. In a rather extensive examination of the resistance of earth electrodes that has come to my attention, the figure of 25 ohms was set as the objective. A preliminary examination showed that while some were within the limit, yet many were high; some 300 ohms and upwards. Improvement to below the 25 ohms being obtained by either one or more of the following means: (1) drive present rod lower; (2) install second rod; (3) connect anchor rods to earth electrode; (4) salt ground. At times it seems almost an economic impossibility to obtain desired resistance. In the Dominion of New Zealand the required resistance of a single electrode is 10 ohms and a recent report indicates that over 97 per cent of those tested came within this limit. One type of electrode used which is successful in soils difficult to handle is to place a mat of wire mesh two feet below the ground surface. Considerable success has resulted from the use of this method in New Zealand.

When the resistance of secondary neutral of a distribution system—the resistance of earth electrode for stations or lightning arresters is concerned, very much lower resistance than 25 ohms is, of course, imperative.

If tests of resistance of the soil surrounding the earth electrode are made, it will be found that this resistance naturally increases as the distance increases from the electrode. If a potential is placed on the earth electrode, it will be found that there is a potential difference between the electrode and points in the soil surrounding the electrode; also a difference in potential between points in the soil. This is to be expected in flow of current through any resistance. This is commonly called the voltage gradient.

In an actual case of an earth electrode connected to an electrical system while it is carrying current, a person standing on the soil near the electrode and touching it may receive a shock to the extent of the difference of potential of the electrode and the soil upon which he is standing. Hence, it is becoming common practice to protect the wire from the earth electrode above ground, to prevent persons receiving shocks.

In testing of earth electrodes, the utmost care must be exercised to consider the wire and electrode as alive. Rubber gloves and other protective measures must be used.

An entirely different problem is that of affording protection to workmen while engaged in working on dead lines or apparatus which has been alive or may be made alive. This hazard is fourfold. (1) There is in the case of high tension circuits or apparatus, the static charge that must be drained off. (2) There is the possibility of induced current from paralleling a live circuit. (3) There is the hazard of a cross between the dead circuit and a foreign live circuit. (4) There is also

the possibility of an error in operation. The problem is by shorting and effectively earthing the dead circuit to protect the workman.

Chains were possibly the first means used. These were usually a light flexible chain to each end of which was attached a light manila line. In the case of a single dead transmission line, the rope was thrown over and the chain pulled up over the line and by means of the two ropes, the chain was pulled snug against the lines. As was usual at that time, the sky wire was a ground wire, the line was grounded and shorted. Much trouble was encountered, however, by the use of chains due to dirty chain giving very high resistance and due to the possibility of obtaining almost a resistance of infinity over very dirty chain. The chain still stands, however, as a light and simple means of earthing lines, and is yet in use, particularly by patrolmen of lines through rough and remote territory. The chain is being superseded by ground clamps. These consist of a clamp, either screw or spring that effectively connects to the earth connection and is connected by a flexible wire to a similar clamp that connects to the wire or apparatus to be grounded. This is the simple form of the clamp ground. It has many forms, some providing for nesting of clamps for earthing a three-phase line and some providing fuses or breakers for opening the ground circuit in case of grounding a live circuit. We will, however, deal only with the simple form. Provision is usually made to have the clamp mounted on an insulating stick, similar to a switch stick. The clamps are arranged so that the stick can be removed without touching the clamp, so that the operator is protected while placing the clamps in position and removing them. Clamps are effective and definite in action and resistance to grounded surfaces low. They have the disadvantage of not being as light as a chain. Where it is possible to use the grounding switch it is the most effective and sure means. Its application is, however, limited to the protection at a point. It should be provided with means of locking, both in the open and closed positions. All that has been said above in regard to an effective and sure earth electrode of low resistance applies also in providing a satisfactory earth connection for temporary grounds.

In using the temporary grounding devices, connection is first made to ground connection, the line is then tested by bringing the device near the dead line to make sure that the line is dead, the connection is then made to the dead line. After the work is completed, the device is taken off the dead line and then from the ground. This seems so simple, that it hardly seems necessary to state it. Unfortunately however, men have connected first to line and have removed the ground first, with fatal results. In this instance, the operator putting himself in series with the ground device and receiving line potential to ground.

Temporary ground devices must of course receive frequent and satisfactory inspection and maintenance. Too often maintenance has been neglected and the device wrongly blamed for inefficiency.

No attempt has been made to exhaust the various points touched upon but an attempt has been made to direct attention to this rather neglected but fundamental subject.

To sum up:

1. A rod driven into the ground is not to be considered an earth electrode until it is tested and its resistance known to be satisfactory. Periodic retests are also necessary.
2. The connection with the earth electrode to the line should be effectively protected.
3. Temporary grounds and their use should be made definite.

CHAIRMAN DOELLER: Thank you, Mr. MacLachlan.

CHARLES S. BOWDEN (General Safety Chairman, Ohio Public Service Company, Ashland, Ohio): I should like to ask the speaker what he considers a fair ground resistance for a 110-volt power line.

I should like to know from your experience if it is necessary to ground both ways from a workman on a tower and what size wire you use when you ground your transmission lines.

MR. MACLACHLAN: I would ground both ways from any gang for protection, especially if they were parallel. You are speaking of 110-volts now, or something of that nature.

In connection with the last point, do you happen to know, Mr. Mulligan, what size of wire is used in grounding?

MR. MULLIGAN: It is supposed to have the conductivity to carry the current in the line: if they should make a mistake in grounding, it must be heavy enough to give a chance to the relays to operate.

MR. MACLACHLAN: It would vary with your conductor.

MR. BOWDEN: Have you made any potential tests to see if it is necessary to ground away from the tower to the workmen? Would there be enough difference in between the conductor to necessitate one ground each way?

MR. MACLACHLAN: We had an accident that we investigated theoretically by test, in which the ground was not at the tower, but above, a mile and a half away, where the man got enough to knock him off the tower. We are playing safe on that. That ground had actually shorted a mile and a half away.

MR. BOWDEN: It was away from the energy side or on the energy side? There was sufficient voltage through there to do that.

MR. MACLACHLAN: There must have been.

PAUL KUHN (Safety Eng., Penn Central Light & Power Company): In connection with temporary safety grounding, what experience have you had with the neon detectors that ordinarily are worked out on transmission lines?

MR. MACLACHLAN: I am definitely afraid of them, due to transportation difficulties in connection with the shipment of a delicate piece of apparatus.

MR. KUHN: I should like to ask if anyone else is using Neon detectors for transmission work. (Two)

May I ask these men whether they use any other methods besides the Neon tubes? (No)

J. P. McCANN (Safety Supervisor, New England Power Association): We use an insulated stick with a metallic end which we place in close proximity to the line, which draws sufficient charge from the current to give an indication and it has worked out entirely satisfactorily on voltages about 13,000 and above.

A. A. OLDFIELD (Safety Director, Wisconsin Power and Light Co., Madison, Wis.): In using a detector stick we get a satisfactory result.

CHAIRMAN DOELLER: The thought occurs to me that perhaps this subject will be talked over in the future better when we can have some actual tools here, tools made by the various companies.

G. E. CALLAHAN (Safety Dept., Appalachian Electric Power Company, Bluefield, W. Va.): I just wanted to know if any of the members here have had experience in using steel ground plates for operating switches over the insulated steel on operating 23,000 volts and up.

MR. MACLACHLAN: Just a word, but it is very indefinite. You mean a spill-over at the time it is going to come down the rod? The only thing we are afraid of is that the lightning arrestors will go over at the same time. We have the steel plate to stand on, but they are afraid to stand upon it and handle the switch. That is the theory back of it.

How many companies are testing grounds, not sub-station grounds—I am talking distribution, where your ground cases rest on the poles. (About twelve)

CHAIRMAN DOELLER: Is it an initial test or periodical test?

MR. MACLACHLAN: Both, but I refer to the initial test particularly. How many, when you put in a ground plate, or ground rod, on a distribution circuit for a

grounding of a transformer, or the grounding of a service, or the grounding of a lightning arrestor, test that ground? (About ten)

How many carry out a periodic re-test? (About ten)

CHAIRMAN DOELLER: We are right on schedule now. We shall have the motion picture immediately following this.

(Followed the showing of motion pictures.)

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Quarry Section

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Thursday Morning Session October 15, 1931

A. L. WORTHEN, Chairman
The Connecticut Quarries Company, Inc., New Haven, Conn.

The first session of the Quarry Section convened with General Chairman A. L. Worthen presiding.

CHAIRMAN WORTHEN: Gentlemen, I am glad to welcome you to this session of the Quarry Section. We will get under way without any delay.

Report of The General Chairman

By A. L. WORTHEN
The Connecticut Quarries Company, Inc., New Haven, Conn.

It was quite evident at the Annual Congress last year that, although the Quarry Section had increased its membership some 45 per cent, it was still not representative of the industries included in the section. The chairman called a meeting of the Executive Committee October 24, 1930, with the annual meeting still fresh in mind. The committee discussed seriously and at length the Quarry Section, its relation to

its members and what it might do as a section to stimulate interest. Representation in the section is principally from the crushed stone producers and the committee recognized the need of developing interest in the other industries making up the section.

A second meeting of the Executive Committee was called for January 20 at St. Louis. A combination of unforeseen circumstances forced a cancellation of this meeting.

On April 29 the committee met at Atlantic City, N. J. A nominating committee was appointed consisting of Norman Hough (chairman), National Lime Association, Washington, D. C., N. C. Rockwood, editor, *Rock Products*, Chicago, Ill., and H. F. Yotter, General Crushed Stone Co., Easton, Pa. The program for the Annual Congress was discussed and a general outline approved, it being left to the secretary and president to secure the necessary speakers.

News Letter

The Quarry Section sent out five News-Letters during the year. These have been truly news letters and I am sure the section is indebted to our secretary and news-letter editor for his effort on behalf of the section. All the officers of our section are men who have other jobs to which they must give first consideration and to provide the members of the section with five news-letters during the past year has been a real contribution by our secretary toward the success of the section.

Posters

The Poster Committee of the Quarry Section has produced its allotted quota of safety posters and, in conjunction with the Cement Section, has had issued one poster each month. The demand for these posters during the current year has ranged from 850 to 1700 copies per poster.

We have cooperated with the Poster Division of the Council in taking photographs of numerous hazards in our industry, which have been issued in the form of posters but we regret to have to report that there has been no response to our repeated urging of the producers to send us ideas, photographs or drawings to assist us in putting out appropriate posters. You will doubtless appreciate that the ideas of various men engaged in similar work are far more valuable than the ideas of only one or two. Undoubtedly some of our members have used home-made posters and drawings in connection with their accident prevention work and we earnestly ask that this material be made available to the industry at large.

We believe that quarry operators appreciate the value of safety posters in their accident prevention campaigns. Many a workman, whether skilled or unskilled, is made to realize more forcibly the dangers with which he is surrounded, thus enabling him to fortify himself against injury when encountering such hazards.

We call to your attention the necessity of maintaining attractive bulletin boards, both from the standpoint of a well painted board and a neat arrangement of posters and other material which is displayed. Avoid the crowding of posters on the board, as two or three well arranged posters, frequently changed, will accomplish far better results. You will find that the men visit a bulletin board much more regularly and frequently when the layout is attractive.

The posters issued regularly by the Poster Division of the Council are reproduced in miniature in each monthly issue of the National Safety News and we urge that you make your selection of suitable posters periodically, forwarding your orders to the Council in Chicago.

Statistics

Accident statistics were prepared for 119 quarries during 1930, and were forwarded to the National Safety Council for publication in "Industrial Accident Statistics" 1931 edition.

It is gratifying to report progress in safety at quarries in 1930. The accident-frequency rate was reduced from 26.71 in 1929 to 23.46 in 1930. The accident-severity rate was lowered from 6.11 in 1929 to 3.30 for 1930.

Statistics for 1930, published by the National Safety Council, covered 28 industries, among which the quarry industry ranked nineteenth in accident frequency and twenty-fourth in accident severity. The combined accident frequency rate for the 28 industries was 18.47 per million man-hours of exposure, the rate for quarries being 23.46, or 27 per cent higher than the general average. The combined severity rate for all 28 industries was 1.97 per thousand man-hours, as compared with 3.30 for quarries, which shows that the quarries had a rate 68 per cent higher than the general average.

These figures show that the quarry industry, although it made admirable progress last year, still has abundant opportunity to climb to a more favorable position among the 28 industries for which accident rates were published by the council.

Quarrying companies holding membership in this Section are invited to send their accident records to the United States Bureau of Mines for incorporation in this annual review, if they are not already doing so.

Membership

Considering the general condition of business during the year just ending, the annual report on membership which shows virtually no loss of members by the Quarry Section is a real achievement.

A year ago our Sectional membership total was 102.

Today we have an even 100 members.

During the period from October 1, 1930 to September 1, 1931, we enrolled 9 new members and lost 11 through cancellation.

The new member companies and organizations are:

- Carbon Limestone Company
- G. & T. Earle, Ltd. (England)
- General Insulating & Mfg. Company
- Moulding Brownell Corporation
- National Crushed Stone Association
- National Lime Association
- National Sand and Gravel Association
- Northern Peru Mining & Smelting Co. (Peru)
- Western Brick Company

These new members were obtained by direct solicitation on the part of our members and by mail approach. Our general mailings this year soliciting new memberships, were limited.

A general appeal to enroll was sent to our list of 200 prospective members in December but the rest of our approach was specialized.

The National Safety Council cooperated with the National Crushed Stone Association in January by sending a representative to speak and placing an educational exhibit at the Fourteenth Annual Convention of the Association in St. Louis in January. The same effort was made at the annual meeting of the National Sand and Gravel Association and several new members came directly from this effort. In connection with the Crushed Stone Association convention, a personal letter soliciting membership was sent by the General Chairman of the Section (A. L. Worthen) to each of the members of the association not members of the National Safety Council.

Another general letter was sent to prospects in March, describing the service of the Council in preventing sickness.

During May and June, prospect cards were mailed to each of the members of the Section and many helped by writing or calling upon non-members. The Council followed up each prospect with personal letters and specialized appeal.

Splendid service also was rendered by our members in helping to influence other

members not to withdraw from membership and the result—only 11 companies dropping out as compared to 8 cancellations during the year preceding—is eloquent proof of the loyalty of our group.

Efforts now are being planned to renew vigorous solicitation of new members soon. They will be developed along specialized lines with personal approach in cooperation with our members.

At our annual meeting last year a Safety Manual was tentatively approved and adopted for the Quarry Section with the request being made of the National Safety Council that it be mimeographed in pamphlet form and made available to the members of the section. This was done and a copy of the rules sent to each member of the section. A number of members have requested and received from the Council additional copies for distribution among their organization.

It has been very disappointing to me that we have not been more successful in getting additional members during the past year. It seems perfectly logical that a firm interested in safety would first of all affiliate with that national organization which stands for safety and the prevention of industrial accidents, but this is not the case. If the function of the Quarry Section is merely to provide a means of contact between the National Safety Council and the members of those industries represented in the Quarry Section, I believe it is justifying itself. If, on the other hand, the Quarry Section should take the lead in promoting safety among the members of its industries, it is doubtful whether this can be really effective when those who have the affairs of the Section in charge are engrossed with their regular business affairs and usually find the affairs of the section a source of considerable inconvenience.

Regardless of the growth of the Quarry Section it is extremely encouraging to note the rapidly increasing interest in safety which is manifesting itself in both the Crushed Stone and the Sand and Gravel industries. Both of these associations conduct an annual Safety Contest open to all members of each Association. The contest is conducted in cooperation with the U. S. Bureau of Mines and a trophy is awarded each year to the plant having made the best safety record during the year. In the 1930 contest of the National Crushed Stone Association there were 68 plants entered as compared to 38 in 1925, the first contest year. The accident frequency rate for 68 quarries, 1930, was 30.20 compared with 30.7, 1925, and the accident severity rate, 1930, was 5.86 compared with 6.67 in 1925. The most striking fact, however, is that 19 quarries completed the year 1930 without a single lost time accident whereas in 1925 only one plant had a perfect record. In the National Crushed Stone Association contest the Marquette Cement Manufacturing Co. located at Cape Girardeau, Mo. has recently won the contest for the third successive year thereby retaining permanent possession of the trophy.

The National Sand and Gravel Association completed its second annual contest having 76 plants entered for the contest in 1930 compared with 26 in 1929. The accident frequency rate was reduced from 74.4 in 1929 to 42.7 in 1930 and the severity rate from 9.7 in 1929 to 5.9 in 1930. There were 32 plants which completed the year 1930 without a lost time accident compared with 4 plants in 1929.

I am sure with such progress as evidenced by these two industries that, regardless of the feeling which your officers may have that the work of the Section is not as effective as it should be, the industries represented in the Quarry Section are progressing steadily and rapidly toward the irreducible minimum in accidents.

R. E. COLVILLE (United States Gypsum Company, Chicago): It seems to me that the accomplishments that we have just heard read, particularly with regard to these records of the individual companies and the interest displayed by the different associations concerned with quarries, are really quite remarkable. I think that Mr. Worthen, as chairman, should understand that the Quarry Section feels he is responsible for a great deal of credit that the Section gets for the interest taken in safety matters. I would like to have a record made of our appreciation for the chairman's activities for the year.

CHAIRMAN WORTHEN: That is certainly very kind of you and I appreciate it. I really think that the one bright thing that we can look to as a Section is the fact that although possibly we haven't increased the membership in this Section we have encouraged the safety work among the large industries in the Section to the point where they are accomplishing some real results in accident prevention. We had 22 plants go through the year without a lost-time accident and it was only a year or two ago that our superintendents thought that was impossible.

N. G. HOUGH (The National Lime Assn., Washington, D. C.): I move that this Section go on record in the minutes as expressing our great appreciation for the able guidance of the Quarry Section during the past two years.

(The motion was seconded and was passed unanimously.)

CHAIRMAN WORTHEN: I thank you for this expression of appreciation. I have enjoyed the work all during the year. I haven't been able to devote the time to it that I would have liked, but I have given what time I felt that I could from my business and I am gratified with the results that we have achieved, particularly in the stone industry and in the sand and gravel industry because they were two weak industries as far as accident prevention work was concerned.

I know that you all share with me the keen disappointment occasioned by the fact that Mr. W. W. Adams was prevented from attending this session. Mr. Adams is so familiar to all of us and knows so much about the actual results that are being accomplished in the industries of the Quarry Section that not to have him here is almost like a ship without a helm.

Mr. Adams was to deliver the next paper. He has sent it to me with the following letter. I will read his letter because I think he would like to have me do so.

"Dear Mr. Worthen: I regret greatly that I shall be unable to be in Chicago for the National Safety Congress next week and so shall miss the inspiration and good fellowship that are always to be had in the meetings of the Quarry Section. I have, however, prepared my paper in accordance with the program on the subject of The Progress of Safety in the Quarry Industry and ask you to kindly designate someone to present the paper in my absence.

With best wishes for a most successful session and greatly regretting my inability to be with you, I am cordially yours, W. W. Adams."

Mr. Alexander Miller, Mining Engineer for the United States Bureau of Mines, Vincennes, Indiana, will read Mr. Adams' paper.

Progress in Safety at Quarries

By W. W. ADAMS

Chief Statistician, Demographical Division, United States Bureau of Mines, Washington, D. C.

Nineteen-thirty was a good year for the quarry industry so far as the prevention of accidents is concerned. In fact it was the best year that the industry has ever experienced. Only once before has the death rate been as low as it was last year, and the rate for nonfatal injuries was the lowest since complete records of injuries have become available.

Employment was not as good as in 1929. This is not surprising, in view of the general industrial conditions that prevailed last year. Measured by the number of man-shifts worked, employment was 10 per cent lower than the previous year's level. The average employee worked 255 days, or 13 days less than in 1929.

A reduction in employment means a smaller amount of exposure to accident-hazards; therefore it was reasonable to expect that fewer men would be injured in 1930. As a matter of fact fewer men were injured, and the reduction in the number of injuries was proportionately greater than the reduction in employment. Employment declined 10 per cent; the number of accidents declined 24 per cent.

Accidents dropped from a rate of 130 per thousand 300-day workers in 1929 to only 110 per thousand 300-day workers in 1930. In other words, the accident-frequency rate was reduced 15 per cent. When it is recalled that a one-per cent reduction in the accident rate was recorded in 1929 as compared with 1928, and that the 1928 rate was 20 per cent lower than that of the year before, a further reduction of 15 per cent in the rate for 1930 is an accomplishment that indicates a growing interest in safety on the part of stone producers of the country.

The marked reduction in the accident rate last year is notable because of the conditions under which it was accomplished. Safety often suffers a set-back during times of irregular employment or part-time operation, a condition that prevailed so widely in 1930. When such conditions prevail, the morale of the employees is lowered, the men worry over inadequate or uncertain income, and often both men and management pay less attention to good-housekeeping from a safety point of view. These factors often lead to an increase in the accident rate among employees, yet in 1930 we find an entirely different result. Accidents were not only fewer in number than in the preceding year, but the frequency rate per thousand 300-day workers was also lower than in 1929. It is probable that the conditions from which quarrying and other industries suffered last year had the effect of weeding out many accident-prone employees and those otherwise inefficient, and of retaining on the payroll, for such work as was available, the more efficient workers. As efficient workers are usually the safest workers, this seems to me to be the most probable cause of much of the progress in safety made under the unusual conditions that prevailed in 1930.

Last year's progress in safety was not confined to any one kind of quarrying. All branches of the industry shared the improvement. Outstanding in accomplishment was the progress made by quarries and mills engaged in the manufacture of cement. This branch of the industry led all others by reducing its accident rate 22 per cent. Limestone quarries not connected with the cement industry ranked second with a reduction of nearly 17 per cent. Tying for third place in the amount of progress made were trap-rock quarries and granite quarries, each of these groups having a reduction of 13 per cent in its accident rate as compared with the rate for the year before. Next in order were sandstone and bluestone quarries with a reduction of more than eight per cent in accident-frequency. Then came slate quarries whose progress amounted to 7.6 per cent. Marble quarries came last with a reduction of 4 per cent in the accident rate.

These figures represent progress only; they do not represent the relative hazards of the several classes of quarries, but rather a step made by each group in 1930 over its own position in the previous year.

The accident-frequency rates for each class of quarries in 1930 and 1929, also the per cent of reduction represented by the rate for 1930, are shown by the following figures:

Accident rates per thousand 300-day workers at quarries, 1929 and 1930, and per cent of reduction of 1930.

Kind of quarry	Accident rate		Per cent of decrease in 1930
	1929	1930	
Cement	44.68	34.96	21.8
Limestone	173.33	144.55	16.6
Trap rock	223.00	193.64	13.2
Granite	166.34	144.50	13.1
Sandstone and bluestone	135.38	124.30	8.2
Slate	165.22	152.61	7.6
Marble	96.41	92.48	4.1
Total	129.79	109.76	15.4

These figures showing an average of 15 per cent reduction in the accident rate for 1930 also show that the reduction ranged from 4 per cent for marble quarries to 22 per cent for quarries producing stone for the manufacture of cement. It is well known that the cement industry has long been a leader in accident-prevention work.

Now what did the individual states accomplish? How widely distributed was last year's progress?

Stone is quarried in nearly all states of the Union. Yet in only 13 states is the quarry industry of such magnitude as to require the services of as many as 2,000 men. These 13 states taken together represent approximately 70 per cent of the entire industry, when measured by the number of men employed. When considered as a group, they had fatality and injury rates that were slightly more favorable than the rates for the smaller states.

The following figures show how these 13 important states stood in 1930 and 1929, based upon their accident-frequency rates:

Accident rates per thousand 300-day workers at quarries in the 13 principal quarrying States in 1930 compared with 1929, and per cent of reduction in 1930.

State	Accident rate		Per cent of decrease in 1930
	1929	1930	
Georgia	127.12	65.00	48.9
Illinois	116.40	69.19	40.6
Alabama	167.70	102.13	39.1
Ohio	128.33	92.11	28.2
Michigan	79.29	58.28	26.5
Missouri	218.82	167.57	23.4
Tennessee	119.55	99.75	16.6
New York	133.67	117.12	12.4
Indiana	99.12	90.61	8.6
Pennsylvania	95.07	94.66	0.4
California	159.18	164.17	3.1 (increase)
Vermont	100.75	108.14	7.3 "
Massachusetts	208.32	258.21	23.9 "

It will be observed that ten out of the 13 states lowered their accident rates in 1930. The reductions ranged from nearly 49 per cent in Georgia to less than one per cent in Pennsylvania. Three of the thirteen states suffered an increase in their accident rates; these were California, 3 per cent; Vermont, a little over 7 per cent; and Massachusetts, nearly 24 per cent.

Anyone who is more than casually interested in the prevention of accidents, wants to know how much progress is made or lost each year as compared with the year before. Yet a comparison of the current year with only the preceding year does not always indicate trends.

Let us see how the quarry industry fared in 1930 as compared with five years ago. If we take 1925 as a point of beginning and compare the record for that year with the record for 1930, we find a reduction of 36 per cent in the accident-frequency rate during the latter year. Thirty-six per cent reduction in the accident-rate as compared with five years ago; 15 per cent reduction as compared with one year ago. Certainly the quarry industry as a whole is making rapid strides in the prevention of accidents.

How true this statement is may be seen by considering what the death and injury losses of the industry would have been if the accident rate of five years ago had continued to the present time. In 1925 there were 1.78 men killed and 170 men injured for every 300,000 man-shifts of labor performed. During the five years since that record was made, the quarry industry has worked more than 117 million man-shifts. In connection with this work 639 lives have been lost and 54,455 men

have been injured by accidents. These losses are lamentable from any point of view, but they are not as great as they would have been if the 1925 rate had continued. If the quarry industry had not been able to lower its accident rate since 1925 there would have been 58 more men killed and 11,951 more men injured than the record actually shows. And yet we occasionally hear the question asked, "Does accident-prevention work pay?"

Let us look at this saving from the viewpoint of wages saved. To be sure, there are other points of view, but at this moment look at wages only. The average age of men killed in industrial accidents is 25 years. A man 25 years old may reasonably expect to remain useful in industry for 20 years more. As quarries normally average 250 workdays a year, the saving of 58 lives during the past five years means a saving of \$1,450,000 in wages to these 58 men and their families, assuming an average wage of \$5 a day. This amounts to a saving of \$25,000 in wages for each of these 58 men over a life-expectancy of 20 years that would have been destroyed if the industry had made no progress in the prevention of accidents during the past five years.

Now what of the 11,951 who would have been injured if quarry operators had made no progress in safety?

When men are injured by accidents in quarries, the average period of disability is 18 days. At \$5 a day the prevention of these accidents means a saving of \$1,075,590 in wages to these men who otherwise would have been injured. This saving is conservatively estimated because I am assuming that the injuries which might have occurred would not have included any cases of permanent or partial disability.

It may therefore, reasonably be said that safety work at quarries during the past five years has resulted in saving \$1,450,000 in wages to 58 men who would have been killed and \$1,075,590 in wages to 11,951 men who would have been injured if the quarry industry had made no progress in the prevention of accidents.

Continued interest in safety is the surest guarantee of continued progress in the prevention of accidents. Intermittent interest is almost sure to be reflected in higher accidents rates. In this connection consider one other thing which the quarry industry has done. Take as an illustration those companies that have been enrolled in the National Safety Competition which is conducted annually by the United States Bureau of Mines. These annual safety contests cover both mines and quarries. The first contest was in 1925 and there has been a marked increase in the number of companies enrolled since then. In fact, if the number of companies enrolled may be taken as a gauge of an industry's interests in the prevention of accidents, the quarry industry is more alive to the safety of its workers than any other group represented in these yearly safety competitions.

The contests cover not only quarries, but coal mines, metal mines, and other classes of mines, and quarries comprise about half of the total enrollment. In the first year's contest 103 quarries entered the contest; this number has increased to 201 during the present year, 1931. These quarry companies employ about one-fourth of the total number of all quarry-pit workers in the United States. To a considerable degree, therefore, the accident experience of these companies is a fair sample of the experience of the whole quarrying industry.

The companies taking part in the National Safety Competition have established an enviable safety record. Some of the companies have been participating every year since 1925; others have enrolled in later years. Considering all of them as a group from year to year, there has been uninterrupted downward trend in the accident-frequency rates during the six years during which the contests have been conducted. The progress made has been most impressive. In the first year, accidents were occurring at these quarries at the rate of 48 accidents for every million man-hours of exposure; during the last year, 1930, accidents occurred at the rate of only 22 accidents per million man-hours of exposure. The annual rates were as follows:

1925	48.259
1926	43.241

1927	33.537
1928	29.327
1929	26.782
1930	22.073

In view of the fact that records covering the entire quarry industry in the United States show a 36 per cent reduction in the accident-frequency rate since five years ago, and that records covering all quarry companies in the National Safety Competition shown a 54 per cent reduction during the same period, no better evidence can be produced of the widespread interest of operators in the prevention of accidents and of the effectiveness of the industry's efforts to protect the employees from injury.

CHAIRMAN WORTHEN: Thank you, Mr. Miller. Do you care to discuss this paper or do any of you care to ask Mr. Miller any questions regarding it?

V. P. AHEARN (National Sand and Gravel Assn., Washington, D. C.): During the past year I have been more than ever impressed with the fact that without Mr. Adams the safety work of the Quarry Section and of the quarry industry would have no unification and I know that he has accomplished his results under considerable difficulties. The Bureau of Mines is understaffed. I think it would be quite appropriate if this meeting were to adopt a resolution instructing the secretary to convey to the director of the Bureau of Mines our deep appreciation of Mr. Adams' cooperation and our regret that he was unable to be with us today.

CHAIRMAN WORTHEN: I think that is a happy suggestion. Gentlemen, you have heard the motion of Mr. Ahearn. Will somebody second the motion as made?

(The motion was seconded and unanimously passed.)

CHAIRMAN WORTHEN: I will now call for a report of the Nominating Committee.

Report of the Nominating Committee

N. G. HOUGH (The National Lime Assn., Washington, D. C.): Gentlemen, on behalf of the Nominating Committee, it is pleasing to report, that after a great deal of thought and consideration on the part of the Committee, it is our recommendation that these individuals be elected to the offices which I shall mention.

In the selection of General Chairman the Committee was unanimous in the feeling that our present chairman should continue but in view of the fact that he has served two years and has accepted other larger responsibilities we were finally compelled to recognize his request for relief.

We therefore nominate for the office of General Chairman of the Quarry Section, John Prince, president of the Stewart Sand and Material Company, Kansas City, Mo. Vice-Chairman, William M. Andrews, Lake Erie Limestone Company, Youngstown, Ohio.

Secretary and News-Letter Editor, V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.

Chairman Poster Committee, H. F. Yotter, The General Crushed Stone Company, Easton, Pa.

Chairman Publicity Committee, J. R. Boyd, National Crushed Stone Association, Washington, D. C.

Chairman Statistics Committee, W. W. Adams, United States Bureau of Mines, Washington, D. C.

Executive Committee will include the officers and S. M. Shallicross, American Limestone Company; A. L. Worthen, The Connecticut Quarries Company, Inc., New Haven, Connecticut; N. G. Hough, The National Lime Association, Washington, D. C.; R. E. Colville, United States Gypsum Company, Chicago, Illinois; and Ohio M. Graves, The General Crushed Stone Company, Easton, Pa.

CHAIRMAN WORTHEN: You have heard this report of the Nominating Committee. Are there any further nominations from the floor?

OTHO M. GRAVES (The General Crushed Stone Company, Easton, Pa.): I move you that the nominations be closed and that the secretary be instructed to cast one ballot for the list of officers as they have been placed by the Nominating Committee. (The motion was seconded and was passed unanimously.)

(The Secretary then cast one ballot for the names of men submitted by the Nominating Committee and declared these men elected.)

CHAIRMAN WORTHEN: I consider this Section as very fortunate in having Mr. Prince as General Chairman for the coming year. Mr. Prince is extremely interested in accident prevention work as is shown by the records of his company.

The next speaker this morning is a man of whom I stand in considerable awe. He has held and he still holds so many important positions. He is a past-president of the National Sand and Gravel Association and he is a member of their Board of Directors and at the present time he is a member of the Board of Directors of the Crushed Stone Association. He is able to hold those two offices because he never lets his right hand know what his left hand is doing.

In the 1930 National Sand and Gravel Association Safety Contest, the Missouri River Plant of the Stewart Sand and Material Company at Kansas City, which is Mr. Prince's company, won first place among the larger plants—that is plants working 100,000 man-hours or more. This plant's record was 108,753 man-hours without a lost-time accident.

I take great pleasure in introducing Mr. Prince.

Executive Viewpoint of Safety

By JOHN PRINCE

President, Stewart Sand and Material Company, Kansas City, Missouri

Most executives have first become conscious of the need for safety through the money cost of accidents. The executives of a very large percentage of the smaller industries of the country, including probably all of the quarry industry, have come to realize the need for safety work of some kind within the last few years, practically all within the last ten years. I believe the quarry section of the National Safety Council has been organized for six years.

This rather recent awareness of safety on the part of these executives has undoubtedly come about through the increasing costs of industrial accidents. Before compensation laws were passed in many of our states, the Employers Liability rates in this industry were relatively low, and the Insurance Companies carried the money cost of accidents without seriously disturbing the peacefulness of the management.

As society became increasingly aware of the over-all costs of industrial accidents, industry was forced through compensation laws to pay an increasing percentage of this cost, with the result that the budget item for compensation insurance became larger and larger, until management began to consider what could be done about it. While most insurance policies carried certain provisions whereby the premium would be increased or decreased as a result of the individual record made by the insured, still these credits did not represent the full amount which many executives believed could be cut from their accident cost as the result of a good record in the reduction of accidents.

Among a considerable number of companies in several states, self insurance began to be tried. When this has once been started by a company, the executive sees the rather large money rewards which come through reduction of accidents, or the penalty for an increase in accidents. Right then the safety director becomes an important member of the executive staff, whose results can apparently be measured very accurately in dollars and cents.

From this point on I believe the thorough executive will begin to see a broadening picture and realize that safety work is not, in fact, a separate activity, but one

which is very much tied in with other questions of great importance, such as the average cost of production and the ultimate profits of the operation.

Most executives, I presume, when looking over any plant, quarry or mill, can judge from the general orderliness and the smoothness with which the routine of operations is carried on, as to the relative unit cost of that operation. Is it not true that when one of you sees a plant of orderly appearance and smooth working routine, you are justified in expecting to find a cost sheet with relatively low costs, while the disorderly plant and the disorganized operation indicate a high unit cost on the cost sheet?

Is it not generally true also, that the orderly operation will have the low accident rate, while the disorganized operation will have the high accident rate? If this is true then the problem of reducing the accident rate is but a part of the general problem of management. To accomplish this several things are necessary. The executive must provide suitable plant facilities which are in a broad sense a suitable machine to do the job.

Effective supervision by foremen, sub-foremen or superintendent is probably the most important link in the chain.

Attention must be paid to the physical condition of the workmen, as the man who is physically unfit is apt to become both an inefficient part of the organization and a contributing factor to increased accidents either to himself or his fellow workmen.

The worker needs to understand the best way to do a job, and this is primarily a problem of supervision.

He should be alive to the job with a real interest in it. This may be the result of both his selfish interest in making a living and gaining advancement, and the belief in the fairness and future of the company for which he is working.

Under the stress of present conditions it is probable that management can depend on the interest created by the fear of losing the job to greater extent than has been possible within the last ten years. Even though this may be true, will it not be a mistake for the management to depend upon this reaction? Is not discouragement apt soon to follow fear as the reaction of the employee, and will not discouragement greatly increase the difficulties of maintaining low cost and safe operation?

In the matter of equipment or the machine which is used in the operation, the safety committee of employees is quite apt to see first as a possible accident hazard, the defects in the machine. After the safety committee of employees has operated for some time, it becomes evident that even with correction of the defects in the machine, many accidents continue to happen. Gradually it becomes evident to the committee that the personal factor accounts for perhaps 90 per cent of the accidents. Next the safety committee is apt to pick on mistakes of judgment or carelessness on the part of employees, and in this their findings are apt to be much more severe in censuring or penalizing a fellow employee than is the management. The causes for such carelessness or lack of alertness which result in accidents are much more difficult to locate and are frequently beyond the understanding of the safety committee.

Back of many accidents may be the unseen physical disability or mental disturbance of the employee. At this point I cannot refrain from commenting on the possible consequences of the increasing importance given to the physical condition of the workmen. Perhaps compensation laws which have been forced on a reluctant industry, and frequently by pressure from organized groups of workers are partly responsible. This has resulted in an increasing use of physical examination either before employment or from time to time during employment, and the rejection of workers who are not physically sound.

In a recent examination with which I am familiar, covering some twenty-five truck drivers and employees of that class, over 40 per cent were found suffering from hernia. They are naturally disqualified for heavy work, both for their own good, and in the interest of accident cost to the company. Frequently they are untrained for any other class of work for which they are physically fit. As these methods are

employed by an increasing percentage of industries, such groups of physically unfit may become a real social problem. It has been suggested that in this case the large percentage of hernia found is at least in part the result of previous incompetent supervision. In many cases it is possible these men have not been instructed as to how, or how not, to handle heavy loads, or move a heavy object. At any rate, it is a fact that a man who has been partially ruptured may easily become a hospital case, requiring medical care and compensation for two or three months, and in many states this must be borne by the employer. In some cases the employer is able to relocate such men in different classes of work, but this can hardly be done with a considerable number, and the social problem is likely to result.

Perhaps the most important problem of management among those heretofore suggested, is that of obtaining and continuing competent supervision. In this I particularly refer to the foreman or sub-foreman or supervisor, who comes directly in contact with a group of workers and directs the work. Frequently not enough attention has been paid to the general intelligence, interest, and ability of such a supervisor to anticipate events. The men who will make really competent supervisors are scarce. It seems to me management should make a great effort to have such supervisors understand the problems which confront the management, to the end that they will use fully their own ability to produce the desired results.

The executive must depend largely on the contact these supervisors have with the individual employee if he expects to maintain alertness of the individual, and the morale of the organization. It is through the supervisor that the executive can best make the individual man realize not only the interest the company has in his satisfactory work, but to a proper extent, an interest also in the welfare of the family and the general surroundings of the individual when not on the job. Family difficulties can easily create a worry which will come with the man to the job, reduce his interest in the work he is doing, and his alertness in doing it, to the extent that such a condition really becomes a real accident hazard. The management can probably not accomplish a great deal in correcting such difficulties. At one time or other they confront every one, and have to be worked out individually. The supervisor can if he is aware of the situation, greatly improve it, either by letting the man lay off for a time, or even by giving him an opportunity to use the telephone. This must be worked out by the supervisor through his knowledge of the men under him. He must have the ability to realize the importance both to smooth operation, and a satisfactory accident record, of having men on the job who are competent, alert, and interested in their work.

From my own experience I believe the employee who is really sold on the importance of safety will sometimes have a broader point of view on the subject than is held by the executive. Too often the executive is thinking principally of the money cost of accidents.

A year or so ago, after we had experienced for several months a greatly improved accident record, I was invited to attend one of the regular safety council meetings of our organization. These have primarily been conducted by the men themselves who form their own program and conduct their own activities. It has seemed to me that results obtained in this way, under the leadership of the men themselves, will be more effective than when the company dominates such an organization. At the time I mention, I had become quite enthusiastic about the accomplishments of our Safety Council, and in speaking to the organization, I volunteered the suggestion that a continuance of such a record should be rewarded by the company by some form of bonus. I thought I could see a saving to the company of \$8,000 or \$10,000 a year if such a record were continued, and I believed interest would be stimulated if a part of this were distributed in the form of a bonus. I made the suggestion without discussing the matter with the superintendents or those in charge of the Safety Council. The subject was referred to a committee, who later considered the proposition. Much to my surprise, I was thoroughly called down by the committee, who made it clear to me that safety work when actively undertaken by the workers

themselves was not a result which could be bought and paid for by the company in dollars. The real benefits to the workers in the way of better earnings without lost time, the security of the family, and in the worker's own physical comfort, were the real incentives, and my suggestion of a bonus was energetically declined.

Progress will be made as executives get the broader view of safety work. It has in it much more than the direct money value in lessened accident cost. It is in fact but one part of the general problem of management. As we are able to inspire the right kind of supervisor to the full realization of the importance and responsibility of his position, as we are able to plan smoother or better organized routine throughout the operation, and as we are able to place a sense of security and a real interest in his job in the daily life of the worker, then we will find a good accident record as a result, even though not the direct objective, of such good management.

CHAIRMAN WORTHEN: Would anyone like to ask Mr. Prince any questions?

J. A. GIBERSON (Bluff City Lime and Stone Company, Alton, Illinois): What reactions did you receive from the men with regard to their physical examination?

MR. PRINCE: There were some objections to it at first but they were not serious. We found a surprising number of men who were physically unfit for the work. They probably knew that before the examination and were fearful of the result. We were able to relocate the men who were unqualified in most cases. In most of the cases of hernia that were not too severe, we said that if they would provide themselves with a truss properly fitted, we would provide the medical attention and they could go on working whenever the doctor so advised us.

There were two or three very interesting things brought out by the examination, which included about 150 men. One was the great number of bad heart cases. Usually these were accompanied by bad teeth and we had a great deal of trouble in getting the men to have their teeth pulled out or otherwise treated. The condition of their teeth was entirely responsible for their heart condition. Some of these heart cases were very serious and we had some where the men were in actual danger—where they were apt to drop down at any time through excess exertion. We felt they were a serious accident hazard in the sense of accident costs to the company.

Another thing which we found in the examination and which rather surprised me in view of my general information that I had acquired over a period of time, was that one venereal case was found in the examination of 150 men!

MR. GIBERSON: What was your superintendent's and your chief foreman's reaction to the examination and did you have any trouble selling them the idea?

MR. PRINCE: Our two general superintendents did not object.

This idea originated with the safety director. My realization of the need of the physical examination came through a case of hernia. We had a man with a hernia who was working in one of our rock quarries. One day he had a rupture and had to go to the hospital. Much to my surprise the safety director told me this was a compensatable accident and we would be required to pay hospital and all the other expenses as well as compensation for about three months.

Certainly the rupture was not caused by the job he was doing then or had done very recently. That made us wonder how many potential hernia cases we had on the job and to what extent we were liable for hospital costs and compensations.

OTTO M. GRAVES (The General Crushed Stone Company, Easton, Pa.): Did you examine all of the men?

MR. PRINCE: All who were regularly employed were examined. New employees are required to pass a physical examination before they start work.

We examined most of the men without making it compulsory except for some of the office men and men of that kind. Most of the men accepted the company's offer to make the examination free for their own benefit and they were very glad to avail themselves of it.

R. E. COLVILLE (United States Gypsum Company, Chicago, Illinois): We don't want the men to lose the time and the wages that they naturally would lose when

they are hurt. It seems to me that the costs can be regarded as a good indicator of a lot of other things while all you see is the cost of accidents. There is no reason why we should feel reluctant to admit that cost is something that makes us take this action.

There are no records that we know of that are accomplished without a very definite position being taken by the management. It is true in every kind of operation that when the officers of a company are interested the results obtained in safety work are better than they would be otherwise.

MR. PRINCE: I feel that the reduction of accidents accomplished in our plant was accomplished not so much because of any inference which I as an executive placed on safety but because of the emphasis which I constantly place on the spending of money or on the activities of the foremen in a thoroughly organized routine of operation and in the orderly conditions and orderly cooperation and operation throughout everything we do. It is my opinion that emphasis on our ability to create an orderly situation and a satisfactory routine has resulted in the reduction of accidents rather than perhaps the conscientious safety work which we have gone through.

MR. GRAVES: We ought to do something that would make us, as the Quarry Section, more valuable to the industries it represents. It seems to me that with the several industries that are in this Quarry Section, it is a very pathetic thing that we have but twenty-five or thirty men attending a meeting twice a year. We have an able news-letter editor who writes entertainingly and well, but we don't get to him the wheat out of which he can make the real flour for us to consume. It isn't the fault of Mr. Ahearn, it is just that it does not come to him.

Why couldn't such a procedure as Mr. Prince has just outlined in his paper have been sent in to the News-Letter Editor? I think that it would be most instructive to many of us. In our own company we gave a good deal of thought to the question, "Should we undertake to have all our men physically examined by experts?" We have a good many men and the idea was appalling. We didn't know what ramifications we might be led into and we hesitated to take the step. Once having taken it we had to go through with it even though we didn't know what it would mean. We know that there is a borderline in physical condition and we know that when a man is over this borderline of physical condition then he is unfit for service.

I would like to have some discussion in the News-Letter on the problem of men working that are really too old for their work. We have men who have been working for us as long as twenty-eight years and who are perhaps now about sixty-eight or seventy-two years old, and because of their age combined with their general physical condition they are becoming especially grievous physical hazards and what to do with them is quite a problem. We have thought of a pension system but we have not agreed upon any one kind. In this case we are entirely dropping the humanitarian standpoint, which is not absent from us in our work, because we really think it would be cheaper in the long run to take these men who are old and are becoming physical risks to an unusual degree and pension them. We probably would save money in so doing rather than have them continue in the service and perhaps have a loss of life. I think that, no matter what mistakes we may have made in doing it (and I wouldn't want to hold it up for a model because it is far from that and it is really only a stumbling effort on our part to solve the problem), it might have some constructive thought for somebody else on which to build.

I tell you this in an effort to get you to take these news-letters more seriously. Let us not have them as pleasant gossip letters. I don't think we should stress letters of the kind where a man was standing on the bank and a part of the earth wall fell away. We all have those accidents. I don't think that they are particularly enlightening and we don't particularly want to know what type of goggles a certain job requires. I think that we can get away from that kind of fundamental stuff that I think we have all passed.

With information of the better sort through the news-letter I believe the Quarry

Section will have a more real life and more stamina and backbone throughout the year and our officers will have overcome the handicap that they have now in their lack of support.

W. H. BAKER (J. E. Baker & Company, York, Pa.): I want to back what Mr. Graves said one hundred per cent, but I don't agree with him on the motive for safety work. I feel that we are in safety work primarily for the humanitarian good and with that viewpoint I think the expense of the thing should be secondary. We have given our men to understand that and their position toward the company can be explained in the example where a man was injured and laid up for two months. At the end of that time the doctor said that he could return to work but he refused to return and the committee laid him off and suggested to the company that he be fired.

J. A. GIBSON (Bluff City Lime and Stone Company, Alton, Illinois): I find a reluctance to transmit to this section the things that are really vital and interesting and pass them on to the rest of the fellows. I don't know what is back of it but there is something that keeps us from transmitting to you people the things that might be of interest to the general trade.

We have had a remarkable change in the last two years both in thought and action on the part of the superintendents and the foremen. When I started in my present work they were all scoffing at safety work but now after two years time the superintendent finally admits to me that it was worth while.

Just now I am about ready to call for a show-down on this physical examination. I may get licked but I am going to try to put it over.

I spoke yesterday briefly on the idea of sending the safety committee reports and matters of vital importance in connection with the plants into the homes of the workmen. I was laughed at for that idea about two years ago but that also has been put into operation and in my particular case it has worked. I don't know whether any other firms would have success with it but I do know that it wouldn't hurt them to know what success has been achieved with it.

In my experience I have found that the exchange of ideas is a thing that counts and I would like to receive a news-letter that contains the things that you are talking about because after all no one of us is smart enough to know all the good things that have been developed in safety.

MR. BAKER: We pass our safety men from one plant to the other and have done that for the past three years.

We have examined all our men. We have had physical examinations for the past three years and have met with fine success.

We also pass our safety news from one department to the other and also to the different plants.

MR. GRAVES: Mr. Chairman, you can see my point in that statement of Mr. Baker. I should like to know also what they are doing there. Have you any objection to my knowing about that, Mr. Baker?

MR. BAKER: Not at all. I think you are doing a lot of things that, if we knew of them, would also help us to stop accidents or to reduce them.

MR. GRAVES: I feel the same way. I would like to have a clearing house with a real amount of information to go out through the news-letter.

MR. BAKER: I say this, not to boast, but to show you why we are sold on the safety idea. In 1927 we had 213 accidents in which time was lost and in 1930 we had but seven lost-time accidents.

V. P. AHEARN (National Sand and Gravel Assn., Washington, D. C.): As the News-Letter Editor, I am particularly grateful to Mr. Graves for saying what he did. A year ago in my first news-letter I said that my conception of my job was that I was nothing more than a clearing house for information—that all I had to do was to arrange the material and place it in printable shape and pass it along to the National Safety Council for distribution. As long as I do not get that material then the members of the Quarry Section will have to be content with editorial comments and

I am sure that you are all just as tired of reading them as I am of writing them. I would deeply appreciate any help that you can give me and, to keep in line with Mr. Graves' suggestions, I think the news-letter has not been a success, and I am not saying that with any idea of extreme modesty either. I think it ought to be of real value to this Section and if you will send me the material I will give you my word that I will get it out more promptly than I have the past year.

MR. BAKER: In the handling of your dynamite you block drill the stone. You put the dynamite in the stone. The hole is naturally at the top and the dynamite goes in. That stone and a number of others go off at the same time, or they are supposed to go off, but that stone does not go off and it rolls down into the quarry where a man starts to sledge it. That has happened in all quarries as has been stated to me by Mr. Quigley a number of times. How are you going to know whether that stone was block drilled? We finally found a way and I would like to pass the idea along to you. We use a set of keels and we set the block up on these keels. It has saved many accidents for us and I think it will work for most anyone. Put a keel on each side of the stone and on the top and then either way it rolls, if it hasn't gone off, the keel will show and it will be block drilled instead of hammered.

CHAIRMAN WORTHEN: In my annual report I made reference to the Marquette Cement Manufacturing Company and the Cape Girardeau plant. Three successive years without a lost-time accident, 224,514 man-hours in 1930! It seems to me that that is truly a remarkable record. Those of you who are familiar with the operating management of a plant realize the credit that is due the superintendent of a plant which establishes a record such as that. He must instill in the minds of his men the importance of sufficient safety precautions and he must also see to it and see to it good that his equipment is safeguarded. It seems to me that this next paper on the superintendent's viewpoint of safety which Mr. E. M. Gould is going to deliver will be a real lesson in the practical application of an accident prevention program.

The Superintendent's Viewpoint of Safety in the Quarry Industry

By E. M. GOULD

Quarry Superintendent, Marquette Cement Manufacturing Company,
Cape Girardeau, Mo.

As I have been asked to prepare a paper on "The Superintendent's Viewpoint of Safety in the Quarry Industry", it is natural what follows will be my own views and experiences and may not truly represent the average views and experiences of quarry superintendents.

My early years were spent in the coal mines where accidents were plentiful and in those days practically no thought was given to accident prevention. From the coal mines I went to quarry supervision at various plants, until in the year 1924 I went to the Cape Girardeau plant of the Marquette Cement Manufacturing Company as quarry superintendent. This quarry had only been in operation about two months at that time and was operating under adverse natural conditions, twenty-four hours per day, and seldom getting enough stone to keep the kilns in continuous operation. Their La Salle plant which had been in operation a great many years had built up a very good safety organization and had a good record in accident prevention work, while our record at the Cape Girardeau plant was poor.

At about this time the management employed a young safety engineer and also sent the safety engineer down from the other plant for about a week and got us organized in accident prevention work. The engineer from the other plant was a very good speaker, with considerable experience in this line, and through group meetings he got us pretty well sold on the safety idea for a start.

Each year thereafter our record showed improvement and we watched it with great satisfaction. During 1928 we were first successful in reaching our goal. When we operated that year free from all accidents we felt like and did do some celebrating. The record from 1924, when safety work was started, to date is as follows:

Year	Man-Hours	Lost-time Accidents	Days Lost	Fatalities	Permanent Disabilities
1924	198,806	16	324	1	1
1925	351,498	6	42	2	0
1926	207,386	3	70	0	0
1927	216,707	4	119	0	1
1928	212,921	0	0	0	0
1929	197,327	0	0	0	0
1930	224,512	0	0	0	0
1931	to date	0	0	0	0

I well remember my personal view at the time we started. I felt that guarding the machinery and making unsafe places safe was O. K., but when it came to educating the men to work safe it was all "Tommy-Rot", as who in the world would get hurt on purpose? It really seemed ridiculous to go around telling men to be careful, as I felt that it was only natural for men to avoid injuring themselves. But as this was the policy of the company, I felt it was my duty to carry out this policy the same as any other policy or rule the company made. The first two years of our safety activities were not so encouraging although very interesting. One great drawback was that we had a very large labor turnover. Had it not been for this, I feel our record for the first two years would have been very much better.

By the end of the first two years I had seen enough improvement that I was fully convinced that there was such a thing as educating the workmen to the extent that they would be much more careful of themselves as well as their fellow workers. I was personally converted to the "Safety Gospel" and have been a disciple in accident prevention work ever since.

I think it can be said that the quarry employees as a whole went through about the same process of evolution in accident prevention as myself.

The foregoing statements are given, not to show any achievements in accident prevention work on my part, but to impress on the minds of any executives who may be here and that to date have made no efforts in preventing accidents in their organizations, that no matter how had their present records are or how set their key men are against the proposition, they too can perfect a smoothly functioning safety organization and absolutely stop lost-time accidents if they will determine that accidents must stop and then organize their men to that end.

Our past record is not the product of any one man but the result of the organized effort of all our men. If I were to mention any single person in our organization to place more than equal honor upon, it would be our safety engineer, Mr. Greer, as his whole time is devoted to this work and under his leadership we have been able to build up a wonderful safety record.

It is true that years ago the general impression was that accidents must happen, and that no man would intentionally injure himself, and therefore it was useless to preach safety, or to spend money in educating men to be careful. But the progress made in accident prevention work in the past decade is so great that it seems as if there is absolutely no excuse whatever for the heads of any organization to longer take this attitude. In fact it is nothing less than criminal negligence for any industry to go ahead maiming and killing men when it is in their power to stop most of these accidents, and from the great number of accidents reported each year, there are undoubtedly many organization heads still taking the attitude that accident prevention work is all "Tommy-Rot" or they, in a feeble way, are merely wishing to stop accidents in their organizations and let it go at that. If these same organization heads

did not give any more thought or energy to production and sales than they do to safety work, they would go in the hands of the receiver in a short time.

If you were to ask me for my opinion on how to perfect an organization in accident prevention, my answer would be as follows: The head of the organization must make up his mind that he is going to stop accidents and that he *doesn't mean maybe*. This, in my opinion, is one of the most important features of the program, because when the organization head really makes up his mind that accidents must stop, then he will put the idea over to his superintendents and foremen the same as he would any other important operating program, which will practically insure its success.

The next move should be to map out a definite plan or program. I suggest that the services of an experienced safety engineer be obtained for at least a week, if not permanently, to make a survey and then outline the program. If for any reason you do not wish to keep an experienced engineer after the program is decided upon, you might pick some man in your organization who will follow the program to the letter. In selecting this man, be careful and select a man who is a good mixer, one whom the men like and have confidence in and one who is a fair talker and is sold 100 per cent on safety work himself.

The next move is to sell the idea to the superintendent and foremen. This sometimes is not as easy as it may seem, but the success of the venture absolutely depends on this, and should it happen that any one of these key men cannot be sold on the idea after persistent effort, there can be but one remedy left and that is to replace him.

A superintendent or foreman must be completely sold on safety work himself in order to put the idea over to his men to the extent that accidents will be entirely eliminated because it does not take long for the men to see if their boss really believes and practices what he preaches.

Naturally, the next move is to sell or educate the men themselves to work safely. There are several successful methods in use to accomplish this purpose and naturally each organization considers theirs the best, or they would undoubtedly change to the better method. Possibly geographic location, social environment and nationality of workers has a great deal to do with why different plants in various locations, using different methods acquire similar results.

The methods used by our company are as follows: We have a full time safety engineer who is in charge of the safety department. Every three months a workmen's safety committee is appointed by the foremen, consisting of one man from each department. This committee meets for one hour every Wednesday morning, except the first Wednesday of each month, which is given to the foremen's safety meeting. Steady attendance at these meetings is required of both committees. The proceedings of the meetings of both committees are about the same.

At these meetings, near accidents are discussed and if any remedies are suggested, they are given due consideration. Minutes of the previous meeting are read, dangerous conditions or practices discussed, articles regarding safety work are read and suggestions or talks heard.

We also have a safety court and police force which appears to create more interest in safety work than any one other feature of our program. We elect a chief of police every six months and every safety committeeman is a police officer. They all wear a special safety police badge while on duty. Any employee from the plant manager on down caught violating a safety rule or in the act of executing an unsafe act is arrested and notified to appear at the next safety court.

Our court consists of the safety committee as jury, the plant superintendent as judge, and the safety engineer acts as the prosecuting attorney. The defendant has the privilege of having any one he wishes to defend him, or if he wishes, he may defend himself. After the evidence is all heard, the defendant is conducted out of the room while a vote is taken by the jury. If they find him guilty the judge sen-

tences him to draw his fine out of a grab box. The fines are all written on cards and require the guilty person to do such things as report before the next safety meeting and read an article on safety, or show the committee how to give first-aid treatment for various injuries, etc. Also a photograph is taken of all convicts and placed in the rogues' gallery in the clock room. Everyone convicted takes his punishment good naturedly and then is on the watch to catch somebody else. The court trials are held at the regular weekly safety committee meetings. Besides making arrests, the chief of safety police takes about one hour each day to go all over the works on an inspection trip and reports to the superintendent any dangerous conditions, careless practices or unsafe tools he may discover.

We call all of the men together for about thirty minutes during working hours four times each year, and the safety engineer, superintendent and maybe some outside speaker give them talks on safe practices. We also give the men a chance to express any ideas they may have or in other words, we just have an old time revival meeting.

At these meetings we try to impress on the minds of the men the pain and mental suffering accidents cause, also the empty pay envelope, the distress that is caused in fatherless families, the curse of going through life a cripple, etc.

We have a first-aid room fully equipped with trained attendants in charge, and we insist that anyone getting as much as a scratch must report immediately for first-aid, and this tends to eliminate infection cases.

We have a doctor visit the first-aid room from ten to eleven a. m. each day except Sunday and he takes care of all treatments except the first treatment which is rendered immediately after the accident.

We enter our quarry in every contest for which we are eligible and also create departmental contests of our own, as we feel the American people are great sportsmen and it seems like contests of different kinds will bring results when most other methods fail. In our local contests we give prizes to the winners and to all safety committeemen and chiefs of safety police at the end of their terms.

An attractive and permanent safety bulletin board is maintained in each department, and through our membership in the National Safety Council new and interesting posters are displayed regularly throughout the plant. This and the other services of the Council we have found to be indispensable in promoting our safety program.

The foremen are held responsible for the safe operation of their departments the same as they are for production and costs.

The whole secret of successful accident prevention lies in educating the men in safety work to the extent that they personally think out all the dangers involved in their individual work and then perform their work in a safe way, ever bearing in mind those true slogans, "*It does not pay to take a chance*" and "*Safety-first—Watch your Step*." Then again it is very essential to impress upon the employees' minds that they should look after the dangerous practices of their fellow workers and warn them of the danger, should they discover a dangerous act about to be executed. The safety court and police force are on watch for careless practices so they can make an arrest. Also after an employee comes before the safety court, he is anxious to report somebody else for the fun he gets out of it. Altogether it seems that everyone is kept alert in safety work.

When a workman makes a suggestion that he thinks will help the safety work, it is always a very good policy to give him an attentive ear, and if the suggestion is not sound and you have to reject it, use all the diplomacy possible as his next suggestion may be very good.

If you will visit the plants having a good safety record, you are sure to notice a wonderful spirit existing between the company and the employee. Friction between employer and employee is naturally detrimental to a good safety record.

Labor turn-over is another item worthy of consideration. Every new employee means another man to train to work safely.

Machinery should be well guarded but it is surprising how few accidents are caused by unguarded machinery when compared to those caused by pure carelessness.

A company just starting out in safety work should not be disappointed if, at the end of the first year, they have had several accidents, because as a general rule it takes several years of hard persistent effort to reduce accidents to a minimum, although after the first year there should be a marked improvement.

When the men have been educated to this point, the greater part of the details of accident prevention work will be automatically taken up by the workmen themselves, and as they begin to feel the responsibility they take more interest and pride in making a good safety record.

It has been our experience that it is a great stimulus to safety work to allow our workmen and foremen the privilege of drafting our yearly safety program.

The effort required to eliminate accidents is no less than whole-hearted cooperation, and the entire organization from the president down to the water boy can be compared to a chain in which each man represents a link; and if one man gets hurt, the record is broken the same as is true of the chain when a link is broken. So every man in the organization must believe and practice safety if a perfect record is to be attained.

If a small percent of the money that is paid out for insurance or for compensation where insurance is not carried, was spent for a well organized continuous accident prevention program, faithfully followed, along with plenty of thought and persistent endeavor, a great many industries would show a big financial saving as well as a great saving of pain, grief and fatalities to their employees. In closing I want to ask you to remember, "You pay more for safety when you try to do without it."

CHAIRMAN WORTHEN: I don't know how the rest of you feel but it seems to me that these papers this morning have been educational as well as interesting.

ADJOURNMENT

Thursday Afternoon Session
October 15, 1931

A. L. WORTHEN, Chairman

The Connecticut Quarries Company, Inc., New Haven, Conn.

The second session of the Quarry Section convened with General Chairman Worthen presiding.

CHAIRMAN WORTHEN: The Program Committee had been hopeful they could secure a foreman who had come up through the ranks to finish up this plan of presenting various phases and the views of those who have to do with the operation of our plants. Unfortunately we were not able to secure such a person to come here. Mr. Colville, who came to our rescue in this dilemma, interviewed a number of men, and I know from the preparation he has made that he is going to be able to give us more of a picture than we have ever had before, showing just how our foremen and laborers view this effort we are making to prevent accidents.

The Foreman's Viewpoint of Accident Prevention

By R. E. COLVILLE

Manager, Insurance Division, United States Gypsum Company, Chicago

In the operation of a quarry the foreman is in a position similar to that of a man halfway up a ladder—he looks up to the positions above him and looks down reviewing the experiences he himself has passed through. He is able, therefore, to get the point of view of the management and of the men. He knows that an efficient management is sincere in the desire to produce a good quality product economically and without injury to its men. It provides buildings and working areas not only well designed but maintained in first class condition. Its equipment is guarded and well maintained and only intelligent, able, desirable workmen are employed. Today most of the men working are the hand picked, experienced, intelligent workers.

Under these conditions all injuries are preventable.

The United States Gypsum Company, in stating its policy, requires that its properties be maintained in the best condition, and places responsibility for carrying out the policy on men in supervisory capacities. Rules and regulations for safe operation have been developed from several years experience. These include general requirements for all employees and specific rules for each department. The supervisory employees of the company should set the example of compliance with these rules. Under the plan discipline is administered for violations of rules.

The workmen themselves believe the company wants to save money and wants to have a good record to point to. This is true and no denial is made. Some workmen feel that accidents will happen and by the law of averages no man can escape. Over a period of years there is a large enough number of injuries to touch the entire force yet analysis of the record proves that a small number of men receive the majority of injuries.

It is difficult for some of the workmen to realize that an apparently minor accident is a potential serious injury. They feel "a miss is as good as a mile." These minor accidents, however, occur because of a condition or a repetition of incorrect or unsafe methods.

It is important, if the plan is to succeed, that we overcome such obstacles and misunderstandings. It is good to have rules, but let us not have too many. Let us be sure to enforce the rules we do have. Foremen must exercise judgment in the administration of discipline in order that workmen will not fail to report minor injuries, for fear of discipline. Discipline the man who violates rules—who insists on doing

his work in an unsafe manner—just as we discipline the man who fails to work honestly.

The significance of the housekeeping condition is often overlooked. Some of our past injuries, if correctly reported, would read "Driver stumbled over tie—foreman didn't appreciate close relation between housekeeping and accidents." Foremen must be on the alert for these conditions, must observe the working areas, equipment and the physical and mental condition of the men. Then we must be sure our men are placed in jobs for which they are fitted. We can permit no show of bravado or horseplay.

We have found that the best measure of injuries is the cost—it eliminates theory and personal opinion—and when put before the foreman in the regular operating meetings gives him a practical measure of his accomplishments. We do not limit our measurement to "Lost Time" injuries only but consider an injury to be any case which requires the attention of a doctor regardless of severity. One of our quarries with 39 men had a cost of \$1.15 per \$100 payroll for injuries in 1930. Its 1931 cost per \$100 payroll is \$.08—a reduction of 93 per cent. What better measure could we ask?

A good foreman will set a good example which his men can follow. This is as true in handling problems of accident prevention (in complying with rules) as in matters of cost (where we conserve power, labor and materials). There is little to be gained by simply telling our men once and in generalities that they "must work safely." We must demand safe operation, indicate the correct methods of work, then continue to direct our workers.

We have analyzed the injuries which have occurred in the past and from these have devised such specific rules for our local problems as "Loaders shall work from side of cars—not between end of car and rock pile." Occasionally an able, experienced, careful worker is injured. In these cases, we usually find that his mind was not on the job at the moment, that he was distracted by someone or something or that he was not "up to par" physically. We try to keep our men "accident prevention conscious" by our bulletin board record of injuries, our warnings on the job, letters and occasionally small incentives or prizes for contributions to our accident prevention plan.

As we observe the effect of these methods on the organization it is clear that they understand the waste which results from injuries—not only in cost to the company, but to themselves as well. They recognize that the inefficient, wasteful worker—whether his laxity be in production, quality or injuries—will be eliminated from the organization.

An interesting viewpoint of a workman is indicated in the following letter, written by a workman in one of the operations of the Connecticut Quarries Co.

"Dear Mr. Worthen:

"My opinion of our accident prevention campaign is as follows: Twenty-three years ago a crusher bedplate fell on my right arm, crushing it from the shoulder down. The chain holding the bed-plate was old, weak and no good. I waited for an hour without help until a doctor came.

"When I was lying down waiting, a freight train came along and the fireman on the train took an old piece of rope and tied it around my arm. They told me later that if my arm had been cut more instead of crushed and if the fireman had not tied the rope around my arm I might have bled to death.

"Today with the first-aid training I received from the Bureau of Mines I believe I could even help myself in such an accident. Even if I couldn't, a dozen others in the quarry could. I think fifty people gathered around when I got hurt and only the fireman on the train knew what to do.

"Also today our chains and machinery are inspected so such an accident could hardly happen now. The posters we have and mostly the letters about accidents at the other quarries make everyone think how it might happen to him.

"Anyone with an injury like mine knows how good safety work is. Men

working for the company today are more fortunate than I was because every other man is watching for their safety.

Sincerely yours,

Fausti Rigoletti."

One foreman states his viewpoint of the development of the accident prevention movement in this way.

"The first stage was conducted on the order of a political campaign, with speeches and posters, the general endeavor being to "sell" the workman on safety.

"The second stage might be called the guarding era. While some of the guards applied under this regime were hazardous in themselves, most of them served the purpose well.

"We are now in the third period—we think, talk and act accident prevention rather than simply "safety first." We do not rely on guards alone but appeal rather to the intelligence of workmen. Each man is accountable for his own injury or contributing to the injury of others."

The accomplishments in saving of cost and suffering have encouraged many of our men to make worthwhile contributions in Accident Prevention and in production and have proved the soundness of this plan.

WILLIAM H. BAKER (Safety Engineer, J. E. Baker Company): I think this paper was wonderful. I am particularly interested in safety to the foreman, and this has given me some good ideas, which is the reason for my being here. I think we can get the most out of these meetings by doing as Mr. Graves suggests, exchanging ideas, and I believe the best way to establish a good safety record, or rather, which is more important, to reduce accidents to a minimum, is to do it through your foremen. Co-operate with your foremen and get their co-operation. Every working day our shop whistle is blown at ten and three o'clock, as a reminder to the men to "work safe." In my opinion too much cannot be said about the value of working for safety with the foreman.

J. A. GIBBSON (Bluff City Lime and Stone Company, Alton, Ill.): In our organization any accident in any department is charged up to the foreman of that department, and he has to square himself with the rest of the foremen in the plant if he has an accident. Our foremen are doing their best every month. They have the experience and the knowledge, and the responsibility is on their shoulders, and they are not going to have an accident in their department if they can help it.

Mr. BAKER: Every Monday at 12:25 each foreman gets his group together and discusses matters of safety pertaining to that particular group; that has helped us tremendously. Then once a month we have plant meetings. The minutes of those meetings are sent from plant to plant, and remarks come back from the different plants, with suggestions, many of which have proved valuable. We now have another committee working along with the safety committee, known as the investigation committee, which investigates the plants and makes recommendations, such as repairs, different signs, or changes of various sorts. That has also helped a great deal in reducing accidents.

We had another factor in quarry operation which caused a few accidents before we got on to it. The stone along the face of the quarry will become loose in wet weather, and drop. Therefore every morning and afternoon the face is gone over by the superintendent and quarry foreman and the contractor foreman before work is started.

There are always some men who have to be watched—they will get between the truck and the quarry or with their back to the quarry, and you have to keep an eye on them.

While I have no desire to bring the prohibition question into discussion, I wonder if you have noted that there is a difference nowadays. It used to be in the old days when the men got their pay checks there was always some disturbance, and in

one of our plants we used to have a policeman there once in awhile. Now you see no drunken men, and we have no trouble. The plants are better for it.

Another point is that the plants are cleaned up. We attribute that entirely to the safety program, because we think our foremen are 100 per cent with the company. They see the safety side, as well as the humanitarian side. We endeavor to keep the families of the men interested. We have get-together dinners once in awhile, and we have the co-operation of the workmen's families. Instead of saying "good-bye" in the morning, a man's wife says "Don't get hurt today."

CHAIRMAN WORTHEN: Mr. Baker has reason to be enthusiastic about what has been accomplished in his plant. The record he read us this morning of the accomplishment of elimination of accidents was certainly creditable. Mr. Quigley, Chief of the Bureau of Mines in the Department of Labor and Industry, very often points out just such things as Mr. Baker's company has done.

MR. BAKER: Three different schools in communities where our plants are located have given courses in safety, and that has also been a help.

THOMAS J. HEALY (Safety Engineer, T. H. Mastin Co., St. Louis, Mo.): In our eight quarries we did not have much success until we sold the superintendent of the quarry on safety devices. When we got them to put on the bulletin board each man's name who had a reportable accident, the accidents started to go down. In the last eight months in the eight quarries there have been twenty-one accidents, none more than a four-day loss. With the eye cases we had trouble, and at this time most of the quarry workers wear goggles in all operations. We are getting the men to wear safety shoes. After the Bureau of Mines car went through and put up instructions we noticed a considerable difference.

CHAIRMAN WORTHEN: I do not know how many of you have taken advantage of the Bureau of Mines service. My company just completed a course with them. It will assist you in developing your safety program. Many of our men who were lukewarm are enthusiastic over the training they went through. I would not have believed that some of those men who went through the course could have ever tied bandages or done things of that sort, but they all went through and received certificates. I want to remind you again of the fact that that service is available, and to assure you that it is most helpful.

The operator who does not think his insurance rate is high is the exception. Mr. Quigley, to whom I just referred, likened workmen's compensation laws to that luncheon dish we sometimes see called goulash. They throw everything together and pull out what they call a compensation rate. We want some solution to this mystery, and we also want to know who is responsible for the goulash, and we are fortunate in getting Mr. George V. Fuller, Assistant Secretary, National Council on Compensation Insurance, to come and explain it to us. The title of his paper is "The Operations of the National Council on Compensation Insurance and its Relation to Compensation Insurance Rates." Personally I have been looking forward with a great deal of pleasure and anticipation to what Mr. Fuller is going to tell us.

The Operations of the National Council on Compensation Insurance and Its Relation to Compensation Insurance Rates

By G. V. FULLER

Assistant Secretary, National Council on Compensation Insurance, New York City

Naturally, your major interest in this address is in connection with the development of the rates which you pay for workmen's compensation insurance. I am sure, however, that you will be interested in a few facts concerning the organization which I have the honor of representing at this Congress.

The National Council on Compensation Insurance, which is located in New York City, was organized in 1919 as an association of insurance carriers engaged in writing workmen's compensation insurance throughout the United States. Its main purpose at that time was to centralize the efforts of the carriers in the development of equitable compensation rates. The Council has now grown to a membership of about 110 carriers of all types, this membership representing an extensive distribution of compensation underwriting throughout the United States, as well as Porto Rico and the territories of Alaska and Hawaii. While the Council's major purpose is still the same, its functions and influence have been considerably extended.

The development of all matters pertaining to workmen's compensation rates, and the rules, classifications of industry and merit rating plans necessary for applying such rates, is vested in the permanent Staff of the National Council, now numbering about 85 executives and employees. Rates and procedures proposed by the Staff are reviewed by various committees of member carrier executives and either approved, amended or rejected as seems advisable. The entire operations of the National Council and its various committees are under the direct supervision of the National Convention of Insurance Commissioners through its special representative, who is permanently resident in the office of the National Council. As a matter of fact, this special representative acts as chairman of all committees having to do with rating matters, with authority in most cases, to cast the deciding vote in the instance of a tie ballot of the carriers on such committees.

The National Council, through its six administrative bureaus located in various sections of the country, also administers or directly supervises the application of compensation rates, rules, classifications and merit rating plans in some fourteen states. In general, such administration consists of the inspection of individual risks for classification and rating purposes; the calculation and promulgation of individual risk rates; and the examination of the actual policies, covering all risks throughout the particular territory, to prevent improper underwriting or non-compliance with the Bureau requirements for unfair competitive or similar reasons. The Administrative Bureaus of the Council are sanctioned by the State Supervising Authorities in their particular territories and through the support of such authorities, the Bureaus are able to exert control over the writing of compensation insurance in those states subject to state supervision. Similar control is possible in states which are not subject to State Supervising Authorities by means of mutual agreements made by the members of the Council in the signing of its Constitution.

The primary functions of the National Council, as previously stated, are the collection of past experience from its members, the correlation of such data for rate making purposes and the development of rules, classifications and merit rating plans for use in the application of such rates. Obviously, the experience of one carrier alone could not be expected to produce even reasonably reliable rates for all industries. Therefore, by pooling their individual experience, the carriers are able to accumulate a very large volume of data, from which reliable and equitable rates may be developed for their mutual use. Then, too, it is much more economical to centralize all of the expensive statistical operations necessary to develop equitable rates. Standardization of rate making methods and fair competitive practices in connection with the actual application of the rates themselves are possible only through the existence of a central organization. The Council also acts as a clearing house for all information and advice regarding compensation insurance.

The Council itself develops the rates for practically every state in the country where there is a Workmen's Compensation Law permitting of private insurance.

In some twenty-six such states, compensation insurance rates are subject to the review and approval of Insurance Commissioners or other state supervising authorities. In about ten states legislation has not provided for state supervision over compensation insurance rates, so that in these states rates adopted by the committees of the Council are final. In a few states there are independent organizations similar to the Council but each limited in jurisdiction to its own particular state. Even in connection with most of these states, the Council cooperates with such local organizations in the determination of their rates.

Let us now discuss the general principles underlying the making of compensation insurance rates. I am not going into the mathematic theory nor the detailed steps involved in compensation rate making, but instead, I shall try to clearly outline the fundamentals, which after all, should be of major interest to the purchaser of compensation insurance.

The purpose of workmen's compensation insurance is to guarantee monetary compensation to employees in industry for injuries sustained by them through accidents in the course of their employment. Accident cost in terms of such monetary compensation varies from industry to industry according to the operations conducted by such industries. Naturally, one would not expect that a shirt factory would produce as great an accident cost as a quarry. Obviously, therefore, compensation insurance rates, which are in fact indices of accident cost per unit of exposure, are not going to be uniform from industry to industry. It happens that the most satisfactory unit of exposure for compensation insurance purposes is payroll, and therefore, our compensation rates are really indices of accident cost per one hundred dollars of payroll.

The first step, therefore, is to develop a series of industrial classifications to which all risks may be assigned, each classification being intended for a reasonably homogeneous group of risks. The practicability of application governs the number of such classifications. While an excessively limited number of classifications unquestionably would permit the development of a very reliable average rate for each classification, due to the greater volume of data that could be collected in each class, it would not be possible with too few classifications to assign rates to individual risks which would be sufficiently variant to fairly reflect the hazards of such risks. Conversely, an excessive number of classifications would not permit of the consolidation of enough accident cost experience under any one classification to make it possible to develop a reliable or reasonably stable rate for such classification. The Compensation Manual now contains about 700 industrial classifications, with a certain few state special classes in addition, to provide for industries characteristic of such states only. The Classification Manual is under constant scrutiny in order to keep the classifications in step with changes in industry.

Having established an appropriate table of classifications for industry in general, we are ready to develop average or manual rates to correspond, with the hazards of such classes. At this point may I emphasize the term "rate" as applied in connection with compensation insurance. A compensation insurance rate is actually the ratio of accident cost to exposure and is quoted in practice as the premium charge per one hundred dollars of payroll. Compensation benefits are not the same in any two states, so that insurance rates must vary statewide in accordance with the Compensation Laws of the various states. In general, however, the rates for the various individual states are determined in the same manner and from the same general type of statistical data. These data consist of the past experience of the insurance carriers, reported either directly or indirectly to the Council by means of what is termed "Schedule Z." Under this system each carrier annually reports for each classification, its insured payroll, which, as previously stated, is the measure of exposure subject to accident cost; and the actual

incurred monetary loss, which is the actual accident cost to the carrier under all of its policies issued during that particular year. The reports of the individual carriers are correlated by state, policy year and classification so that not only do we have a large amount of data available in the aggregate but these data can be segregated as desired for use in the various steps involved in rate making. It is obvious that a compensation rate is a direct reflection of the actual incurred accident cost sustained by the insurance companies in the coverage of a particular industry and it is important to note that the accident cost in other industries has little bearing or influence upon the rate for such industry. In other words, the rate for the quarry industry, for example, is not appreciably affected by the accident costs of other industries but is a positive result of its own accidents. It therefore lies within the power of any industry to create a favorable rate by reducing injuries to its employees by effective accident prevention work. The nationwide activities of an industry toward reducing accident cost affect the compensation insurance rates for every state in proportion to the extent that the national experience is used in the determination of the rates in individual states. The use of the national experience in insurance rate making will be discussed later. At this time it is important to stress the fact that while the National Council develops rates, it does not make them. The industries themselves make their own rates by the accidents that are permitted to occur and recur in such industries. If an industry wants lower compensation rates, it must make them itself by all means at its command particularly through the prevention of accidents and the lowering of accident cost. Accident prevention, therefore, which is the keynote of this Congress, has a distinct and very definite bearing upon your compensation rates. If the various industries can reduce their accident costs, the insurance companies through the Council can then develop lower rates from improved experience which the industries themselves have made.

Actual rate making for a particular state consists first in determining what is termed the "state rate level," that is, the total premium required to meet the expected cost of compensation for injuries sustained by workmen in the state during the period that such rates are to be in effect, plus the expense of conducting the insurance business during that period; and second, the apportionment of the total state premium to the various classifications in proportion to their respective hazards or in other words, the establishment of what is termed the "classification rate relativity." It is extremely important that you should understand what "state rate level" means because it plays a very important part in the determination of rates for any particular state. When we develop rates for an individual state, such rates must provide that the accident cost sustained in that state plus the cost of conducting the insurance business is going to be covered by the collected premium based upon such rates. The accident cost in other states does not enter into the picture in the determination of the "state rate level." In other words, a certain definite amount of money in the form of premium must be collected in each individual state to cover its own accident cost exclusively. Of course, we might charge all industries a uniform rate determined so that when applied to the exposure in each industry the premium income in the aggregate would just equal that needed to meet all accident costs. Obviously this would be unfair, because as previously stated, some industries are much more hazardous than other industries and are responsible for a much larger proportion of the total accident cost in the state. Therefore, rates must vary by industry on the basis of their relative hazards or in other words, we must apportion the total state premium necessary to pay the total state losses on the basis of industrial hazard relativity.

The determination of "state rate level" and "classification rate relativity" in connection with compensation insurance can be compared for illustration with the

determination of real estate taxes in a municipality, for there is a very striking analogy. Our "state rate level" corresponds with the aggregate amount of money needed by the municipality for administration, improvement and like expenses and our "classification rate relativity" corresponds with the tax assessments on the individual property owners as based upon their property valuations involving size of plot, location, improvements and other appraisal items.

Each year, in accordance with the provisions of the statistical rules known as "Schedule Z," the insurance carriers furnish the National Council with a report of their most recent experience available. This experience is reported upon what is called a "policy year" basis which differs from a reporting which might be made on a calendar year basis in that a particular policy year's experience actually covers two calendar years. For example, a policy written to be effective on the last day of a particular calendar year is in effect all through the following year; whereas a policy written to be effective on the first day of the calendar year is in effect throughout the calendar year itself. This policy year procedure is necessary to permit the accident cost sustained on all policies issued during a calendar year to be compared with the actual premium collected on those same policies. This is essential in obtaining the actual "loss ratio" of any particular year's insurance writings. The data for the previous years are already on file with the Council and are readily available for combination with the latest experience.

In general, the data reported by each carrier are in the aggregate by classification and are in the form of actual payrolls, actual premiums collected at the manual or adjusted rates existing during the particular policy year of coverage and the actual incurred accident costs, meaning the amounts already paid and those outstanding because of the deferred payment provisions of the compensation laws.

With this, what might be considered as "raw" data, or in other words, the original reporting of premium and losses as they actually existed, it is possible to determine a loss ratio for each policy year showing the ratio of the actual accident costs to collected premiums. While "raw" loss ratios are interesting for purposes of general information, they are not particularly applicable in our rate making process because they are not comparable one to the other.

Over the several years, there have usually been certain changes in the State Compensation Act or other changes have occurred outside of accident frequency itself which have materially affected compensation costs. The Act may have been liberalized in one way or another; the authorities, upon whose judgment the amount of the awards for compensation are dependent, for economic or other reasons may have become more liberal; a general increase may have occurred in the fees for hospitals, doctors and nurses or other medical attention for the injured; and other changes of less importance may be cited as examples of changed conditions which may have affected accident costs. It is apparent, therefore, that the annual experience as reported by the carriers cannot be used "raw" but must be adjusted so that the experience for the individual years used in the process is on a common basis. Since the rates which are to be determined are intended to compensate for the accident cost which will develop on the basis of the Compensation Act and the general conditions existing at the time of determining such rates, it is logical to use the so-called "present law level" as the common basis for the accident cost data. Since the indemnity cost is principally affected by changes in the Compensation Act of the state, the indemnity experience reported for each year is projected to the "present law level" by applying "amendment factors" which represent the difference in cost between settling the same cases under the old and present Acts. On the other hand, while medical cost may be slightly affected by changes in the Act, by far the greater effect is

caused by the increasing cost of medical attention. Therefore, we key the medical cost to the level which may be expected to obtain during the year the rates are effective, as disclosed by the trend of the past medical costs.

As in the case of the "raw" accident cost actually sustained by the carriers during the various years, the premium during the same period of years is usually not collected on the basis of the same conditions. Changes in Manual rates have usually occurred so that the amount of premium that was collected in an earlier year, for example, would not be the same in amount as would be collected at the present time for the same payroll exposure. As you have seen, we have projected the accident cost to a common basis which is represented by the "present law level"; so we must likewise project our actual collected premium for the various years to a corresponding common basis, which obviously would be that of the present manual rates. To determine the "collectible premium," which is the premium that would have been collected in the past if the present manual rates had been applicable at that time, we use as a basis the state payrolls for each year of the experience and the manual rates now in effect.

With both losses and premiums for all years of the experience on a common level we can now determine the expected loss ratio for the period to be covered by the new rates as predicated on the state's own past experience.

It is important, first of all, to understand the term "permissible loss ratio," as applied in connection with compensation insurance. You will recall that a few moments ago I stated that compensation insurance rates provide for two contingencies; first and foremost, the payment of accident cost which is expected during the year the rates are in effect; and second the reimbursement to the carriers for the expenses of operating their organizations during the same period. The standard rate making program of the National Council normally contemplates that 60 percent of the total premium collected under a given set of rates shall cover the accident cost and the balance, or 40 percent of the total premium collected, shall go to meet the expenses of conducting the insurance business; such expenses being acquisition cost, taxes, and the expenses involved in claim adjustment, inspection and accident prevention, payroll auditing and general administration. These percentages vary slightly from state to state due to differences in the tax requirements of the various states and also due to differences in the method of collecting the expense portion of the rates. The "permissible loss ratio" therefore is that ratio of accident cost to collected premium which must be maintained in order that the insurance carriers may break even, and as previously stated, such permissible loss ratio under the standard rate making procedure is 60 percent.

You may wonder why we do not express our loss ratios in terms of dollars rather than percentage. This is due to the fact that while past experience shows accident cost per dollar of premium under a perfectly definite condition there is no way of knowing whether future changes in exposure are going to occur which will upset the proper relationship between premiums and accident costs. If we used past aggregate losses as a basis, then the industries would pay more than they should for their coverage if the exposure were to increase; while conversely, a decrease in exposure would penalize the carriers. Since percentage maintains a constant relationship of premium to losses irrespective of exposure changes it is obvious that the percentage loss ratio is the fairest to all concerned.

The standard rate making program of the National Council provides that the rates for a particular state shall be predicated upon the basis of the three latest available years of experience sustained by the carriers in such state. In other words any future set of rates shall be based upon the level indicated by the average of the loss ratios for the three latest available years of state experience. When the present rate-making plan was devised judgment prompted the selection

of the three latest years of state experience as a criterion of the state rate level. It was then expected that the quantity of data represented by three years of state experience would be enough in practically every state to produce an entirely reliable average loss ratio and the period would not be so long that it would be unresponsive to changes in accident cost conditions, nor so short that it would permit violent fluctuations in the level of rates from year to year. It was also the opinion that it would be sufficiently close to the period in which the rates were to apply that it would guarantee a reasonably prompt reflection of the most recent trend in accident costs in the state. However, while we still employ the three latest available years of state experience for the determination of state rate level, it is not entirely satisfactory because it is actually failing to reflect the steadily increasing trend of accident costs.

The determination of whether the present rates in a state are in need of revision and if so, the extent of such revision, is by means of a comparison of the loss ratio reflected by the average of the three latest available years of state experience and the "permissible loss ratio." In other words, the change in the rate level expressed in percentage is calculated by dividing the loss ratio of the three latest available years of state experience by the permissible loss ratio.

We must now find how much each industry is to be made to pay to cover its proportionate share of the needed aggregate state premium. If in the previous steps we have found that the existing rates are not adequate to meet the aggregate expected losses, it may be that only a few locally important classifications are responsible for the shortage. If our determined rate level indicates existing rates are excessive, maybe the rates on a few principal classes are too high. Even though the state rate level is just right, upon investigation we may find that the rates for certain individual classifications are too low while those for certain others are too high, the effect being a neutralization of the discrepancies. It is the purpose in determining classification rate relativity to correct these conditions. To amend all rates by a flat percentage would produce the appropriate aggregate premium but the inequitable relativity from industry to industry would still persist.

Even in determining classification rate relativity for a given state we want to pay as much attention to the state experience as possible because of state peculiarities that may exist in the various industries, but unfortunately all individual classifications applicable within the state will not produce sufficient data to permit an accurate comparison for hazard relativity determination even though we use more than three years of experience. For example, the quarry industry in Indiana is very important, and the volume of quarry experience in that state is enough to indicate its proper level in comparison with the aggregate. In Louisiana this is not true but yet quarry rates must be provided for Louisiana as well as Indiana. If only three years of experience were used, as in the case of determining the state rate level, there would be very few classifications in a state that would produce enough experience to indicate their proper hazard relativity. For that reason five years of experience are used for relativity purposes,—the five years' experience, of course, being adjusted to the same level as the three years' data used in connection with the determination of the state rate level. Five years of experience satisfactorily reflects changes in hazard but it also prevents excessive fluctuations of the individual classification rates from year to year. Even with five years of state experience there is not enough data in many classifications to reflect their proper hazard relativity. This is where national experience, or in other words, the combination of all states' experience enters our calculations. Here again we use five years of national experience wherein the experience for each of the various states is placed upon a common level so that their data may be properly combined and further adjusted to the state rate level.

As previously stated, an industry in a certain state may be affected rate-wise by the corresponding operations in other states and the smaller the industry is in an individual state, the greater the effect of the national experience. Now just how important must an industry be in a state to justify accepting its exclusive experience as a reliable indication of its own rate relativity? At this step actuarial and underwriting judgment has prompted the setting up of an arbitrary criterion. In the past, several methods have been used as a guide. In a classification where accidents are numerous, the law of average comes more accurately into play than in one where the accidents are infrequent, even though the payroll exposures may be identical. We cannot use a definite amount of accident cost exclusively as a criterion because that system would permit a classification with a high loss cost to have full credibility but not a classification with a low loss cost.

A combination of both exposure and accident cost is really what is required, so our criterion is based upon what is termed the "expected losses" for the state. By "expected losses" we mean the amount of accident cost that would occur in the state if the national hazard relativity were duplicated in the state's own data. Assuming that the state does not produce enough experience to be fully indicative it is logical to expect that the national data will produce a more reliable approximation of a classification's relative hazard than will the state's own data for such a class. We determine each classification's expected losses by multiplying the state's classification payrolls for the latest five years by the corresponding national accident cost for such classification or in other words by what is termed the "national classification pure premium" which has already been converted to the state level of cost as previously stated.

The term "pure premium" has not been referred to previously. However, the "pure premium" for any classification is that portion of each dollar of premium which is intended to cover accident cost exclusively and is actually the ratio of accident cost per \$100 of payroll.

Now it is apparent that in some industries the accident cost is primarily due to infrequent costly accidents while in others the accident cost is due to frequent but relatively low cost cases. Applying our expected loss criterion in one step, therefore, would not permit the feature of accident severity in the experience to be sufficiently reflected in the classification rates. Therefore, we have set up three divisions in both the state and national classification experience, i.e., "serious" indemnity costs including fatal, permanent total and major permanent partial cases; "non-serious" indemnity costs, including minor permanent partial and temporary cases; and "medical" costs covering all payments for medical services whether in connection with an indemnity case or not. A different expected loss criterion must be applied to each one of these parts of each classification's experience to determine the amount of credibility which the state's own experience is to receive in the final rate.

Our criterion provides that if the expected serious losses for a classification equal or exceed an amount which is twenty-five times the average state cost of a serious case, the serious portion of the state rate shall be based exclusively on the state experience. If the non-serious losses equal or exceed three hundred times the average state cost of a non-serious case, the non-serious portion of the state rate is based on state experience alone. And if the medical expected losses are at least 80 percent of the non-serious expected losses, the medical portion of the state rate is based on state experience alone. If the volume of the state expected losses for a classification does not qualify its experience for full credibility, we still allow the state experience to influence the rate in proportion to the amount of expected state losses as compared with the criterion for full credibility.

For example, if the serious expected losses for a classification are between 75 percent and 100 percent of the amount required for full credibility, then the serious portion of the rate is determined by using 75 percent of the state experience and 25 percent of the national. If it is between 50 percent and 75 percent, half the national and half the state experience is used. If between 25 percent and 50 percent, then the state experience to the extent of 25 percent is used and the national experience used amounts to 75 percent. Below 25 percent the state experience receives no credibility and the classification rate relativity is determined on the basis of national experience only. The same procedure applies to the non-serious and medical portions of the rate. The results of this weighting process are called classification "state formula pure premiums."

Now, if the state formula pure premiums could be used to determine the rate for every classification our process would be a simple matter from here on. Frequently, however, other conditions exist in connection with the experience of a classification which properly prompt a pure premium which is a deviation from formula. It is necessary, therefore, to review the individual experience for every classification which is granted any degree of state credibility and to select the proper pure premium for each one. The individual classifications with no state credibility are not reviewed but national pure premiums are adopted for them without further question.

We have now selected all of the classification state pure premiums so that they reflect their proper hazard relativity. A test is now made using these pure premiums and the state payrolls reported in the rate level years to prove that rates based upon such pure premiums will produce the aggregate premium indicated in our determination of state rate level as needed to pay the state losses. Of course, if our test indicated a radical shortage or redundancy in the aggregate premium resulting from the selected pure premiums, we could apply a flat factor to all of the state classification pure premiums to bring them exactly into line in the aggregate but this flat adjustment would not affect the classification state rate relativity in any way. We find, however, in actual practice that such an adjustment is not required due to the care taken in the selection of state pure premiums.

We now uniformly increase these final classification state pure premiums to provide in the rates for the expense of conducting the insurance business in the state. Our last step is to add one cent to the amount thus obtained in order to spread the expected cost of catastrophes over all industries, and we produce thereby the Manual Rates.

You will remember that in the earlier part of this address I referred to what are called the "Merit Rating Plans." A detailed description of such Merit Rating Plans cannot be given now because of the limited time allotted to me but an address concerning workmen's compensation rates would not be complete without some reference being made to the methods which we employ in fitting appropriate and equitable rates to the individual risks themselves.

As the term implies, these plans provide for varying the manual rate on the basis of the merits of the individual risks themselves as measured by their physical conditions and their accident cost history. It would be no fairer to require all individual risks within a classification to take the same manual rate than it would be to require all industries to take the same manual rate. Recognition of variations in physical conditions from risk to risk is given by means of what is known as the "Industrial Compensation Rating Schedule." Determination of the future relative hazards of the individual risks as based upon their past experience is accomplished by what is called the "Industrial Experience Rating Plan." In the Schedule Rating Plan, which applies only in connection with certain manufacturing classifications, we compare the physical conditions of the individual

risk, as determined by an actual inspection of the properties, with the average for its particular industry and if it is physically poorer than the average, the manual rate is increased while if it is physically better than the average, the manual rate is reduced. In the Experience Rating Plan, which on the other hand applies in connection with all classifications, we compare the past experience of the individual risk with the normal experience expected for such risk and the manual rate is increased or decreased according to whether the risk's individual past experience is better or worse than the average.

In closing, I want to stress the three salient points of this address because they are vitally important not only to your industry but to every industry, and by understanding them, the relationship of this Congress to the matter of workmen's compensation rates will be better understood. First, the "state rate level," or in other words, the aggregate amount of premium which must be paid by all industries within a given state for their compensation insurance, is dependent entirely upon the state's own accident costs which have been paid by the insurance carriers. Second, the "classification rate relativity," or in other words, the distribution of the aggregate state premium among the various industries in the state, is in proportion to the individual industries' own accident costs. And third, the "individual risk rates" are, in a major degree, dependent upon the accident costs which have been sustained by the carriers in the coverage of the individual risks themselves.

Therefore, since the basic foundation of all compensation insurance rates is accident cost produced entirely by industry itself, it is apparent that it behooves each industry, either statewide or nationally, to not only reduce its accident costs but to keep them down to a minimum if it desires lower compensation insurance rates. The principles underlying this National Safety Congress distinctly point to ways and means for accomplishing the reduction of accident costs and reduced compensation insurance rates which is one of the numerous and important benefits which may be derived from following its lead. However, as I have pointed out in connection with workmen's compensation insurance, a reduction in the cost of insurance to industry is entirely dependent upon the industries themselves.

CHAIRMAN WORTHEN: Mr. Fuller has given us a great deal to absorb. I am sure there are some questions that you will want to ask him.

ALBERT S. REGULA (Industrial Relations Counselors, Inc., New York City): As I understand it, the rates are established either by your board or some board in each state; the insurance company has nothing to say about the rate that is to be charged.

MR. FULLER: They report their experience to us; the actual determination of the manual rates is made by us and we are absolutely impartial.

CHAIRMAN WORTHEN: The rates are arrived at from the reports of the insurance companies in the various states. In an industry such as ours, where a roadside operation is opened up, where no regard is given for accident prevention, are we bearing that cost? A quarry such as that may operate for four or five months, and they may kill three or four men in that time. We operators who operate on a commercial scale, and who make some effort to prevent accidents, are paying for that man's insurance.

MR. FULLER: It depends upon the classification. If a classification specifically includes quarry work, then any accident which might occur is considered under that classification; in a roadside quarry it would not be so considered. It would go into a general pool and would be used in developing a manual rate to be applied to the entire industry.

OTTO M. GRAVES (President, Crushed Stone Company, Easton, Pa.): I am in doubt as to the meaning of Mr. Worthen's question. A man opens a roadside quarry, runs it for six months and then shuts it up. Would the quarry industry be paying for his insurance?

Mr. FULLER: The quarry rate charged the industry would include the effect of his experience.

V. P. AHEARN (National Sand and Gravel Association, Washington, D. C.): What procedure does the Council follow in establishing its rates? It seems to me that in the ready-mixed concrete industry the National Council on Compensation Insurance has arbitrarily classified that without giving the members an opportunity to have something to say about it. I believe they are classified as concrete block plants. I believe the Council should ask the industry to participate in that question.

Mr. FULLER: All classifications are under constant scrutiny to bring them into step with industry. It is one of the important functions of the Council to study new industries that are constantly developing. Ready-mixed concrete has become a major industry, but up to two years ago there were very few risks engaged in delivering ready-mixed concrete. Naturally, when one or two risks develop the Council is asked for an opinion as to what rates should be applied. We immediately endeavor to get information from the risks themselves to find out what the operations really are and what may be expected or what has occurred accident-wise. On the basis of that information and with other data that we may have on hand we work out a rate and classification which seems fair. We then wait until we can get some actual experience on that type of risk, and compare it with what our premium has been on the basis of the rates we have charged. If we find that the past rate appears proper and that the industry is still small, involving only a few risks and very limited payroll exposure, it is obviously impracticable to set up a special classification for that industry but we must wait until it has developed further. You have mentioned an industry which we have been studying for two years so far as its relation to compensation insurance is concerned. We have found it particularly difficult to obtain only actual experience on this business until just recently. We now have about ten or twelve concerns that are covered in the various states and we are now reviewing the actual experience of these companies to find out if our past rates and classes assigned are justified. If we find that the industry has reached the point where it is entitled to a specific place in our manual we will certainly not hesitate to put it there.

You ask whether we ever get in touch with the industry. That is an important source of information for us. We never develop a classification procedure without going out locally, if we can, to ask about the process and hazards of the industry. On that information and the correlation of other data obtained elsewhere, we determine whether or not we are penalizing the assured or the carrier.

CHAIRMAN WORTHEN: Why is it not possible for the Council to make a rate so that commercial operators, who are operating safely, do not have to bear the burden for those who are not? Is the only recourse we have self-insurance?

Mr. FULLER: As a matter of fact, the quarries are given a rate. You must have an average to start out with, and that is determined by all quarries in that classification, including the haphazard quarry as well as the long-time established quarry. Working from that average we apply the Experience Rating Plan. If the commercial quarry is of sufficient size it very materially determines its own rate. The fly-by-night quarry is usually too small to receive any rating at all; if it does it is usually a charge over the manual rate.

CHAIRMAN WORTHEN: The question is, could there not be developed some means to give recognition to the efforts which the industry is putting forth, and the reduction that it has made in accidents? I do not think anything has been done to bring that about, and it seems that our rates are going to increase, using your methods of determining rates, because I feel that roadside operations are apt to increase.

Mr. AHEARN: It has been my impression that a good many quarries have come to self-insurance.

Mr. FULLER: If the large risks continue to self-insure the time will come when the manual rate for quarries will represent the hazards of the small roadside or fly-by-night quarries. If the time comes when the big quarries insure, and their good experience goes into the rate making procedure, their experience will greatly predomi-

nate and the experience of the small risks will be more or less buried and will have little effect upon the quarry manual rate. But it is obvious that the insurance companies cannot carry the little fly-by-night operators who are bad risks usually on the basis of the experience of those who are good but self-insured.

Mr. GRAVES: We happen to be self-insured, but I would like to ask why it would not be advisable for the Council to draw a line between a quarry which was in operation for a long time, and one which was opened to cover perhaps a ten-mile-road job? Is that not feasible?

Mr. FULLER: I believe it to be a fact that the quarry industry has decreased. Quarries that ordinarily operate ten or eleven or twelve months of the year have dropped off to five or six months or less of actual production, with corresponding decreases in payroll. You can readily see that it would be a very difficult thing to draw a dividing line and maintain it. A large risk on that basis might go into the higher rated classification one year regardless of past experience and the next year it might jump back. Instability would result and be caused by depressive conditions not connected closely with compensation insurance as such.

Mr. GRAVES: What states are represented in your Council?

Mr. FULLER: All states which do not have employers' liability provisions exclusively.

Mr. GRAVES: Let us take the section north of Virginia and east of Chicago. In that section the operations would run eight months of the year. When you speak of the depression period—they are producing less, but it is not that they are starting later but that they are using less men. I do not see that your comment effects the question. I am speaking of the quarry which started, say, in 1925 and has been operating during the regular season ever since, as distinguished from a quarry which is run for six months and then quits.

Mr. FULLER: It may be possible that one can find a dividing line, but whether it can be maintained is another matter.

Mr. GRAVES: You can see what it is doing to the quarry industry. The larger companies think they can do better if self-insured. That leaves the balance of the industry getting the hardship of the rates of the fly-by-night quarry, and losing the benefit of the upper class.

Mr. FULLER: We have recognized just what has happened. There are other industries in the same boat. So far, we have not been able to find a solution which is fully and equitably effective. It may not be satisfactory to the entire quarry industry at present but the longer the big risks are self-insured the longer it is going to take to get experience to develop more satisfactory rates. The Council welcomes any suggestions any industry may offer to better it. We frequently solicit the associations to see if they have any thoughts which might have a bearing on the subject.

CHAIRMAN WORTHEN: This might be an opportunity to get together and make some recommendations.

Mr. GRAVES: I think the whole quarry industry should support any suggestions that might be made toward a line of demarcation being drawn between the quarry in continuous operation, I mean seasonal operation, in contrast to those which run less than a year.

Mr. AHEARN: In southwest Texas where labor is so cheap they can bring in Mexicans and would rather use them than to install machinery. I know one particular operation where five Mexicans were smothered to death in a road-side pit. The established sand and gravel industry had to bear the brunt of that accident. You are forcing us to self-insure.

Mr. FULLER: Were they actually compensated?

Mr. AHEARN: The established industry had to bear the brunt of it next year. I have found the Council very willing to cooperate in most respects. Nevertheless it seems to me that you have imposed a hardship on us which forces us to do things which do not help your members. We would like to have the opportunity to work things out, but you have not given us that opportunity.

M. B. WILKIN (Lumbermen's Mutual Casualty Co., Chicago.): The discussion has apparently entirely lost sight of the fact that the classification allocated by the National Council on Compensation Insurance must receive the approval of the insurance department of the state. Rates cannot be discriminatory between industries in the same classification.

MR. GRAVES: Have the insurance companies who have had any difficulties in the past done anything toward having the insurance laws changed to endeavor to meet this situation? You are admitting that it is a bad situation that you cannot correct.

MR. FULLER: Practically every state has passed a law providing that the rates be not discriminatory. The reasoning you have applied to the quarry industry applies to every industry. Any machine shop owner will tell you that his shop is better than the one across the street.

CHAIRMAN WORTHEN: It has been said that when an operator works on such a scale that he does not come in contact with the suffering caused by accidents he is not so much interested in these matters; however, this type of individual is interested immediately in the rate he pays for his insurance. A number of our larger companies have been so successful in stamping out accidents that they have adopted self-insurance. There are still a great many operators who feel, however, that there must be some service which the insurance companies are prepared to render which will be helpful and for that reason have not adopted self-insurance.

We will now have our last paper, by Mr. F. A. Pollock, of the Lumbermen's Mutual Casualty Company, Chicago.

The Relation of Insurance Companies to The General Promotion of Accident Prevention

By F. A. POLLOCK
Lumbermen's Mutual Casualty Company, Chicago

The topic assigned to me deals with the relationship between insurance companies and the field of accident prevention in quarries.

In order that this subject may be covered in a manner that will be of greatest interest to you, I would like to place myself in the position of an insurance company engineer assigned to a job of creating a more favorable loss ratio on quarry operations.

Rates for compensation insurance on quarry operations are comparatively high, but rates are based chiefly on experience, and naturally the only way to reduce rates is to remove as much of the potential hazard as is possible so that accidents will occur with less frequency and then the consequent lower net cost for protection is a natural result.

Any attempt to convince workmen that an accident prevention program is in progress will be a flat failure unless the workmen are made to realize that the executives and their superintendents or foremen are sincere beyond the monetary value of the undertaking.

Assuming that the management is "sold" on the necessity of reducing accidents my first step is to assist him in organizing his safety committee to produce the best results; second, helping to educate the workmen; and third, to suggest enforcement of safe practices.

Safety Committee Work

In the organization of a safety committee the head foreman of the operations should act as chairman. The other members should consist of the maintenance man; one or more of the foremen and a clerk to act as secretary.

All safety matters should clear through this committee.

Before the regular monthly meeting is held all committee members should inspect all parts of the quarries to determine what hazards exist in connection with the equipment or working conditions.

This report should be made part of the safety minutes.

One man should be designated to look after the first aid equipment and the proper display of safety bulletins.

The secretary should keep the minutes of each meeting providing copies for each member of the committee and one for the manager's desk.

The insurance engineer should be present as a guest at the monthly inspection and meetings, and while the committee meetings are conducted strictly as a company organization, he is sometimes able to offer advice and counsel of value in the work. His duties compel him to be a student of accident prevention and no study is complete without first hand knowledge of the causes and known methods of prevention in the particular class of business he is servicing.

He not only studies accident reports from your quarry but from many other quarries similar to your own. Methods of prevention used by other interests are introduced and discussed.

Analysis of past accidents would be valuable and is almost imperative in any successful accident prevention campaign. When this has been made you know best where to concentrate your safety committee activities.

Because the insurance engineer is not a part of the organization he can make suggestions and recommendations from a safety standpoint which might have some other significance if offered by a member of the committee.

He is familiar with the factors making up the governing rate. His participation in your safety work is not only a benefit to the company he represents but the insured as well. To the insurance company because chance for profit lies in maintaining a favorable balance between premium received and premiums paid. To the insured risk because of the benefits which accrue as the result of a favorable experience.

Experience in this class of business has demonstrated there are a number of well known hazards in the average quarry which can be corrected and an accident avoided. A resume of some of these conditions may help you take the necessary step for correction in your quarries.

(1) *Foot Paths in Quarries.* On account of the number of accidents from employees being run down by trains—foot paths should be marked and cleaned to all the working points on the quarry floor. Where these paths cross tracks guard railings should be provided to prevent one from stepping in front of an approaching train. In winter time the principal paths should be kept clear of snow. Men should then be ordered not to use the tracks as a walk way.

(2) *Stairways and Ladders.* Stairways should be installed at all convenient points for entering or leaving the quarry. Where slopes are over 30 degrees and under 50 hand rails should be provided on the paths, over 50 degrees stairways or ladders should be provided.

(3) *Bank Trimming.* As the falling of chunks and boulders have caused many a serious accident the banks of a quarry should be kept carefully trimmed and kept free from any overhanging or loose material which might fall and cause someone a serious injury. Men doing this work should be provided with safety lines and life belts.

(4) *Track Repair Crews.* Men should never be allowed to work on railway lines alone no matter how small a crew, one should be designated as a safety man and his duty is to warn the rest of approaching trains.

(5) *Goggles and their Use in Quarries.* Many an eye has been lost in starting holes in solid rock breaking chunks and picking in frost so it would not be amiss to provide all employees with a pair of goggles instructing them when to wear same.

(6) *Guard Railings.* When railroad tracks run parallel or close to buildings, and paths cross the tracks at the building entrance railings should be placed between

the door of the building and the track across the path in order to prevent employees from stepping in front of moving trains.

(7) *Blocking Frogs and Switches.* Many serious accidents have occurred to trainmen who caught their feet in switches so the blocking of this equipment should be practiced in every quarry. The old type or chunk of wood soon wears out and the so-called Hart block has been designed to eliminate the extra cost of replacement. This piece of wood is so constructed that it can be bolted to the flange of the rail and should the train be derailed it would clear the block entirely.

(8) *Lights on Trains.* As most trains are pushed out of quarries there should be a light on the end opposite the locomotive. A regulation switchmen's lantern tied to the car has proven to be the most economical and successful to maintain, as electric wires and their connections are often broken.

(9) *Trestles and Bridges.* Wherever a quarry railroad is bridged over another travel way the bridge should be boarded up and wings should be built in such a manner as to prevent the material which falls from quarry cars in transit from falling on the people or equipment below.

(10) *Car Cleaning.* Many men have been killed while cleaning dump cars in dump position. Cars must be securely blocked before work is started on same.

(11) *Protecting Car Repair Men.* All cars set in on side tracks should be securely blocked and a D. rail at main line set. This will prevent cars from running away and getting on the main line. If a man is working on the car the D. rail will prevent a locomotive or other cars bumping it. The key to the D. rail lock should be carried by the repair men.

(12) *Locomotives:*

A. Foot boards have always been the cause of many a serious accident and they should not be a part of this equipment. Side steps installed on the front and rear of the engine will take their place.

B. Material such as shovels, picks and bars should not be carried where they will interfere with the use of grab irons on hand holds.

C. In moving locomotives bell must be rung as a warning to the crew and when approaching shovels, bell must be rung or whistle blown.

(13) *Shovel Equipment:*

A. A ladder with a hand rail should extend from the floor line to a point of boom.

B. On electric operated shovels equipment house should be erected over each shovel meters and switch installation and the number of the shovel painted over the door of this building. The only key to this door should be kept in the hands of the shovel operator and if any work has to be done on the feeder cable leading from this switch to the shovel the man in charge of this work will have to receive this key from the shovel operator thus preventing the possibility of a mistake in cutting off the current on the wrong shovel, this will eliminate possibility of an accident of a workmen cutting into a hot line.

C. *Safety Belts.*

A safety belt should be provided for each shovel and men working on Booms should be required to wear same, this will prevent a serious accident should he slip.

(14) *Hand Tools.* Many a hand has received a serious injury where the employee has been allowed to use tools with split or cracked handles. Any such equipment should be condemned at once and new handles installed.

(15) *Blasting.*

A. Metal shelter houses should be provided for workmen throughout the quarry, those of the circular type that can be rolled are the most convenient and as the men can keep them close to the shovel operations.

B. Electric blasting machines should be provided with locks so that unauthorized persons cannot cause a serious accident by tampering with same.

C. Signals. Air whistles should be installed at suitable points on the air lines

throughout the quarry. Whistles should always be sounded and at night an addition of a red flare light to warn the men that a blast is about to be set off and its location.

(16) *Locomotive Cranes.* On account of the shear hazard on cranes devices should be provided to warn employees in the vicinity that the machine is swinging.

(17) *Draw Car Heads.* On account of the number of feet that are lost every year on car draw bars a rubber belt guard should be installed on the end of every car over the top of each draw-bar.

In regard to the education of the workmen I feel that one good safety bulletin board posted close to the time-clock or some other place on the property where most men have to pass; and an additional number of small ones in the eating houses will be great help in the education of the workmen along safety lines.

Eating houses may be so fixed with tar paper that safety motion pictures can be shown to the workmen during the lunch period at noon. This has been tried out in a number of large quarries and has proved successful along the educational lines.

Majority of the men should at some time or another receive first aid training. First aid kits should be put in dinner pails and should be installed in every locomotive and shovel in the quarry. The operator of these machines should be responsible for the kit.

It has been found in small towns where quarries are located that the safety education in schools will reflect in the accident experience in the quarry as the children are sure to bring home ideas along these lines to their parents. And last but not least the personal contact made by the safety engineer will do a lot toward educating the workmen as to his safety.

In regards to discipline we believe that an employer is responsible for the safety and welfare of his employee. He is entitled to cooperation of all employees in safety which factor is so important to themselves. Discipline at times is necessary, men should expect it and employers should enforce it. The manner of enforcing discipline is best left to the individual enterprise.

In summarizing the past remarks I wish to say that the management must show active and sincere interest, superintendent, foremen and safety engineer must work together, that safety education must be done in a manner that will reach every employee, and discipline should be used only when experience demonstrates its necessity.

If you are not availing yourselves of the safety information in the National Safety Council library and the assistance of the safety engineer of your insurance company, in reducing your losses, you are neglecting an opportunity of value to your organization.

E. W. FITZGERALD (Marquette Cement Manufacturing Company, LaSalle, Illinois): In our quarry we have 2300 volts running from the main switch house to different machines. During dry weather we do not take the precaution of putting the cable on wooden horses, but we have a series of blocks about every thirty or forty feet on the cables. In addition to that the foreman has the key to the main switch house. He is held responsible for accidents. He opens the switch house, and takes out the fuse before the machine is moved. In addition to that we have steel hooks with wooden insulated handles that the men who move the cable are compelled to use, as well as to wear rubber gloves. During wet snowy weather we have wooden horses on which the cables are strung to keep out the moisture. We have never had any trouble, but it is a matter of taking every precaution.

CHAIRMAN WORTHEN: Before adjourning I would like to get into the minutes my appreciation for the cooperation I have received during the past two years from the officers and executive committee of this section, and I want to assure the section that it has been a pleasure to me to act as Chairman of this section during the past two years.

ADJOURNMENT

Wednesday Luncheon Session
October 14, 1931

Joint Meeting of Cement and Quarry Sections

R. B. FORTUIN, Chairman
Pennsylvania Dixie Cement Corporation, Nazareth, Pa.

The joint meeting of the Cement and Quarry Sections was called to order by General Chairman R. B. Fortuin of the Cement Section, who presided.

CHAIRMAN FORTUIN: We have a very interesting speaker on our luncheon program to-day. Mr. D. D. Fennell is a consulting engineer and resides in Chicago. Mr. Fennell has been giving safety talks for the past twenty years in cities all the way from Canada to the Gulf of Mexico and from the Eastern seaboard to the home of the beautiful girls—Hollywood. I take pleasure in introducing Mr. Fennell.

Safety and the Interdependence of Men

By D. D. FENNEL
Vice-President, Turner and Turner, Inc., Chicago

There is no subject more apropos to our present economic situation than the one I propose to discuss at this meeting. The safety of the world, of the community, of the individual industrial or commercial enterprise and of the individual himself, depends to a large extent upon the measure of our recognition of the necessity for true interdependence in the affairs of men.

There is to be considered, (1) international economic interdependence, (2) industrial interdependence within an industry, (3) employment interdependence, (4) social welfare or the interdependence of the units constituting a community or state.

1. International interdependence. Never in the history of mankind has the world been in such a state of flux and change as since the commencement of the Great War. To be sure the Napoleonic ascendancy brought numerous political and geographical changes in the countries of both the new and the old world but hardly to an extent comparable with those which have taken place in the past seventeen years. A study of the geographical maps and political data of Europe, Asia and Africa and the islands about them, as of 1913 and 1931, will reveal such changes in forms of government, kinds and personnel of rulers and national border lines as have never occurred in a like period in the world's history.

There is going on constantly such a contracting of distance in both the fields of transportation and communication that it takes to-day, one-quarter the time to go around the world that it once took to cross the Atlantic Ocean.

The change of price in an important security on a stock exchange in America is published in the newspapers of England, Germany and France in the next edition, issued the same day as the change takes place.

Many of us could not follow nor support the late president Wilson when he proposed a covenant of nations to consider and act upon matters of common import in a crisis, yet when England abolished the gold standard the stock markets of America were immediately depressed and prices of securities fell abysmally.

We did not want political interdependence but we find we certainly are inter-nationally, economically interdependent whether we will or no.

Without question, the safety of mankind, as men "move in upon each other," is demanding that they sit down and counsel together before they resort to the brutal, destructive instrument of war to settle a disagreement.

2. Industrial interdependence within an industry. When the throttle-hold of politics is taken from the throat of industry and companies making like articles may confer as to the quantity of products the market can consume and are permitted to regulate scientifically that amount and the character of it, a sounder economic structure will have been brought into being. Overproduction is the result of the extremely individualistic character of the manufacturer executive and has had much to do with the bringing on of the industrial depression of to-day. No industries have suffered more severely from this unwise character of competition than those you gentlemen represent. It is my unbiased opinion that the day is not far distant when manufacturers will be urged by government to better regulate their inter-company competitive relations rather than be forbidden by law to do so as at present. Safety for every industry—its perpetuity—will be secured by such means—when men shall have become economically wise rather than politically astute.

3. Employment interdependence. The ideal in industrial relations is the recognition by employer and employee of the essential place of each in the success of the company's program. It is only through team work that a company objective may be achieved. All the safety codes that may be written, in which effort is made to secure obedience to their provisions through force will fail of their purpose. The building into the organization of a spirit of mutual dependence, the men looking to the management for leadership and trusting it and the management looking to productive labor for production and believing it will be secured, spells success and profit to each.

In the trying times we are experiencing, with depleted forces, and high demand for product, more than at any other time, is needed great candor, a fine quality of leadership and a constant checking up on all the accident preventives. It is an unusual time and opportunity for the putting on of a competent educational program in plant methods in general and in safety work in particular, that a well-oriented nucleus may be equipped to guide the augmented force that will soon be necessary to meet the production demands on the plants.

4. Social welfare, or the interdependence of the units constituting a community or state.

Industry and its leaders are coming to recognize that part of their job is not only to train men and women to produce things but to make possible for them enlightenment, liberty, social happiness and the impulse to achieve worthwhile goals. The safety and certainty of a continuing understanding in an industrial group is predicated upon a recognition of real mutuality of interest between management and workers.

After all, what character of purpose or career brings such satisfactory returns in happiness of heart and contentment of conscience as the spending of oneself in the culture of a fellow man so that he may measure up to his possibilities and fulfill his destiny?

The first safety engineer of whom I have heard is one John Woolman, a Quaker, who was born in New Jersey in 1720. When he came to manhood he at once commenced the instruction of the Quakers in New Jersey in reading and writing and later in farming, hygiene, in the care of their homes and the care of their bodies. He later continued his efforts with the Friends of Virginia. No Quaker excepting William Penn has exerted the influence for good among his people as did this humble teacher-artisan who earned his living as a tailor while carrying on his beneficent enterprises.

In the midst of his work he one day stopped to take stock of himself and here the interdependence of the man and his associates stands forth. Said he in describing this experience: "Being then desirous to know who I was, I saw a mass of matter of a dull gloomy color between the south and the east, and was informed that this mass was human beings in as great misery as they could be and live, and

that I was mixed with them and that henceforth I might not consider myself as a distinct or separate being."

It seems as though the words I quote from a dialogue of Plato, so appropriate to my thesis, might have been written yesterday instead of centuries ago. He stresses our interdependence as citizens of a state when he says:

"And can there be any greater evil than discord and distraction and plurality where unity ought to reign? or any greater good than the bond of unity?"

"There cannot."

"And there is unity where there is community of pleasures and pains—where all the citizens are glad or sorry on the same occasions?"

"No doubt."

"Then when any one of the citizens experiences any good or evil, the whole state will make his case their own, and either rejoice or sorrow with him?"

"Yes," he said, "that will be true in a well ordered state."

This picture of men contributing of their interest and their energies that the lives of their fellows may be rich and full is the new vision of social responsibility and opportunity that our industrial and commercial leaders as well as the workers who follow them are gradually coming to acknowledge—this interdependence of men.

If we carry this doctrine far enough will it not of itself insure the success of the entire safety movement? Supposing both the automobile driver and the pedestrian might be taught to *know* the other was *depending* on him to play fair and take no chances; that the workman be made to realize that the guard was put on the machine to protect him and that the foreman *depended* upon him not to remove it; that the clean-up man was taught always to remove oily rags to a place free from the possibility of ignition because his supervisor *depended* upon him to do it? What efficiency would enter the field of safety if such interdependence could be made concrete!

When that time comes in the economy of human affairs that the interests of our fellows shall mean, relatively, as much to us as do our own because "we are all one body and members one of another," then shall the safety movement realize its fondest hopes and highest expectations in a creditable, intriguing record of achievement.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

Joint Meeting of Cement and Quarry Sections

R. B. FORTUIN, Chairman

Pennsylvania Dixie Cement Corporation, Nazareth, Pa.

A. L. WORTHEN, Chairman

The Connecticut Quarries Company, Inc., New Haven, Conn.

The second session of the Cement and Quarry Sections convened with R. B. Fortuin, general chairman of the Cement Section, and A. L. Worthen, general chairman of the Quarry Section, presiding as joint chairmen.

CHAIRMAN FORTUIN: Our program this afternoon calls for what promises to be a very interesting discussion on "The Value of the Plant Magazine." The thought of the Program Committee in listing this item on our program was that everyone would take part in the discussion. This topic is strictly not a Cement Section nor a Quarry Section topic. It is an employee's publication topic, but since a number of the quarry organizations and cement organizations have gone into the matter of plant publications the Program Committee thought it would be well to get the pros and cons from the various people present.

We have some pioneers in this phase, and I would like to call on Mr. Couchman of the North American Cement Company to lead the discussion.

The Value of The Plant Magazine

By ALBERT R. COUCHMAN

Safety Director, North American Cement Corporation, Hagerstown, Md.

The plant magazine or house organ, as it is commonly called, has an unlimited organization value. It provides the safety engineer with a kit of diversified tools which if properly applied will greatly facilitate the difficult problem of maintaining interest in safety, as well as organization interest. I repeat organization interest because no undertaking, within the boundaries of industry, whether it be safety or otherwise, can be successfully carried on without the wholehearted support and confidence of the mass of workmen within the organization. Therefore, the composition of the plant magazine may be paralleled with the work of the safety engineer.

Everyone who is working in the safety field has recognized the task of reducing accidents an educational one. While there are various methods of applying this education through direct contact with plant activities, on the other hand, however, the dissemination of literature designed to interest both employer and employee is an important factor.

The plant magazine should be designed for such a purpose. It should be a medium through which the safety engineer can permeate the ideals of safety into the minds of the workmen. If this is to be accomplished it is necessary for the safety engineer to have a profound knowledge of the fundamentals of applying psychology to effect, through his magazine, the safety habit. There are many ways in which this knowledge may be applied to interest men to think and act safely. It should be borne in mind that organizations are composed of various types of individuals, material that interests one group may not interest another. In our organization, I make periodical checks of the reaction of my material. If I find that I have hit the wrong key, I immediately take steps to correct the situation.

It has been my experience that much good can be accomplished by becoming personally acquainted with the entire organization. Aside from gaining a knowledge of the characteristics and habits of an individual, it gives one a clearer conception of the kind of material that appeals to a certain group or groups of men.

Illustrated sketches, poems and personal items blended with wit and humor appeal to a cross section of the mass of readers, but real interest is shown if some form of competitive material is published that refers to the inter-departmental or inter-plant activities.

The safety engineer's pathway is not always strewn with roses; invariably new ideas, new procedures and methods, relating to safety, are bitter pills for some plant men to swallow. I have found, however, that the plant magazine has been the key to unlocking the minds of workmen and plant executives to some of these ideas which otherwise might have been a total failure. When I hit upon a new idea, or have the good fortune to borrow one, I always depend upon the plant magazine to put it across. If one department or plant accepts it, then I try to create an agreeable public sentiment by giving them magazine publicity which creates a desire for other departments and plants to fall in line for their share of recognition.

If the scope of the plant magazine is broadened to include the safety news of the entire organization, its value is materially increased for it can be used to stimulate a spirit of friendly rivalry. The workman in the quarry, the repairman in the mill, the salesman on the road and the executive all meet on a level as contributors to its pages.

This same spirit of rivalry if properly encouraged and directed may provide the spark to ignite the fire of enthusiasm which is such an essential constituent of every successful safety movement. Through its medium of advertising it may be employed to rekindle this enthusiasm at the first indication of lagging interest.

I recall, near the close of 1930, a personal letter was sent out to all foremen and department heads, asking for their comments on, "What They Were Going To Do To Make The 1931 Safety Campaign A Success." The first replies received were published and within a short period replies came rolling in from all directions. The plant magazine not only offered a challenge but the spirit of rivalry was aroused. Bill Jones decided that Tom Brown was not going to get ahead of him; in this and similar instances the plant magazine has been a valuable asset in maintaining organization interest.

Since the conception of the magazine of which I am editor, I have discovered some real talent: down in the quarry we find a Shakespeare, in the mill we find a Mark Twain and throughout the plant many Byrons have stepped from the side lines to promote accident prevention through their contributions to the plant magazine.

The plant magazine with its messages of safety is a subsequent factor in the promotion of public safety as well as safety in the homes. While the National Safety News and other similar magazines have attributed to these important phases of accident prevention, on the other hand, however, their distribution has been limited, thereby leaving a gap between the plant and the home. The plant magazine can be utilized to fill in this gap and with a proper distribution, it should produce a far-reaching effect. The entire family is given an opportunity to acquaint themselves with the plant activities, that same safety habit which is gradually being engrained into the characters of the workmen will eventually have a psychological effect upon both family and community as a whole.

This, however, is only one side of the picture that enables us to visualize the value of the plant magazine. On the other side we find it a medium through which men and management are brought together in a closer relationship. It promotes goodwill and helps to obliterate indifference. It leads men to appreciate and view the problems of management with a cooperative attitude; it helps to increase their personal efficiency and strengthens their confidence in the organization with which they

are connected; all of which assists in building a better morale, which after all is the one essential cog in the wheels of industry.

Again may I repeat that the plant magazine has unlimited value.

CHAIRMAN FORTUNE: Who is going to be the first one to start discussion?

D. B. COLEMAN (Missouri Portland Cement Co., St. Louis, Mo.): There is no doubt that names appearing in a plant publication create interest. The more names of men in plants you can use, the more interest they will take. The only way I can see that you can do that is by publishing personal news of their trips, vacations, their new automobiles, or things of that sort. In a monthly publication when such news comes out it is stale. What other measures can be taken to get names in our papers relating to news that is fresh? Perhaps somebody here has had and settled that problem.

CHAIRMAN FORTUNE: My answer to that is the March, 1931, issue of our plant publication. On the front cover of this and other issues is the following: "He brushed his teeth twice a day. The doctor examined him twice a year. He wore his rubbers when it rained. He slept with the windows open at least eight hours every night. He stuck to a diet with plenty of fresh vegetables. He relinquished his tonsils with several worn out glands. He did his daily dozen daily. He was all set to live to be a hundred. He had forgotten about trains at grade crossings."

That page carries a lesson. The first inside page carries the editorial comments which may cover anything from accidents in the plant to general orders from the management, or a change of policy in our executive offices in New York. On the next page is an article reprinted from "Trained Men," by Irwin Brout. The page following that has a message from our president to the employees.

This issue happens to be one of those in which we have unusual things. We were going to send two representatives from each of our two plants to the meeting in New York, and the ballot was included in this issue. The men tore off the bottom third, or the lower third of one sheet, as their ballot.

The next page carries news items. The seventh page is the most important part of our magazine. It is a summary of Accident Investigation Committee reports for the month of February. There is a detailed description of every accident, together with the extent of disability, who was responsible for the accident, the name of the injured person, and a suggestion for the elimination of similar accidents in the future. The men don't want their names on that page, and they will be very careful they don't get on it. That is sufficient punishment, we find, in a great many cases.

The next page covers departmental records, and the last page the plant records of all our eight plants.

The last two issues published were dedication numbers of the two plants for which we presented trophies and they carried the speeches delivered at those dedications. In the page of snapshots is one of men from one of our plants. We call them "Big shots from another plant."

W. M. POWELL (Medusa Portland Cement Co., Cleveland, Ohio): We started a plant magazine in July, 1930. Our magazine is about five by seven and can be conveniently slipped in the side pocket of a coat.

In answer to Mr. Coleman's question as to whether a man's name appearing in an issue after a month's lapse of time from the time the particular thing happened would be considered old news, I don't think the fellows look at it in that way. The majority like to see their names in print regardless of how old the news is. We have found the boys like to see their name in print except in connection with an accident which they don't like so well.

We feel the plant magazine is an excellent way to reach the men in the plant. The men are anxious to get it. If it isn't there on the day it is supposed to be, there is an awful yelp about it. I have heard some say they would almost as soon miss their pay check as not to have their magazine.

We have eight plants and we give each plant a section of the magazine. A local

editor is appointed to cover the news from each plant. We have captioned the sections from these various plants with appropriate names, such as: "Wampum Warblings," "News from Newaygo," "Tales from Toledo," "Broadcasts from Bay Bridge," "Dixon Doings," "Yodels from York," and "Manitowoc Music." Once we omitted these headings. Immediately we got a letter from the chief clerk in the North Carolina office calling our attention to the omission.

Our magazine is printed on a fine grade of paper so that half-tone cuts can be used. We get about 1,200 copies, which cost us about \$90 a month.

CHAIRMAN FORTUIN: On October 1, 1930, we started compulsory physical examination for all employees, from the general manager to the lowest laborer. That issue of our magazine with a full description of the physical examination by our general manager went to every employee together with a copy of the physical examination report, so if there were any comments the men had ample time in which to make them, and we could adjust our plans accordingly. We believe the success of our physical examination program is in a great measure due to this preliminary work.

JACK DEMPSTER (Canada Cement Co., Ltd., Port Colborne, Ontario, Canada): I don't edit a plant magazine but I have edited for nine years an employees' publication. There is a wide difference. I have always contended that an employees' publication will do itself incalculable harm by trying to put out a publication that will compete with the *Saturday Evening Post*.

I claim the employees' publication should be the means of bridging the unseen gap between master and men. It should be a means of conveying orders or suggestions from the office. It should be the means of conveying the thoughts and expressions of the men to their fellow men, but it should be printed on such stock and so inexpensive that when they have read it they can throw it away. Then there is no monetary waste and they are not compelled to take it home, put it away on the book shelf and never look at it again.

Our paper has been put out every Monday for about nine and one-half years. It is mimeographed. I type the stencils, mimeograph the paper, fasten them together, put on the cover, hand them out to the men, and get all the blame.

I contend that as an inexpensive method of giving publicity to the policies of the office, you cannot supersede the employees' publication, provided you keep it in that field.

Mr. Powell said his magazine costs in the neighborhood of \$90 a month. Probably ours costs \$9 a month, but of course we are only one plant. Our paper is for our plant alone. We print 200 or 250 copies, including those we mail out and, personally, we don't give a hang whether the recipients like them or not. Sometimes they don't like them because they criticize them, but our paper is intended for our gang and nobody else, and our gang appreciates that paper because there is always a cry raised by the man we miss at the time office Monday morning.

Our plant paper is a six-page 8½x11 magazine with a picture of the plant on the cover. That is the only half-tone we have. The rest of it is begged, borrowed or stolen outright from posters issued by the National Safety Council, and since our paper isn't sold and is given to the employees and there are no pretensions made for it, we steal wherever we can. If we can steal lots of copy, so much the better, but the main thing is that it goes over and reaches the men and they react very favorably to it. When there is anything special up, like balloting for employees to go to receive the Cement Association trophies, all the instructions are put in the paper. They all know beforehand what they are to do and how to cast their ballots, and so on.

I don't agree with the policy of putting in personals. Sometimes they are stale by the time the paper comes out.

I firmly believe that the little bit of money a paper costs is one of the finest investments our plant has ever made. It is one of the finest ways of talking to our men without calling a meeting. It bridges the gap between the employer and employee and fosters the spirit of camaraderie. We don't say this with any degree of vainglory

or boastfulness (we are just part of the cement industry that has such wonderful safety records), but our plant is now on its nine hundred and sixteenth day without accidents, and our paper is practically 75 per cent safety. Sometimes it is 100 per cent safety. We are criticized because they say we put too much safety in it. You can't put in too much safety in any activity that you take up in our industry. Whether the paper has anything to do with safety records or not, I don't know and never will know; nobody will ever know to what extent the spirit of fraternity and camaraderie displayed in old Plant 8 of the Canada Cement Company is intensely fostered, I believe, by a paper that costs about two cents a copy.

CHAIRMAN FORTUIN: I think I can say without any hesitancy that those organizations that do have plant magazines, or employees' publications, are sold on the value of the publication. Perhaps the reason we all don't have such a publication is because the individual to whom it would be put up to in the organization hasn't sufficient push to take the responsibility for getting it out. If you once get to thinking about a magazine from the employee's point of view, you will appreciate the value of it.

W. H. BAKER (J. E. Baker Company, York, Pa.): I know nothing about magazines. I am anxious to get some information. I would like to ask Mr. Dempster what he puts in his magazine besides the safety literature?

Mr. DEMPSTER: I generally write on the front page an editorial, in which I discuss anything from the birth of a nation—with the exception that I leave out politics—to what I think will help our safety cause. The rest of the paper is taken up with a discussion of accidents or near accidents, some personals and generally a humorous story or two, a moral and one or more jokes, and a cartoon or two. It is composite. No two issues are alike. No real definite policy has been adopted. If you take a year's publications and look at them, you may see a definite policy running through the fifty-two issues. The only things we stress are safety, harmonious relations between employer and employee and love for our country.

CHAIRMAN FORTUIN: Both the Quarry Section and the Cement Section have monthly news letters. Would you be willing to give up those monthly news letters? (Cries of "No.") They are of value to you in your safety work. The same thing can be said of your plant publication if you tie in each department and bring them all into a nucleus which forms the basis of safety work and the actual operation of your plant.

J. A. GIBERSON (Bluff City Lime & Stone Co., Alton, Ill.): Two years ago when I came to your meeting my main effort was to find out something about news letters. I started them and have kept up continuously since, a publication of the exact minutes of the safety meetings each month. We have built up our record and reduced accidents. The publication so far has been purely a safety magazine coming from the safety department. We have not attempted to include any messages from the management except those relating to safety. We send the publication with the National Safety Council "Safe Worker" into the homes of the workmen, and I find we have created an interest that I don't believe we could create in any other way.

CHAIRMAN FORTUIN: We have about 35 to 40 per cent foreign born employees and a great many of them cannot read or write or understand English. At various times we have asked several of these foreign born employees to tell us what was in the last issue of our plant publication and, believe it or not, they gave verbatim everything in the publication the previous month. Why? Because they took the magazine home and their children, who are in the schools, read the magazine to them at the dinner table, and they were able to get the material in that way. I venture to say they get more out of the magazine than the so-called American citizen who sometimes uses it as something on which to figure an estimate, or a job.

We have stated that if at any time we found any of our plant publication issues laying about the plant, the publication would stop immediately. To date we have not found one laying about the plant.

A. J. R. CURTIS (Portland Cement Association, Chicago, Ill.): Mr. Dempster didn't say so, but it has been his custom for one issue of the month to give in his plant publication a résumé of the statement of the Portland Cement Company on significant accidents. It isn't customary for us to supply copies enough of the statement so that each employee can have one, however we will be glad to increase your allotment. If you want to get enough for the whole crowd, that would be hard on us. A better way would be to put a résumé in your publication, as Mr. Dempster has done.

CHAIRMAN FORTUIN: For those of you who have never tried a publication and are thinking of doing so, it is well to start with the publication of the minutes of your safety meetings as Mr. Giberson did. You can feel your employees out that way and see whether they really want something of that kind.

M. P. GREER (Marquette Cement Mfg. Co., Cape Girardeau, Mo.): I would like to know more about how plant publications are passed out to the men, what time of day, what days, or what method is best for doing that.

CHAIRMAN FORTUIN: Our publication comes out on the fifteenth of each month. However, the last two issues we have skipped a month in order to make a combined dedication number, but on the fifteenth of the month it is published and given to the men as they punch out at the close of the day's work.

W. M. POWELL (Medusa Portland Cement Co., Cleveland, Ohio): We try to arrange to get ours to the plant as near pay day as possible, and they are passed out to the men with their pay checks.

MR. GIBERSON: Our news letter is mailed to the home of each employee. We do that in five plants, and the number varies from 50 in one plant to 125 in the largest plant.

A. R. COUCHMAN (North American Cement Corporation, Hagerstown, Md.): Our publication is mailed to individuals in our sales departments and salesmen on the road, but those for the mills are sent to the associate editor who distributes them.

MR. DEMPSTER: Every Monday morning I stand at the time office window, and pass the publication out to the men when they get their time checks. At three o'clock I catch the other shifts. Every man who comes in to get his time check gets a copy.

CHAIRMAN FORTUIN: It has been a pleasure, to have charge of the meeting up to this point, and I want to congratulate the officers for next year and wish them the best of success.

With a great deal of pleasure I now turn the meeting over to Mr. A. L. Worthen, general chairman of the Quarry Section.

CHAIRMAN WORTHEN: I am sure I voice the sentiment of the Quarry Section when I say we enjoy this opportunity of meeting jointly with the Cement Section at these annual gatherings. We realize we have some distance to travel before we can reach the record made by the cement industry, but we feel we are rapidly coming within hailing distance and that we are traveling fast.

Most of us know very little about the relation between the human mind and accidents. Those of you who attended the joint session last year will recall the very interesting talk which Dr. Hulbert gave us, in which he told us that it might be important that a man should be thinking of safety when doing hazardous work, but it was still more important that no outside diversions should distract him from the work at hand.

Our speaker this afternoon is another prominent psychologist of the country. He is Professor of Applied Psychology at Northwestern University, Evanston, Illinois, and a member of the Psychological Corporation with consulting offices here in Chicago. His principal interest is in the field of management training and the selection of men. He is the author of a book on the "Psychology of Sales Management," and is continuously working on research and study in industrial psychology. I think we are fortunate in securing Professor S. N. Stevens, whom I wish to introduce at this time.

Basic Principles in Planning A Safety Education And Publicity Program

By PROFESSOR S. N. STEVENS

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Broadly speaking there are about two fundamental questions which may be asked regarding human behavior. Why do individuals act as they do—that is, what are the mechanisms and processes in behavior—and why do people act as they do? It is with the latter question that we are primarily concerned in the present discussion. Attempts to answer this question have been made since man first speculated regarding the origin and causes of his own acts. A completely satisfactory answer would imply the ability to predict individual action on the one hand, and the ability to control or modify it on the other. We must confess that such an answer is forthcoming in the present state of our coming knowledge. The claims of the pseudopsychologist, the phrenologist and quackist fraternity are generally to the contrary notwithstanding.

While the advance which the modern psychology has made in this field does not enable us to manipulate individual action with certainty, it offers data which are suggestive to those who are concerned with direction and control of public opinion and modification of individual action.

What is the nature of those inner and outer factors which determine and control our behavior in given situations? Why do I turn my head to the source of a loud noise, stop my automobile when the traffic light flashes red, stand up when the national anthem is sung, vote for a particular candidate or read a paper before a scientific association? The blanket term "motives" may be applied to all the mechanisms in the organism which determine our response in these and other situations. The motivated response then is one which is determined primarily by conditions or factors in the organism. Knowledge of these factors is of the greatest significance to those interested in modes of effective appeal with a view of human action.

Man's Nicely Tied-up Packages of Ideas

There have been those in whom these inner factors or motives are primarily rational or logical in nature. It is assumed that man is possessed of nicely tied up packages called ideas, as a result of experience in the world; and after a preliminary period during which these ideas are compared and arranged rationally, determined actions result. Furthermore, it is assured that some of these ideas carry with them a kind of inherent rightness or soundness, as if they were certified checks which will be instantly recognized by reasonable and right thinking persons. For example we are presented a poster which carries the statement that carelessness is one of the chief causes of accidents, with a suggestion that the elimination of carelessness will reduce the number of accidents. This statement is undoubtedly true, the information is undoubtedly authoritative, but it carries no guarantee that the recognition of this fact will, of itself, make people careful. The idea that human action is motivated basically by rational processes is essentially artificial and unreal. A great many people tend to rationalize their ideal after the act has taken place but it is one of the most certain conclusions of modern psychology that in the vast majority of our actions there is a little in the way of preparation that may be included in such terms as, reason, judging or thinking. A safety program based on the assumption of rational motivation or human action cannot be expected in the long run to yield results that will be satisfactory.

A second common error regarding the control of the factors in human behavior is that the organism reacts in a more or less mechanical way to external stimuli. From the point of view of this conception the "right" stimuli will inevitably release the

right responses, that is to say, correct information concerning the proper safety procedure or positive instruction concerning it is expected to lead to positive and desirable reactions. This will not occur unless the information or instruction is arranged to appeal to motivating factors within the individuals to whom the appeal is directed.

It is with the nature of these motivating factors that we are concerned in organizing and presenting publicity material designed to promote safety and individual well-being. My reaction to the names of Gandhi, Lenin or Herbert Hoover is not explained by the fact that these words are auditory stimuli, but rather in so far as these actions present drive and intensity and determination, and the appeal which those names as symbols make to certain fundamental non-rational reaction patterns or tendencies to action. These reactionary factors, many of which were acquired in boyhood, furnish a background and are the source of the drive for most of the activities of the individual. Some of these may be inherited but most of them are acquired by a social conditioning. They are called attitudes and may be defined as the more or less persistent tendencies by reason of which the individual is rendered particularly susceptible to certain kinds of situations. Attitudes of a more general type are illustrated by one's reaction to prohibition, bolshevism, old-age insurance, socialism or the like. Our attitude toward bolshevism may determine our behavior toward Russian art, the Russian ballet, Lenin, whiskers, Tolstoi. A striking characteristic of attitudes of the latter type is the facility with which they became attached to symbols. These symbols or stereotypes as they are called, are illustrated by our conception of the whiskered Russian throwing a bomb; long haired poets, excitable Frenchmen, the mysterious oriental, and so on. These stereotypes often symbolize the attitudes of certain individual groups or races, or they may represent our attitude toward the idea or principle.

The Story of a Prohibitionist

My father was a prohibitionist. He was a prohibitionist, according to his method of rationalization, because of the fact that his father was a great drunkard and he felt that prohibition was a desirable state of affairs for the nation. In my humble opinion he was a prohibitionist because of the fact that he had been hungry since his father didn't have enough money left after he had been at the saloon to take care of the family; because he had been beaten when he was a boy by a father who was drunk and wild; because he had seen himself and the rest of the members of the family go without shoes and clothes because of the inroads of an unrestrained liquor habit on the domestic pocketbook. All of these emotional experiences rather than a rational evaluation of prohibition versus non-prohibition were the background for his attitude toward it.

So we might go on. But we tend to stereotype and symbolize our attitudes, and to have a symbol or stereotype stand for the thing in general and in particular.

The value of this idea, for instance, in terms of a safety program is this: When safety can become a stereotyped idea and symbolized in such a way that an individual's attitude toward it is the product of an emotional reaction to it, then that campaign can become a motivating stimulus pattern because it works on inner rather than outer factors in the life of the individual.

They are of great significance to those who are concerned with the control or modification of individual action for the reason that by means of pictures or in other ways it is possible to appeal to the attitudes of the individual through his stereotypes.

This appeal is possibly caused, to a large extent, the stereotype which the individual holds determining the nature of the impressions which he gets from the world about him. My stereotype of the Irishmen expresses my antagonism or hatred or my affection or respect. At any rate it acts as a factor so far as my impressions of an

Irishman. These stereotypes may be formed as a slow accretion of impressions over a long period of time or they may be a result of a long program of systematic propaganda. With that impression a collective attitude of a group may compel the object of the stereotype to conform to the picture. The creation of these stereotypes is one of the great games of the publicity agent.

We may briefly summarize the characteristic attitudes and point out their significance to those who are trying to modify the conduct of men, women and children. Attitudes as factors in human action may be characterized as follows:

1. They tend always to express themselves in action.

Attitude leads to action of a very definite kind. For instance, here is an individual who believes in the sanctity and the inviolability, so to speak, of Republican policies. There are still a great many who still believe that. They wouldn't vote for any other individual. They would vote only for the party irrespective of the individual. Their attitude determines conduct. You can predict it. Know their attitude with regard to a certain thing, and you can tell the kind of behavior they are going to indulge in. It is a characteristic of attitudes that they tend toward fixed action patterns whenever the stimulus is presented which produces, if you please, the arousal of the emotional stereotype or symbol which is the inner machinery for the outer reaction.

2. They tend to have a strong emotional coloring.

No one has ever set the world on fire by just a cold idea. Someone said that every great movement is the lengthened shadow of a man. It was an idea plus fire, plus an emotional drive that had become wrapped up and had engulfed the idea itself.

Slavery, for instance, was looked upon in a more or less abstract, cold, logical way by thousands and thousands of people, but when somebody got the idea hot enough, because of the emotional contacts, to get active then slavery became not a political issue but a moral and a social and almost a religious issue. In other words, the attitude has the emotional coloring. The idea with the coloring produces the attitude.

The Dynamic Motive Toward Safety

Therefore, with regard to building up a safety campaign, an attitude towards safety that is casual, abstract, and theoretical has little value. The attitude towards safety that possesses not merely a rational appreciation of the good that safety involves, but either an emotion of fear or insecurity on the negative side, or the emotion that comes perhaps in the sense of love for one's family and desire to keep well and strong, motivated by that larger social emotional background, then the safety idea becomes dynamic in action.

Someone said that the individual didn't like to find his name in the paper associated with an accident. In other words, the attitude toward safety there is motivated negatively by a distinct feeling of unpleasantness, when his personal achievement is related to something that is undesirable socially, industrially and economically. The attitude toward safety which that individual has developed is colored by a strong desire to get away from a feeling of unpleasantness which a failure to maintain the safety rules would necessarily entail.

3. They do not involve rational processes as an antecedent to action.

4. They may be conscious or unconscious.

Nowadays we are coming to appreciate the role the unconscious plays in determining much of our behavior. I am not one to make any fetish of the unconscious or to think in terms of something esoteric or mystical, or something of that kind. To me it is a perfectly natural part of our total mental and emotional make-up. We are not always adjusting to our world on the highest level of consciousness.

As we sit in this room we are stimulated by a whole range of stimuli, many of

which are being attended to acutely, a vast range of which, however, are just being absorbed and adjusted to us on an unconscious level. You are not always aware of how comfortable or uncomfortable the seat is, but you are aware of my voice. You are aware of a lot of other things and perhaps are attending to them. The lights are what they are, but if one of these bulbs were to suddenly go out you would be aware of the difference, but for the most part it isn't specific stimulus to which you are attending. The lower level of sensory awareness, the lower level of adjustment is continuously going on and is being maintained as a very important basis, in my opinion, for much of the rich and full types of behavior and experience which we enjoy.

Attitudes Associated With Symbols

5. Attitudes are associated with and are easily released by symbols, signs, slogans, phrases, catch-words and pictures in individual cases to build up a stereotype or mental picture in which the attitude is personalized and characterized in graphic form.

Here is where the value of cartoons, posters, slogans and the like, which are freely distributed throughout plants and in journals and in the trade papers and in the plant papers and employees' magazines play a role, because one never can tell when a picture will become a stereotype for a safety attitude, or when a slogan will become emotionally tied up in such a way that it becomes a dynamic source of power for regulating safety behavior. The signs and symbols and stereotypes which can most frequently be built up over a long period of time are, of course, the chief instruments or mechanisms which the safety educator can indulge in.

My little boy came home from school the other day and he had a poster which he had designed for the safety campaign they were carrying on in the school. It was so interesting I went around to the classroom to see the designs of all the other children. Here is a child naively building up his conception of the safety attitude in a symbolic form, and my little boy had a picture of a street, an automobile and a little dog that had been run over, and at the bottom he had written across it, "All boys must keep their dogs off the street if they want to have a lot of dog babies." The point was that he had had a little female dog that was about ready to have a litter, and he had been looking forward to it with much anticipation. She ran out in the street and got run over, and it was a very emotional shock to him.

In a very real sense the symbolization of a safety attitude operates in various industries perhaps in a different way with different symbols, but nevertheless with a compelling motivating effect once it has been established and the emotional accretion is developed.

Newspapers make large use of this mechanism in appeal to group attitudes. Slogans almost always appeal to attitudes. Whoever stopped to analyze a slogan? It is what the slogan implies or suggests that makes it effective.

6. Where fundamental attitudes are involved the response is used in proportion to the intensity of the stimulus.

7. Attitudes may be developed as a result of a single experience or they may be established by a systematic and persistent propaganda. An example of the first is the establishment of an intensely negative attitude toward an individual or race as a result of a single experience. In the second case our attitude toward safety may be established as a result of a continuous presentation of materials arranged in dramatic and dynamic settings suggesting health, well-being, efficiency and the like.

By that I mean our fundamental attitudes center around the maintenance, the development of a feeling of personal well being. Secondly, they center around a need for and an attitude of social adequacy with regard to other men. Third, they center around our concept of ourselves as an effective instrument in the economic,

social, and political life in which we live. The fear of insecurity, the need for a loving experience that centers both in the family and in society as a whole, and the need for complete self expression that gives one a sense of power and a sense of personal well being; these drives tend to crystallize easily in attitude and as such are most effectively worked on by the safety operator.

For instance, when an individual makes a mistake and has an accident and is reported for it, and his name does appear in the paper, he has a very definite lowering of self esteem. To a certain extent he is not merely endangering the lives of others, but he is reducing that particular quantum of "I-ness," that sense of complete adequacy as an individual which is a very unpleasant experience and one which he strives to get away from as quickly as possible.

The significance of attitudes to those interested in a program of safety is obvious. The objective of such a program is the modification of conduct of men and women which may be termed as "safety behavior." Such a change in conduct cannot be effected except through a change in attitudes.

We may apply the term propaganda to the technique involved in bringing about such a change. Propaganda has been defined as the manipulation of attitudes by means of significant symbols and has for its objectives an arousal of action in specific situations. The most effective modes of propaganda appeal are those which refer to established stereotypes. These take graphic form in pictures and symbols or the written form in slogans. One must always be certain that there is some assumed causal connection between the picture symbol or slogan and the attitude or stereotype at which the appeal is made. Safety behavior which you purpose to establish must be demonstrated in dramatic form and present in settings which connect it with the stereotypes and symbols of well-being, efficiency and so on. From a psychological point of view the function of propaganda and publicity organizations may be generalized as follows:

Publicity Functions Generalized

They are concerned with the development of tendencies to action, namely, attitudes, by the manipulation of significant stereotypes and the arrangement of satisfactory situations which permit the completion of actions thus initiated.

Propaganda campaigns may be divided into three classes: first the campaign may be directed to already existing attitudes; second, the objective may be the establishment of new attitudes; and third, opposing attitudes must be overcome. All propaganda agencies make some assumption concerning the psychological makeup of the constituency toward whom their appeals are made. A fundamental problem has to do with a nature and kind of fundamental attitudes which may be assumed to be present in the beginning.

What are fundamental attitudes? The answer to this question is exceedingly hard to discover. It is exceedingly likely that no answer can be satisfactorily determined without a great amount of careful research. This is particularly true in the case of fundamental attitudes to a safety program.

In other words, we assume we are going to deal with a group of people who either have an attitude we want to change; an attitude which is opposed to the attitude which we hoped they would have, or certain emotional reasons for the presence or absence of the attitude. These assumptions you have to make. When you are starting a campaign in your quarry or in your factory or industry, you are assuming the presence or absence of a desirable or undesirable attitude on which you are going to build your safety program.

Generalized attitudes are dangerous to talk about and are very uncertain in character. However, there are about three attitudes of a sufficiently general character to be present in almost any group of men and women. One is the attitude which

grows out of our desire for an adequate experience of selfhood. This often may be experienced in terms of power self preservation. It is the attitude toward which most of the successful safety programs have been directed.

A second attitude is our desire for social approval. Scan the advertising in all of our magazines and one discovers that the fear motive is the power of the appeals toward social approval, social well-being and social experience. In the safety field at the present time too little has been done in establishing stereotypes or symbols on the basis of which this generalized appeal could be made.

The third type of generalized appeal based on a fundamental attitude apparently common to great groups of people is that based on insecurity. Whether that insecurity be a mental, physical or social attitude, much use has been made of this generalized attitude in most of the safety campaigns that have been carried on. Its success has been in direct proportion to the manner in which such insecurity has been symbolized through slogan or stereotype or symbol, which permitted a large range of emotional reactions to become aroused by the principle which the stereotype represents.

In conclusion, it will be well to point out that no safety campaign can be expected to produce permanent results unless the modification in the behavior of individuals, which it produces, can become sufficiently stabilized to furnish the basis for the development of definite habit patterns which will function even in the absence of the stimulation which the symbol and stereotype tend to afford.

Discussion

CHAIRMAN WORTHEN: It is quite possible that there are some here who might like to ask a question regarding this paper.

R. B. FORTUN (Pennsylvania Dixie Cement Corp., Nazareth, Pa.): What do you mean by psychological inference as to personal responsibility for accidents?

PROFESSOR STEVENS: The strongest basis of appeal in a safety campaign is going to rest equally between two of the basic needs, and therefore the sources of drive in individuals. The first is: The individual's own sense and need for a feeling of security; secondly, his need for the social approval of the men with whom he works. These two things seem to me to be very important considerations, and appeals should be made from both attitudes and with equal forcefulness.

The statement made here about a plant magazine, in which a man who was responsible for an accident had his name mentioned and didn't like it, was eloquent evidence of the thing I am suggesting when I say that every man wants to have and needs to have a sense of personal well being. To use a technical term, he must have an egoistic experience. He must feel for himself that he is an adequate, satisfactory person. Any time you reduce this, you are going to get a negative self feeling. In other words, the man is going to get away from the thing that is unpleasant, and when his responsibility for an accident has brought this negative self feeling to his doorstep, he will try to be more careful in order to get away from the condition which has produced that lowering of his own self esteem.

Similarly, the individual who cannot function effectually in regard to his fellows, who doesn't have their confidence, trust and good will, is going to have a very definite drive toward the establishment of an attitude that is positive on the part of these workers.

When safety as an attitude is symbolized in some such social terms it becomes a very definitely positive motivating factor toward the elimination of accidents.

J. R. BOYD (National Crushed Stone Association, Washington, D. C.): I have heard it stated that it is a very dangerous thing to disturb a man's self respect, that he becomes less confident and somewhat resentful. When a man has an accident that is given publicity in the paper and he is held up in a way to ridicule and his

self respect in relation to his own fellow men is disturbed, I wonder if he perhaps doesn't harbor in his mind some little resentful attitude as to the rightfulness of the company in going so far as to center attention upon him?

PROFESSOR STEVENS: I would say that very likely the individual does have a certain amount of resentment. He feels less effective as a person because of the social publicity that his failure has presented. But it seems to me, in spite of the fact that that condition is present, it is a stronger motivating stimulus toward more careful acting on his part than if he were patted on the back for having done something that was positively careful. In other words, the whole argument as to which is more effective, reward or punishment, has never been settled, but in the long run in dealing with men in industry I have observed that both are effective; but where the reaction is to be one that in a sense endangers (I don't mean to put it in terms of safety exclusively) and where the reaction is one which involves other people as well, it seems to me in general that the negative conditioning is stronger than the positive one.

J. A. GIBERSON (Bluff City Lime & Stone Co., Alton, Ill.): Two years ago I brought up the question as to whether it was a good idea to carry the whole plant question of safety, the troubles and the bad situations, into the families of the men, and I didn't get much satisfaction on the floor, but two or three men afterward talked to me about it. I went away from here with the idea that every man who talked to me said, "For God's sake, don't carry the plant into the homes; it is bad psychology. You don't want to get the women worked up."

In spite of that advice, I have for two years through our plant publication carried plant safety news into the home, and through the wife and through the children to the man, and have gotten results from that action.

Is it bad psychology to get safety into the family and into the man in that way?

PROFESSOR STEVENS: My reaction is this: After all is said and done, the man as he goes to his job, whether we would like him to do it or not, takes his family with him. There is no question about it. Sometimes that has positive and sometimes negative results, depending upon the kind of family the man has.

The Western Electric Company here in Chicago has introduced a method of what we might call psychological interviews with different employees. I have been very much interested to learn that the positive stimulation which the family has given, has worked in very desirable ways to reduce accidents and prompt strict attention to work. The company believes the talking of a worker with his wife and family about his work, the problems involved, and why he must go to work in the morning with a positive attitude toward his work and safety, has all produced very positive results.

Of course, the important thing to remember is, that to most socially minded men—and I imagine that classification includes both men who work with their hands and heads, and all the rest of us from the lowest laborer to the highest paid executive—the anxiety with regard to the social and economic welfare of their families is one of the most potent factors in what they do, say, and think during the course of their working day. To have built up in the home a positive safety attitude based more on a feeling of confidence that everything possible is being done to promote safety within the factory, rather than the negative one of fear or anxiety lest something should happen, would have a very positive and beneficial effect on the worker when he left home to go to work.

As I understand this news letter of yours, it tends to reinforce the attitude that the company is exercising every possible energy toward the reduction of accidents and the promotion of safety.

MR. GIBERSON: That is one thing back of the safety campaign. The company has done everything in its power. In two years' time, we have cut down the

number of accidents but we still have 50-odd accidents a year. There have only been two mechanical accidents a year. Failure of mechanical equipment has happened only once in each of the two last years. What bothers us is the personal equation in the accident campaign. With that thought in mind we have been getting results.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Refrigeration Section

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Wednesday Morning Session October 14, 1931

VINCENT WAKEFIELD, Chairman
 City Ice Company of Kansas City, Kansas City, Mo.

The first session of the Refrigeration Section convened with General Chairman Vincent Wakefield presiding.

CHAIRMAN WAKEFIELD: The first item of business is a report by your General Chairman on the year's activities. In rendering such a report I bring to you the feeling of the Executive Committee that we have just completed a year which we

view with some satisfaction. The Refrigeration Section has made as much if not more progress than any other section in the Council in spite of the uncertainty in business, which necessarily impels many members to economize, and in spite of the many mergers which have occurred in the ice industry. Despite those facts, I am happy to say we have held our membership and have even made a slight increase.

It is of interest to note that the new members during the year come to us from ten different states, and one from the Philippine Islands, so it seems that the work which we got under way four years ago in New York City is beginning to spread itself throughout the country, and that the industry, as a whole, is registering its appreciation. We have made considerable progress, although not as much as we want, in reaching the cold storage and the ice cream industries as well as the ice industry.

We learn some very interesting facts from a study of our statistical reports. In the year 1926 there were only two companies which gave the figures of their accidents to the National Safety Council. This year we received reports from fifty-two companies with an exposure of more than twenty-five million man hours. While there still are one hundred and fifty-odd members who are not giving their figures to the Council, our report does give us a real cross-section of experience in this important industry.

We find, for instance, that our plants average 35.17 lost time injuries per million hours worked, and that there are 2.28 days of lost time per thousand hours worked in comparison to 18.47 for industry as a whole. Our injury rates, therefore, place us among twenty-eight major industries, twenty-fourth in frequency and eight in severity. I think these are impressive figures which constitute the reason for our appearance here today.

I don't know of any time within the last ten years when I have felt more encouraged about the ice and refrigeration business. We are standing today on the very brink of a new development and no one knows where it is going to take us. I refer particularly to space cooling. It is coming, carrying us into fields that we have not covered before, giving us a new use for our product, and again, I hope, helping to strengthen national credit of our business.

No industry can accept its true place in the economic scheme of things unless it follows the precepts of other major industries in recognizing the hazards of its business and in making an effort to curb them. This effort not only saves money but it also saves human life.

We are now to have the pleasure of hearing Mr. Alvin H. Baer, of Waynesboro, Pa., President of the American Society of Refrigerating Engineers, who will address us on "Safety in Design and Installation of Refrigeration Machinery." Mr. Baer.

Safety in Design and Installation of Refrigerating Equipment

By ALVIN H. BAER

President, American Society of Refrigerating Engineers, Waynesboro, Pa.

The safety problems included within the scope of this title are so interwoven with problems of "safety in manufacture" and "safety in operation" that it is rather difficult to keep them separated. I have therefore concluded that the title ought to be enlarged and interpreted to cover to some extent "safety in manufacture", for the design of refrigerating equipment is in nearly every case accomplished by those who are engaged in its manufacture. Of course, we all realize that safety in manufacturing processes of various kinds is covered by other sections.

First, we ought to consider the meaning of the word "safety" as it is used here. I understand that it will mean "reasonable safety to life, limb, health and property."

Many of you already know that an American standard safety code for mechanical refrigeration was recently approved and recommended for adoption by everyone. It

would seem to be sufficient for me to submit a discussion of this code for it is intended to indicate to everyone interested in the use of refrigerating equipment what is reasonably safe. However, a code can only state requirements and limits; it cannot include an explanation of the reasons for these requirements. I will therefore first discuss what I believe to be the outstanding hazards or risks that should be safe guarded and will then submit the code itself.

Turning first to the designer, who, by the way, usually goes his way with praises unsung,—we would consider that he is the one who is to make most of the major decisions which determine the degree of safety that any piece of equipment will possess. He will select the refrigerant, taking into account the hazards as well as the efficiency that different refrigerants show. He also must decide how the refrigerants shall be handled; how strong the various parts of the equipment shall be and what safeguards or safety devices are incorporated into the design.

Those of you familiar with the engineering side of refrigeration know that refrigerants possess widely different characteristics; one may be liquefied under a high pressure and may do its cooling under relatively high pressures requiring heavy apparatus and yet it may have other characteristics very desirable. Another may be liquefied at relatively low pressure and perhaps do its cooling at or below atmospheric pressure but may possess other characteristics that become serious hazards. The designer must first consider which refrigerant will be most suitable from the standpoint of efficient refrigeration and if that one may be reasonably safeguarded he will probably select it; otherwise, he will select the one next best, that will be reasonably safe for the use intended.

The manner in which the refrigerant is circulated and controlled in its functions will have a great deal to do with the safety conditions surrounding its use. In one case it may be so handled that nearly all of the working liquid refrigerant supply is carried in the evaporator or low pressure side of the plant. In another case the evaporator may contain mostly vapor and gas, the liquid supply being held in a reserve receiver or in the bottom of the condenser. Again, the liquid may be admitted to the evaporator by means of electrically controlled valves or by automatic expansion valves (pressure control) or by float controlled valves. The flow of the gas and vapor from the evaporator after it has performed its cooling work may in some cases be allowed to carry slugs of liquid which become dangerous if they enter a rapidly moving compressor. These, on the other hand, may be properly controlled, separated and kept away from the compressor.

The strength of parts which the designer will select, will, in most cases, require very little of our attention for the reason that this is mainly a question of machine design practice and the practice in that branch of design work has been so well established that we can add little to it here. There are however other parts of the plant where the designer will have to use his judgment and will have only a limited degree of established practice to follow. This will mostly be in the low side equipment.

The type of safeguards and safety devices which the designer selects brings us to the heart of this subject. To properly consider these I want to take up in the order that I see them the outstanding hazards which may occur with the operation of any piece of refrigerating equipment or in any refrigerating plant after it is assembled and installed. The word "hazard" in this case may be assumed to mean the "risk of injury to people and property that attends the use of refrigerating equipment."

Among other things the hazards growing out of the characteristics of the refrigerant itself are the chief ones. For example, the effect of escaping refrigerant on human lives, or on the products being cooled, are paramount things to consider. The hazard due to fire and the ease or difficulty with which the refrigerant may be controlled come next. These hazards may be divided into three general groups.

1. Those inherent with the equipment.

2. Those connected with the operation of the equipment.

3. Those due to sources outside the equipment and its operators.

In the first class are hidden defects in castings, errors in the physical composition of metals, hidden defects in the walls of pipes and joints, imperfectly rivetted and welded seams, improperly proportioned parts.

In the second group we may list—overheated compressors, excess pressure, temperature strains, damaged gaskets, stuffing box damage, vibration damage, imperfect foundation base, frozen pipes and tubes, unstable supports, hydraulic hammer.

The third group will include unsafe machinery nearby, sinking foundations, failing supports, weather damage, flood water damage at low floor levels, falling roofs or building walls, storm damage, fire damage.

It will be recognized that some of these hazards may be safeguarded by the designer and some will call for watchfulness on the part of the erector and operator, while the remainder are elements beyond the control of either but may be safeguarded to some extent. In order to discuss them more in detail I want to classify them in a different manner and to mention such safeguards as are generally known.

The safeguards should of course be understood and I will refer to these first. Some of them will be used quite frequently, in fact every plant will require them, others come into use only for certain cases.

Hydraulic Test. This is a test accomplished by pumping a hydraulic pressure on compressor cylinders, pressure vessels and any other parts that may be subject to pressure. It is used to determine the strength of the part and will sometimes be applied until the part fails in order to determine the ultimate breaking strain of a particular design or to check the designer's figures.

Air Test. This is a test accomplished by pumping an air pressure on compressor cylinders, pressure vessels and all other equipment that will contain refrigerant when placed in the plant. It may be employed to test the strength but only with substantial screens or guards around it to protect workmen in case of breaks. It is usually used to determine tightness against leak. When thus used the part being tested will be submerged under water or if this cannot be done the outer surface of the part where leak may occur will be brushed with a liquid substance that would disclose the smallest bubble of air escaping through a leak.

Dry Out Test. This consists in baking the parts when partly assembled or after complete assembly to insure that they are completely dry inside before the refrigerant is introduced. It is useful when refrigerants are used that will combine with water to form other substances that are troublesome.

Chemical Analysis. This is a test used chiefly by the manufacturer to determine whether the materials that have been used in the manufacture of equipment agree with the specifications. The physical composition of the metal being known, its suitability for the purpose will be easily determined from well tested available data.

Tensile Test. This is a test also used to determine the suitability of the materials used as to strength. It will be applied generally to materials used in equipment and chiefly by the designer and the manufacturer. With this we may also class the bending test which is applied by clamping a strip of the material in such a manner that it may be repeatedly bent back and forth to determine its resistance.

Inspection Test. This will be applied both during the manufacture and after the equipment is installed. It comprises a very close check of both materials and finished equipment according to well tried rules. It will disclose many defects before the other tests are applied.

Relief Valve. This is a pressure relief valve having adjustable spring tension and is attached to compressor cylinders and other pressure vessels where excess pressure may occur. It will act as a safety valve to relieve excess pressure at a predetermined point.

H. P. Cut-Out. This is a device attached to a high pressure gauge or having facilities within itself for attachment to pipe lines connecting to pressure vessels and

compressor cylinders. It will have parts suitable for electric wire connection to motor starters, magnetic valves, etc., and will respond to pressure by opening the motor circuit and stopping machinery before excess pressure occurs.

Water Failure Switch. This is a device that acts somewhat like the H. P. cut-out with the difference that it will function in a reverse manner to operate motor starters, magnetic valves, etc., and stop compressors, pumps, or other equipment when the water supply fails or its pressure becomes very much reduced.

B. P. Control. This is a device that controls the back pressure at which the plant may operate. It is placed in the refrigerant suction line to the compressor and when the back pressure has been reduced to its setting it will act to prevent the compressor from taking further gas sufficient to reduce this pressure further. It is used where the temperature level in the evaporator must not go below a certain fixed point on the thermometer or where there is danger of freezing liquids inside of the pipes and rupturing them.

Engine Stop. This is a device or combination of them that will automatically shut off fuel or steam to internal combustion engines and steam engines when excess pressure occurs or temperature levels go beyond pre-determined points. It may be a magnetic valve placed in the supply line to the engine operated by H. P. cut-out, water failure switch, thermostat, etc.

Remote Switch. This is an emergency switch in the main feed wires to the plant that is located outside the engine room and preferably near an outer door or window where it may be reached from the outside in case of a sudden accident occurring in the plant accompanied by rapid escape of the refrigerant, or in case of fire. This switch may be located within the engine room and one or more remote controls for it located outside as stated.

Fire Department Control. This comprises a pipe line from the main parts of the refrigerating system to a point outside the building having a special valve in this pipe locked and under the control of the Fire Department of the city or town. The outlet from the valve will be led to a diffuser placed above the roof of the building and away from surrounding buildings or into a water mixer having its outlet leading to the sewer or the pipe will be led into a tank of water. The Fire Department are thus enabled to release the refrigerant from the entire plant before entering when the extent of the fire renders this advisable.

Motor Stall. This comprises a rule or method for designing compressors and applying motors for driving them in a manner that the motor will become overloaded and stall before sufficient excess pressure occurs in the compressor and the refrigerating equipment to burst either of them. This is applied chiefly with very small machine sizes where the use of such excess strength does not create unusually heavy compressor walls and equipment parts.

Let us now turn to a further discussion of the hazards against which safeguards need be planned and classify them for detailed consideration as previously mentioned.

Compressors

1. **Unequal casting walls** are sometimes a serious hazard. They occur when the core becomes shifted before or during the pouring of the casting in the foundry. They are difficult to locate as there is no outside indication of this occurrence. Unequal thickness may be noted when it occurs near openings but if it exists only in the interior of the casting, it will be missed. The safety precaution employed against this occurrence is the hydraulic test. Under this the thin wall will be ruptured and the unsafe casting rejected.

2. **Incorrect physical composition of the metal** used in castings is also a hazard but not so serious as some others. It will occur due to wrong information in the Engineering Department or to mistakes in the delivery of the raw materials. The result will be chiefly a lack of sufficient strength or other properties of the metal. Safeguards against this are the hydraulic test or chemical analysis.

3. *Overheated compressors* will occur due to lack of lubrication, failure of water circulation, resulting in excess pressure, rough surface of walls or too close fitting. The result may be vaporized oil with excessive pressure which exaggerates the trouble or scored cylinders which is followed sometimes by pistons sticking in the cylinder. Safeguards against damage due to failure of water are relief valves and water failure switches. The other occurrences are met usually by close observation and check up on the part of erectors and operators.

4. *Closed stop valves* are a hazard that may occur in any plant. Men will start the compressor, believing the stop valves are open or forgetting to investigate this. The result, of course, will sometimes be a bursted compressor attended by serious danger to employees and equipment. The safeguard against this is the relief valve and the H. P. cut-out.

5. *Water failure* will occur through the breaking of supply pipes, the failure of electric current driving the pump, the bursting of the main supply, etc. The result will be excess pressure and the chance of bursting compressors, softening gaskets and strained joints with a hazard equal in all respects to that mentioned under No. 4. The safeguards are the relief valve, H. P. cut-out and water failure switch.

6. *Metal destruction* will occur when refrigerants that are otherwise desirable come into contact with water even though it be the small quantity contained in the air. Destructive acids are formed that slowly destroy the metals of compressors or other parts, thus releasing refrigerant when least expected. The principal safeguard is the Dry Out Test.

Pressure Vessels

1. *Defective seams and connections* may occur in the manufacture of condensers, receivers and other pressure vessels. The defect may not be visible on the surface yet when equipment is first subjected to working pressure it will result in a failure that may become a serious hazard. The safeguard is the hydraulic test which will prove out inferior strength and the air test which will prove out leaks.

2. *Excess pressure* will occur in a condenser, receiver or any part of the high side when water supply fails, when equipment is started with valves closed and sometimes from other causes. The proper safeguard against damage in such case is the relief valve, H. P. cut-out and the water failure switch.

3. *Expansion Strain* will occur in pressure vessels if they are allowed to fill up with liquid refrigerant and the plant then shut down with the stop valves closed. In such case the gradual warming of water, brine or other substance that was being cooled or continues to flow, will create an excess pressure that may burst the vessel. The safeguard for this is the relief valve.

4. *Frozen tubes and pipes* may occur when filled with water or other liquids if flow is interrupted or temperature of refrigerant is too low. This can occur in a condenser when pumping out. It will occur in a liquid cooler when the refrigerant temperature is carried too low or when the circulation stops. It can occur in a brine cooler if the refrigerant temperature is low or the brine solution too weak or the circulation stops. The safeguard for this is the water failure switch for the circulating line and B. P. control on the compressor suction.

Pipe Connections

1. *Joints* where pipes connect to pressure vessels and the joints between pipe lengths in a line may sometimes become hazards. Usually these defects will be detected when the air test is applied and the hydraulic test will prove the strength further when extreme measures are warranted.

2. *Expansion and contraction* to an unusual extent may fracture a pipe joint without notice. We can guard against it in most cases by avoiding long straight pipe runs without a bend or change of direction. When threaded joints are used, this safeguard is of greatest importance.

3. *Supports* for pipe lines are more important than many suppose. First to be safe, they must be of sufficient strength to carry five times the weight loaded on them in the case of smaller size and up to ten times such weight in the case of larger sizes. Second, the supports for large pipes ought to be adjustable vertically to avoid unequal strain and permit proper leveling. Third, for long pipe runs, the support should permit sliding of the pipe when wide changes of temperature occur. Pipe lines should not be bound tightly to a building column or other immovable support except when the intent is to anchor them lengthwise.

4. *Vibration* in pipe lines may result in ultimate fracture of a joint, the loosening of flanges and threads and the ultimate failure of supports. One safeguard against this is the use of secure supports. Another is the correction of the cause, if possible. When the vibration starts with vibrating machinery, the cause may be found in the bases or foundations.

Power Equipment

1. *Engines*, either gas, oil or steam, boilers, shafting, etc., are items to which we will not have to give much thought as safe practice is generally well established. We need only recognize here that power units must have safety control and governors for stopping them and the engine stop previously mentioned is one that is especially suitable to refrigerating equipment.

2. *Motors, generators, switchboards* and similar items will not require our consideration as safe practice in those lines is well established. I should remark, however, that several of the safeguards mentioned herein function by actuating the motor starting equipment and shutting down the motors when an emergency occurs.

3. *Foundations* may become the cause of serious hazard if improperly built or if placed on insecure footings, because slipping machinery will soon break pipe. To secure proper safety, therefore, the designer must know something of the sub-soil on which footings will rest. In certain cases the foundation will have to be reinforced or footings extended. In all cases, the grouting under machinery that will be subject to the usual operating conditions will have to be carefully done and the foundation bolts must not be drawn down until this grouting has become well set. Failure to observe this rule may cause the frame of the machine to be put under a strain and result in serious hazard later on while the machinery is in motion.

Fire, Flood and Storm

1. It would be futile for me to attempt to describe safeguards against these elements. It is not, however, beyond the scope of this discussion to mention things that frequently occur and some precautions that may be employed. First, the designer must look to the strength of towers, roofs, stacks, etc. The effect of high wind pressure on these is a serious hazard. A storm that would not seriously disturb a secure building can cause stacks, towers and other parts to fall on the plant equipment, breaking down pipe lines and releasing the refrigerant, thus becoming a very serious hazard to both employees and the public.

2. Failing supports for equipment are a factor that the designer can quite easily control. Too often these are selected according to snap judgment by some one else when they should be selected by the designer who can determine definitely what character of material and size will give not only ample strength but ample safety. Falling equipment which contains refrigerant may easily become as dangerous as a falling stack or tower.

3. Electric motors and other electrical equipment ought to be located above basement levels when flooding of such levels is possible. Stoppage of main pumps and other parts through current failure is a hazard always. The location of water and brine pumps, tanks, pans and pipe lines above electric wires and electrical equipment is of great importance and the careful designer will try to avoid this because of the possible short circuiting and other risks that will attend the operation of the plant where such a situation exists.

It is well for us to consider that two classes of designers are usually concerned with the production of a refrigerating plant. One is the machine designer, the other the plant designer. The former will be experienced in the designing of machinery and equipment, and the various shop methods used in its manufacture. He will know much of the shop men's problems as well as of the manufacturing facilities of the particular shop where he is located. The latter will usually be experienced with the theory and practice of refrigeration, the characteristics of refrigerants, the behaviour of both the refrigerant and the refrigerating process that is to be used for applying the cooling effect to products or places. He will generally have considerable experience with the installation of equipment. Neither of these men, however, can accomplish more in connection with the production of a complete plant than to exercise care and give thoughtful study to the safety precautions that should be employed. Therefore, there must be cooperation of others to secure the full degree of safety in the operation of any plant.

The Code Should Be Uniform Practice

I am convinced that this code ought to be made the uniform practice with all manufacturers of equipment, and with all city or state authorities who are concerned with the adoption of codes or regulations applying to refrigerating plants. I hold this conviction because of the manner in which it was developed. It, in truth, constitutes a summary or cross section of the opinion of all those actively engaged in the refrigerating field as to what should be set up as safe regulations for this field.

Some of you are familiar with the discussions among and investigations made by those having the development work in charge. The Committee included more than forty individual representatives of more than 25 engineering societies, trade associations and other recognized authorities. Every viewpoint from the machine designer to the final inspection authority having the approval of plant installations for the public was thus represented, and it would in any such case, be necessary for much discussion and considerable lapse of time before differing viewpoints could be understood and reconciled. No uniform regulations had previously been advanced in such complete form. The code represents a cross section viewpoint of almost 100% of this committee.

The project was sponsored by the American Society of Refrigerating Engineers and when the final draft was finished it was submitted to the Society for formal approval and then submitted to the American Standards Association where it has also been approved. The Committee had during the period of development followed the

The procedure under which the work has been done provides for review and revision at certain times so that improved equipment and new methods developed in the refrigerating field may be properly recognized by future modifications.

I am offering the Code as part of, and supplementary to, the above discussion. It rightfully takes first place in any such discussion and I hope that those who have not previously studied it will do so at their earliest convenience and apply its provisions in their business so far as safety measures are found necessary. Its various requirements generally explain themselves or are explained by the definitions. However, a few features occur to me as requiring additional explaining.

Paragraph 102. When manufacturers of equipment make the Code a part of their standard practice, it may used as printed. City and state governments who make its provisions a part of their laws or regulations will, however, have to add additional provisions that specify the department, bureau or other authority having jurisdiction and also the fees and penalties, if any. The reference to authority in this paragraph may be interpreted as meaning the department or bureau specified in ordinances or laws.

Paragraph 120. The machinery room referred to should not be interpreted as meaning only the engine room of a plant where compressors, pumps, motors and the like are usually located. It will include also the room or rooms where receivers, condensers and other high side pressure vessels, also shell and tube brine coolers, water coolers and the like are located.

Paragraph 201-5. The classification by "amount of refrigerant" may be accepted as the best means of determining the class to which a given plant belongs. While there will in some cases be larger plants having a proportionately larger charge of refrigerant operating with less risk than a smaller plant with a smaller charge of refrigerant, this will not generally be true. The greater the amount of refrigerant contained in a given plant or system, the greater will be the risk if all of the usual safety measures applying to each size plant are employed.

It is fair to say that other rating methods were discussed in the earlier Committee meetings such as the capacity of the plant in tons but the classification shown was accepted finally as the proper method of classifying plants for the purposes of this Code.

Paragraph 310, 3. Industrial and commercial systems will, of course, overlap occasionally, that is, there may be a commercial system that will be larger and have a larger refrigerant charge than some industrial systems. However, the provisions of the Code allow for this so far as it may be done in a practical way. A study of the Code will show that the larger commercial system differs from the industrial system chiefly in the fact that it is likely to have more employees and people generally exposed to the hazards that accompany its operation. Commercial systems as a class are, therefore, subjected to stricter regulations.

Perhaps some of you may desire information concerning other points. If so, I will be glad to supply it as far as I can. A Committee on Interpretations selected from the large Sectional Code Committee may also be addressed in care of the American Society of Refrigerating Engineers for an interpretation of any of the Code provisions that are not clear. New problems not definitely covered in its present form may also be submitted in writing to that Committee for interpretation.

Diagrams Illustrate Code

Some features of the Code may be more clearly shown by diagrams.

(Mr. Baer then exhibited six slides, photographs of which may be borrowed from the Council's headquarters office upon request.)

Diagram 1. This illustrates one form of adjustable relief valve for use where a

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single valve is required. An important feature of this type of valve is the material from which the sliding valve body is made. This must be of steel, monel metal or other material not affected by ammonia when used in ammonia plants and may also be made of brass or similar non-corrosive materials when used in plants employing other kinds of refrigerant. Any similar form of spring tension relief valve having adjustment will serve the purpose.

Diagram 2. This is included merely to show the simple and inexpensive manner in which relief valves may be attached to an ammonia receiver. In this case the receiver is of the horizontal type. Although the relief valve might be attached to a tee placed in the liquid inlet or outlet pipe near the surface of the vessel, it is customary to provide an independent connection for it so as to avoid any chance of the valve being affected by the flow of liquid in the main pipes.

Diagram 3. This is another illustration of the kind shown in No. 2. The valve may be attached to a shell and tube condenser, brine cooler or other similar pressure vessel with an independent connection in the same inexpensive manner that is employed with receivers.

Diagram 4. Here we see a special compressor manifold in which provision is made for attaching the relief valve so that excess pressure on the discharge side will relieve directly into the suction. This is considered very good practice for vertical compressors on which such manifolds may be used and is employed quite extensively.

Diagram 5. This indicates the location of relief valve in a bypass between the main discharge and the main suction for one of the late types of horizontal double acting compressors. This will be quickly recognized as providing an equivalent means for relieving excess pressure to that shown in diagram 4.

Diagram 6. This illustrates an arrangement of two relief valves that will comply with the requirements of paragraph 337 of the Code. Where excess pressure occurs rather frequently and the relief valve operates, it will tend to find a new seat which will not be absolutely tight. In such case it should have attention. This arrangement of two valves will provide an open passage to one valve always while the other is closed off for such attention and avoid interrupting the continuous operation of the plant which would otherwise be required where a single relief valve is used.

Discussion

J. F. NICKERSON (American Institute of Refrigeration, Chicago, Ill.): It seems to me this paper is of very considerable value and worthy of very careful study in its printed form. Certainly the American Society of Refrigerating Engineers have done a splendid piece of work in initiating and sponsoring this Safety Code, and naturally the Refrigeration Section look to the technical engineer and refrigerating machinery builder for guidance in such matters.

I would like to inquire of Mr. Baer if the Refrigerating Machinery Association or any of the individual members have compiled any figures as to the number and character of accidents that have occurred in the manufacture and installation of refrigerating machinery in any given period?

Mr. BAER: I am sorry to say such figures are not available in any complete form. Here and there casual records have been made of scattered accidents, but such records have not been assembled. The Refrigerating Machinery Association until this year did not have a full-time paid Secretary, and consequently, many worthy activities were formerly left untouched. The accidents during installation result mostly in injuries to hands and feet. It is rare that there is a very serious accident, although they will occur once in a while with men using rope slings and hoisting apparatus that is not secure.

"We had one case where an accident could have been very serious and yet, strange to say, it was not. Just a few weeks ago a man was investigating trouble in a compressor which was not operating properly. He opened it up and then wanted to turn

the crankshaft. Of course, he could not use the motor but he neglected to pull out the main switch on the switchboard right back of him. He put a wrench on the crankshaft to turn it by hand but the wrench slipped and he fell back against the switchboard. He happened to hit the motor starter and started the motor and even though the machine flew to pieces, he did not even get a scratch. He might have been electrocuted in falling into the switchboard with the current on, or the machine bursting might also have hurt him very badly. Very often men have luck like that.

Two Pertinent Questions

GEORGE B. BRIGHT (George B. Bright Co., Detroit, Mich.): I'd like to ask Mr. Baer two questions in connection with Code work. In municipalities I have had the following criticism in reference to our paragraph on non-combustible materials for a certain class of machinery rooms. Most of the Building Codes don't recognize that. They claim that we should require them to be fire-resisting material.

The other is in the paragraph where we leave the specifications of pressure vessels to the jurisdiction having authority. Apparently there has been a slip-up there because states and municipalities very seldom have specifications, and they want to know why we don't refer to the A. S. M. E. Code and be done with it. I'd like to find out from Mr. Baer whether he has any suggestions to make on these two points.

Mr. BAER: In answer to the first question in regard to machinery rooms being built of non-combustible material, there is a great deal of contention on that, as well as on numerous other subjects. Many of those on the committee were opposed to laying extra expense on owners of plants beyond what is justified by experience. As I recall the discussion, it was pointed out by almost every one that the record of fires starting in an engine room or causing serious damage in an engine room was not sufficient in the larger plants to warrant our putting in this Code strict specifications for building materials.

There is one section of the Code pertaining to commercial systems which specifies that under certain conditions when a flammable refrigerant is used, the machinery room must be built of non-combustible material. On the other hand it was felt the Code ought not to be so severe as to specify non-combustible material for every plant.

Pressure Vessels

The other question in regard to pressure vessels: I may say frankly that the A. S. M. E. Code for pressure vessels has not been accepted and put to use by any of the people in the refrigerating field. It is felt by most of them that it is much too severe for our field and is unfair to that extent. They have been told about that at various times, but their committee insists on having it just as it is. There are a few people, I understand, who do use it, but so far as we know there are not many people in other lines of business that are using it.

The welded tank manufacturers appointed a special committee and tried to influence the A. S. M. E. committee to change the Code. They claimed it was too severe and was not justified by the experience in their field. A slight change was made last fall, but not in the direction of making it easier, rather making it harder.

In our field there have been thousands upon thousands of welded pressure vessels put out, and so far as we are able to learn there has not been one of them ruptured where it had a relief valve attached. There have been a few ruptured with relief valves attached but only where the valves were plugged so they could not operate.

CHAIRMAN WAKEFIELD: We have had this discussion on "Safety in Design and Installation." It is very pertinent, therefore, that the next subject should be "Safe Practices in the Operation and Maintenance of Refrigeration Plants." I am very glad to present our speaker, Mr. George B. Bright.

Safe Practices in Operation and Maintenance of Refrigerating Plants

By GEORGE B. BRIGHT

President, George B. Bright Company, Detroit, Mich.

Assuming that all plants are properly designed and constructed, and that they are all inherently dangerous by reason of the fact they operate under pressure and employ some kind of a refrigerant; this paper is confined only to safe practice in so far as the refrigerant contained in equipment and apparatus is concerned, and does not deal with other hazards of building or moving equipment.

All refrigerants are suffocating. Some present a further hazard of being toxic, flammable or explosive.

In order to deal intelligently with this subject, refrigerating systems should be considered for three distinct and separate uses, as follows:

(1) Industrial refrigerating plant, used in the manufacture or processing of materials, such as ice-making plants, cold storage warehouse, ice cream plants, dairy plants, packing house, chemical plants and other places of similar industrial enterprise.

(2) Commercial refrigerating plant and/or air conditioning plant, used in a commercial and/or business place, such as meat markets, stores, florist shop, hotel, office building, restaurant, candy shop, bakery, and other places of similar commercial enterprise.

(3) Domestic or household use—any refrigerating system assembled and/or installed in a single residence, duplex and/or apartment dwelling.

Refrigerating plants in the industrial group, while some of them contain many thousand pounds of refrigerant, do not present any great hazard—due to the fact that they are usually in charge of a skilled operator, and, further, any great loss of refrigerant would prove costly from a renewal standpoint as well as impair the operating efficiency.

Most industrial plants are so located that they are not hazardous, except to workmen employed directly within them. Where the public comes in close contact with such plants, it is usually some place remote from any part of the refrigerating system.

For the Industrial Plant

Some suggestions for operation and maintenance for industrial plants are as follows:

(1) Check pressure gauges often, at least every 10 days, to be sure they are registering proper pressure.

(2) Every refrigerating plant should have the following thermometers:

- (a) In the liquid line between condenser and receiver.
- (b) In the suction line to each compressor or absorber.
- (c) In the discharge from each compressor or generator.

(3) The thermometer in the liquid line is the best check as to proper condensing pressure. If corresponding pressure of condenser is not close to that shown for the temperature of the liquid leaving the condenser, then it is evident that there is air in the condenser or the condenser is dirty. This also applies when the temperature of the liquid leaving the condenser is more than a few degrees above the outlet water temperature from condenser.

(4) Thermometers in the suction lines should never show in excess of 5 degrees to 8 degrees F above that of the corresponding back pressure, and never below. If above, it shows suction superheat and that all of the low side surface is not being used to the best advantage.

If below the corresponding temperature, shows that too much liquid is being fed to the low side, which results in freezing back to the compressor or absorber, also some danger of liquid shocks to the compressor.

(5) The thermometers in the discharge lines should show a temperature to correspond with that of the condensing pressure and superheat. If below, shows that sub-cooling is taking place either by liquid being fed into the cylinder or excess water jacket cooling is taking place. If above the corresponding pressure and superheat, the excess is sometimes caused by leaky valves, piston or undue mechanical friction.

There is a fixed relation between suction superheat and discharge superheat, depending on the refrigerant used.

(6) All pipe connections should be kept tight and free from vibration. It should be remembered that no leak will ever take up with a refrigerant, no matter how small it is.

(7) Keep refrigerant free from oil and foul gas by purging system.

(8) Be sure that every pressure vessel that can be shut off is equipped with a pop safety valve of "Code" size and setting and that it is in proper working condition. If there is a stop valve between vessel and safety valve, be sure that it is open. Most of the accidents of pressure vessels failing are due to safety valves being out of commission. Some operators make it a practice to note safety valve inspection at least once a week on their log sheets.

(9) Where plants are equipped with devices to stop the compressors, by means of pressure limiting device, the same should be checked and tested at least once a month.

(10) Keep all valves and lines marked so that in case of emergency it would be easy to transfer refrigerant or shut off any part readily by reference to labeled lines and valves. Where more than one compressor is used, it is well to designate them by numbers, then follow some system of numbering valves, such as No. 1 suction valve, Nos. 2 & 4 discharge valve, etc. Where it is necessary to close such valves, a warning tag should be placed on same calling attention that the valve is closed. Also a tag should be placed on starting switch, calling attention to it being necessary to open discharge valve before starting compressor or discharge of pump, whichever the case may be.

(11) In shutting down a compressor, the suction stop valves should always be closed and never opened until machine is up to desired speed when started again; then the opening should be gradual to be sure that no entrained liquid is drawn from lines into compressor suddenly.

(12) Never open or close a valve in a refrigerating system until after you have made a check as to what will happen if you do. Many accidents have been caused by opening of a valve allowing liquid to flow into compressor suddenly, and wrecking the compressor.

(13) Keep all bolts and nuts free from rust and oxidation by using some protective such as graphite and cylinder oil. This is also an excellent protector for valve stems.

(14) Keep a full charge of refrigerant in the system at all times. Anything less than a full charge means the plant is operating at low efficiency on the evaporating surface.

(15) Keep brine to proper density, as a weak solution will freeze on the evaporator, and is also far more corrosive.

(16) Keep brine solution as near neutral as possible or slightly alkaline. Acid or strong alkaline brine causes pitting and corrosion.

(17) If electrolysis appears, check brine system over for bronze or brass fittings. Some times, a bronze impeller in a pump has been known to ruin all the cast or steel fittings in a brine system.

(18) Brine treatment recommended by A. S. R. E. Corrosion Report.

(19) Keep condenser clean and free from scale. This adds to the efficiency as well as prevents deterioration of tubes or pipe.

(20) Keep frost and ice off of cooling coils, where it is possible to defrost. Some ice plant operators make it a point to defrost ice storage room coils in sections just before the summer season sets in. This is done by placing canvas over ice and defrosting one section at a time.

(21) Keep tools, such as wrenches for compressor, stuffing box and valve glands, handy at all times. A neat tool board is very useful for this.

(22) Keep gas mask in operating condition. Operator should have monthly "gas mask drill"—this always means proper use and condition.

(23) If necessary to remove refrigerant from system, it should always be placed in suitable container in accordance with regulations, or discharged with suitable absorbent.

(24) Refrigerating plants of the commercial group present an entirely different problem to that of the industrial plant, for two reasons:

1st: Many plants are not operated by skilled operators. In a great many, the operator knows absolutely nothing about refrigeration.

2nd: It is the commercial group where the public is subjected to the dangers and hazards of refrigeration by virtue of the fact that they are constantly in such places.

(25) It is impossible to assume that commercial systems are properly designed and constructed. For anyone familiar with present methods is well aware of the fact that such is not the case. While it is true some manufacturers are attempting to build good equipment, there are others that are not—so there can be no safe practice for operation or maintenance of such systems that are not safe from a design and construction standpoint.

For the Commercial Plant

Some suggestions for safe practice in operating and maintenance of Commercial Refrigeration Systems:

(1) The person in charge of the system should become familiar with the system and the various parts.

(2) The suction and discharge pressures should be observed frequently during the day. Where systems do not have pressure gauges, then the suction and discharge can be observed by placing hand on the pipe. If pressures or temperatures do not correspond to that recommended, call a service man.

(3) Where systems are manually operated, be sure to follow instructions for starting and stopping them. If automatic, do not tamper with controls—better call an expert service man and be sure.

(4) Do not use sharp instruments in removing frost or ice from low side. Many evaporators or low sides are made of thin copper tubing and are easily punctured.

(5) In the event of a leak, call a service man or the Fire Department immediately. Domestic refrigeration presents an entirely different problem from either Industrial or Commercial systems.

Most people are entirely ignorant of the fact that all Domestic Mechanical Refrigerators have the same potential danger due to pressure of the refrigerant, as well as toxicity, as some of the larger systems.

It is true, however, that except with systems used for apartment dwellings, there is not the same danger or hazard to the public as with that of the commercial system.

Some safe practices recommended for domestic use in single homes are as follows:

(1) Obtain the following information and place on a card, and keep near the refrigerator in a convenient place for use in case of emergency:

(2) The name and correct chemical formula of the refrigerant used.

(3) If refrigerant contains a warning agent, the name and correct formula of same.

Refrigeration Section

(4) The name, address, day and night telephone number, for service.

(5) The name, address and telephone number of the physician or hospital to be called in case of emergency.

(6) Keep the cooling unit in the refrigerator free from ice. This can be done by defrosting at regular intervals. It is better to defrost before any ice accumulates, as a light coating of frost will melt away in a few hours; where, when evaporator surface and tray sleeve become covered with ice, it is necessary to defrost all day and sometimes all night.

(7) After defrosting, wipe out tray sleeve with a cloth—this will prevent trays from freezing fast.

(8) One of the common causes of leaks is by unnecessary damage done in removing frozen-in ice trays.

(9) Don't tamper with any of the controls—call a service man.

A careful checkup of 54 accidents reported in a number of ice plants reveals that only one accident was caused by reason of the refrigerant.

In that case the operator opened an oil drain valve wide and was burned by ammonia before he could close the same. This was purely neglect on the part of the operator by carelessly opening a valve, wide open, on a system under pressure.

Most of the accidents of recent years in the large industrial systems that have come under my observation, have been due entirely to the careless use of the equipment.

A brine cooler in Detroit blew up when filled with liquid and the inlet and outlet valves were closed; also the stop-valve between the pop safety valve was closed.

In another case, a large quantity of ammonia was discharged from a plant that drove the people out of buildings half a block away when a discharge line made of light weight broke. Nothing would have happened beyond the plant if the bypass on check valves had not been left open, with the result that several thousand pounds of refrigerant were lost—whereas less than 100 pounds would have been lost if the check valve bypass had not been left open.

Two other places reported accidents due to stop valves being closed and pressure did not relieve through safety valve. The A. S. A. Code provides that no stop valve will be permitted between pressure vessel and safety valve.

It is believed that much trouble and many accidents will happen unless some precautions are taken to have all refrigerating systems designed and constructed in conformity to a code, and installations made only by competent workmen licensed by the State or Municipality having jurisdiction.

Discussion

EMERSON BRANDT (Midwest Utilities Co., Chicago, Ill.): A study made by our Engineering Committee during the past year indicates that accidents usually occur outside the engine room. Many accidents occur in handling ice. This study bears out the statement made by Mr. Bright that the refrigerant rarely causes an accident. Last year there were three accidents reported caused by the refrigerant. In every case it was due to the fact that a man had opened up the system without having properly pumped it out, and so was endangered by having ammonia blown into his face.

The accidents in the operating department were less than ten per cent of the total in the ice industry. These accidents also were of low severity.

FRED I. McCANNISH (National Association of Ice Industries, Chicago, Ill.): It seems to be general practice to locate the gas masks in or about the engineer's desk, usually in the engine room. Would it not also be good practice to locate some of them outside the engine room, or at least accessible from the outside near a window or door.

Several accidents have happened in the past few years from electrocution; in several instances in or about the ice crane. In at least two cases it was found that

the electric power used on the crane was 220 volts, and in one instance it was found that 500 volts were used.

CHAIRMAN WAKEFIELD: In our company we had a very bad experience with a break. Atmospheric conditions were such that when the leak occurred the fumes went down and practically put out of commission the entire operating force. All of our masks were inside. We just could not get to the valves to close them down. The result was that we lost about seven thousand dollars' worth of ammonia, three men were badly injured, and we had to call on the packing houses to send down an emergency squad with their masks before we could get into the plant to do anything. So we learned our lesson that way. In all of our plants now we have a mask inside, but there also are some accessible from the outside, so if anything like that happens again we can at least get into the place with the other masks. The location of the masks is most important.

The next item on the program likewise is something in which we are all interested. We have been talking about how to prevent accidents. Now we are to hear from an eminent authority on what to do after a man has been injured. We have had the great pleasure on previous occasions of hearing this speaker. I am happy to present to you Dr. C. R. G. Forrester.

The Economy of Good Surgery

By DR. C. R. G. FORRESTER
Chicago, Illinois

I am very much pleased to be able to talk to you again, although I am rather surprised that you can stand for a second medical discourse from one man. The last time I talked it was more on the neglect of cases in their inception in regard to small infections. I attempted at that time to show the importance of closer care to the immediate treatment of those cases. Today, I would like to impress you gentlemen with the importance of handling big cases as contrasted with the little cases, and at the same time bring to your attention the importance of getting serious injury cases into the hands of trained, competent, capable surgeons.

I do not wish my statements to be misconstrued. All medical men are well-educated. They have to be. But we in our profession are specializing, just as you gentlemen are in yours. There are many physicians who in certain lines of practice are very much more capable than I am. Frankly, I don't know how to take out tonsils. And I would be very sorry for the patient that I had to operate on for a thyroid.

Inversely, I'd be very sorry for the man with a broken leg who had to be treated by the surgeon who took out thyroids. So for that reason I am trying to show here the importance of having your cases placed in the hands of men who are practiced in specific lines. It sometimes is heart-breaking to see cases which have been handled by men of indifferent training in those particular lines. Therefore, if I were to try to do work with which I am not familiar, other doctors would feel the same way about me.

Having your bad cases treated properly at the start means not only an economical saving in medical and hospital costs, but also in compensation, and in future earnings.

I had the question put up to me last year by some of the gentlemen, "How are we going to get hold of the right doctor?" If my memory serves me correctly, I made the statement at that time, if you have a surgeon in your particular locality rather distantly related to your plant, but in whom you have confidence, who can supervise your work and check your cases, you will find it profitable to use his services. Find the man who is trained to do a specific job, then get each case into that particular man's hands at the time, not four or five months later, after further damage may have been done.

(Mr. Forrester then exhibited 17 slides, photographs of which may be borrowed from the Council's headquarters office upon request.)

Slide No. 1. shows a high school boy with a fractured left arm who was injured March 22, 1931; fracture surgical, neck of humerus much displaced and angulated. Treated elsewhere and then came to us on March 31st, eleven days afterwards. The family were averse to open surgery. I tried by traction methods to pull down the fracture but it was too long out of place, so I opened the shoulder and put in a beef bone peg. There was a three months' disability in this boy's case.

Slide No. 2. This was a deformity when the boy came to me. You can realize with that type of deformity it meant that boy would never be able to raise his arm over his shoulder. He has a permanent limitation and non-use of the shoulder joint.

Slide No. 3. This operation compared with the first one, shows the beef bone peg in position with a perfect reduction at the point of fracture. With a frame to hold the arm at right angles, this bone healed; the beef bone peg inside dissolved and there was no further discomfort.

Slide No. 4. Here is a painter thirty-three years old who fell off a twenty-foot scaffold, breaking the right leg. He had a fracture of the right femur, and further complications. Such cases usually run from six to eight months. This man was able to return to work six months after injury. The physical examination showed no shortening and no functional disability but as you gentlemen know the State Industrial Commission makes it a point to see that these people get something, anyway.

Slide No. 5. This is a picture of the fracture. You see the alignment is perfect, with no distortion.

Slide No. 6. That is another angle of the same fracture, showing nature's bridge across the callous. The action of the limb is perfect as a weight-bearing member.

Slide No. 7. A man of fifty-eight, a candy maker, had his hand caught in an electric wall fan and had it crushed and torn. He had considerable destruction of tissues but under local anesthesia we completely repaired the tissues. He had a dislocation of the thumb the loss of which means considerable money. There was no infection. The usual disability in these cases runs from two and a half to three months. This man returned to work at the end of two months. He was so satisfied with the result that he refused to accept anything but a penny in compensation settlement. That was a shock, I will admit.

Slide No. 8. This shows the man's hand completely dislocated and compounded and the fracture comminuted. That man three weeks ago sent each of my associates a box of his own candy. He was so grateful.

Slide No. 9. This is a lateral view of the reduction held in place with a false capsule for the thumb joint, showing complete union of the fracture. You can't see now where it was fractured.

Interesting Case of a Laborer

Slide No. 10. Here is a boy of twenty-one, a laborer. A hook slipped from the hopper and knocked him down which resulted in a broken left leg and a bruised back. This man had a compound comminuted spiral fracture of the left tibia; also a fracture of the left transverse processes of the vertebra. Under local anesthesia we reduced the fracture with a temporary splint and put a cast and walking iron on this man. He was hurt on the twentieth of February and discharged from the hospital on the nineteenth of March, less than a month. This shows what can be done where immediate intelligent service is given. You can quickly figure out in dollars and cents what that means.

We had trouble with him because we caught him playing baseball while he had a walking iron and cast on, and with labor being short we could not get him to go back to work. In fact, he would not go back to work until his case was settled. The Industrial Commission gave him twenty-five per cent of the leg and an indefinite

disability of the back. I am afraid I lost my temper because I went over with the attorney to the Industrial Commission and told them it was an insult to my own surgical ability and I would not stand for such a settlement. The result was the man got fifteen per cent for his leg and nothing for the back.

Slide No. 11. This shows the comminution of the tibia into the knee joint. This man had no loss of motion, no shortening and, no atrophy of the entire limb.

Slide No. 12. Here is a coal hoister who was hurt on April 10th, left forearm crushed between the conveyor chain and sprocket wheel. He had a compound comminuted fracture of the radius and ulna of the forearm about the wrist. On the eighth of May under ethylene anesthesia we reduced the ununited fractures and wedged them and the man was discharged from the hospital on May 12th, four days after the operation. X-rays on August 7th showed complete union. The usual disability in these cases runs from six months on. On August 7th there was a ten per cent limitation of motion. The estimated specific loss was twenty per cent of the arm. There was a lump sum settlement of nine hundred dollars, equivalent to twenty-five per cent of the arm. This includes an older injury to the neck.

Slide No. 13. Here is a man of forty-five. On May 31st 1929, he was injured. He caught his right wrist in an ice saw, causing laceration of the volar surface over the ulna.

He did not come to me until May 11, 1930. The surgeon who operated on this case was supposed to have sutured the ulnar nerve. That nerve supplies fifteen and a half muscles in the hand. The hand did not improve. He had no use of it, so he came to me as a patient. I operated on him and I found that the nerve had been sutured to a tendon. Of course, that is not physiologically sensible. You have to suture a \$1585.00. If that case had been sutured properly at the start, the man would have returned to work at the end of ninety days.

nerve to a nerve, just like any telephone system. I operated on this man and sutured the nerve. On May 5, 1930. Estimated specific loss twenty per cent of hand, awarded

Slide No. 14. Here is a man sixty-three, a watchman, who was hurt March 21, 1930. He fell on a stairway injuring his right shoulder. The first examination on April 21, 1931 approximately a year later, showed an unreduced dislocation of the shoulder. He was operated on the 29th, and discharged from the hospital May 10th. After the operation there was a complete reduction. Length of treatment, four months and four days. Anticipated disability six months. They gave the man 25 per cent of the arm, but you see the money spent on this case for medical hospital, compensation, including temporary and specific loss.

Slide No. 15. Occupation, actress. Date of injury March 1928. I did not see the case until August 1930. Pott's fracture of the ankle; that is a fracture of the knuckle of the lower end of the tibia and lower end of the fibula. When those conditions are properly reduced and properly treated at the time the accident occurs, these people can be handled under local anesthesia in the surgeon's office. The day the fracture occurs the reduction can be made, the plaster cast and walking iron applied and they walk the following day. This woman had a very badly deformed foot. She could not walk on it. I sent her to the hospital and had to fracture the leg above the ankle and change the line of weight bearing. There was no possibility of changing the condition of the ankle joint. It was too late. Time lost to date of operation three years seven months. Period of treatment four months. She had about twenty or thirty per cent loss of the foot. She drove her own automobile to California in the last sixty days.

Slide No. 16. Here is a patient of forty-two, injured August 1, 1930, posterior dislocation at the ankle joint. There was a cast placed on this case—no reduction was made. X-rays were taken October 29, 1930, and showed no improvement. The examination showed an inverted foot with atrophy and loss of motion. On December 13, 1930, I performed the operation; the time lost to the date of operation was four months twelve days before I received the case; period of treatment six months eight days; specific loss thirty-five per cent of the foot, and the settlement was \$1,281.20. This case had been given a permanent total disability before the operation.

Slide No. 17. Carpenter, age thirty-eight, hurt June 9, fell from scaffold. I did not see this case until October 18. A comminuted fracture into the ankle joint and interference in weight-bearing line. There was an open wound in the lower portion of the leg with two draining sinuses. Palliative treatment, using medicines and local treatment, failed. Operated next June 4. He had an osteomyelitic leg. Specific loss was forty per cent of the leg. If that case had been handled at once by a man trained in this work the whole thing would have been materially simplified.

Report of Engineering Committee

By EMERSON BRANDT

Chairman

One of the primary functions of the engineering committee is to furnish the section with safe practice pamphlets which outline specific methods for accomplishing the usual work of the industry. At the first of this year, the refrigeration section had none of these pamphlets available. For this reason, the various activities embraced by membership in the section were grouped in their logical divisions as to probable subject matter in the pamphlet and total content. The following were set up as subjects for safe practice pamphlets for the refrigeration section.

1. Safe Practices in the Operation of Refrigeration Plants, and Machinery.
2. Safe Practices in Manufacturing and Distributing Ice Cream.
3. Safe Practices in Cold Storage Operation.
4. Safe Practices in the Manufacture and Storage of Ice.
5. Safe Practices in the Distribution of Ice.
6. Safe Practices in Car Icing.

It was felt at the time that other items would probably be added as the needs of the industry developed or were made known. These six were established as a basis for the first productions.

The pamphlet on Safe Practices in the Distribution of Ice has been prepared by Messrs. Ray Finch of the Bureau of Safety, Inc. and R. H. Ferguson of the National Safety Council and has been printed and made available to the industry thru the National Safety Council.

Pamphlets numbers 1 and 6 are now in production and early release of them is planned.

In order to foster interest among others engaged in the industry, contact was made with the National Association of Practical Refrigerating Engineers. This organization is an educational association whose membership is composed largely of operating men in the refrigeration industry. The safe practice pamphlet on car icing is being compiled by a chapter of the organization under the direction of a member of the engineering committee.

In the statement of work in prospect for the engineering committee at the beginning of the year there was a statement that the committee would be glad to receive correspondence on specific problems falling within the scope of its work, for discussion and publication in the news letter. This correspondence did not materialize, altho the committee handled similar matters presented to it thru the safety engineers.

In order to promote discussion in the news letter as well as definite action along accident prevention lines, the committee has made a study of accidents occurring during the past year in the ice industry. The accidents were classified according to departments, cause, and severity. The most prolific sources of accidents were determined in that manner. The results of the survey will be submitted to the news letter editor with comments and it is recommended that

the membership be invited to suggest and initiate preventive measures specifically aimed at eliminating these major sources of accidents.

It is further recommended that these studies and analyses of accidents be extended in the same manner to include other divisions of the industries represented by membership in the Refrigeration Section.

ADJOURNMENT

Thursday Morning Session

October 15, 1931

VINCENT WAKEFIELD, Chairman
City Ice Company of Kansas City, Kansas City, Mo.

The next session convened with General Chairman Wakefield presiding.

CHAIRMAN WAKEFIELD: The first order of business is the report of the Nominating Committee, by Mr. J. F. Nickerson.

J. F. NICKERSON: I take pleasure in presenting the following list of officers for the Refrigeration Section:

Report of the Nominating Committee

General Chairman—VINCENT WAKEFIELD, City Ice Company of Kansas City, Kansas City, Mo.

Vice-Chairman—FRANK L. DUGGAN, Consolidated Ice Company, Pittsburgh, Pa., and T. A. ADAMS, Union Terminal Cold Storage Co., New York, N. Y.

Secretary and News-Letter Editor—EDWARD H. FOX, National Association of Practical Refrigerating Engineers, Chicago, Ill.

Poster and Slides Committee Chairman—GEORGE C. BAKER, Consumers Company, Chicago, Ill.

Membership Committee Chairman—L. W. DANLEY, Southern United Ice Company, Jackson, Miss.

Statistics Committee Chairman—HERMAN HILLENBACH, American Ice Company, care of Knickerbocker Ice Company, New York, N. Y.

Engineering Committee Chairman—EMERSON A. BRANDY, Middle West Utilities Company, Chicago, Ill.

Members at Large—

A. J. AUTHENRIETH, Middle West Utilities Company, Chicago, Ill.

A. H. BAER, Frick Company, Waynesboro, Pa.

GEORGE B. BRIGHT, George B. Bright Company, Detroit, Mich.

CARL C. CLEMENTS, National Dairy Products Corporation, New York, N. Y.

E. G. HITT, Chicago District Ice Association, Chicago, Ill.

BURFORD B. McCULLOCH, Bureau of Safety, Chicago, Ill.

GARDNER POOLE, American Institute of Refrigeration, Boston, Mass.

JAMES S. SPALDING, Railways Ice Company, Memphis, Tenn.

H. L. TRASK, United States Cold Storage Company, Kansas City, Mo.

COL. P. A. WEATHERED, Southwestern Ice Manufacturers' Association, Houston, Texas.

CHAIRMAN WAKEFIELD: You have heard the nominations. Are there any other nominations to be made from the floor?

(A motion was made, seconded and carried that the nominations be closed and the secretary be instructed to cast a unanimous ballot electing the officers named.)

CHAIRMAN WAKEFIELD: The next item on this morning's program is a discussion of, "Safety Measures in Cold Storage Power Plants," which is to be presented by Mr. T. A. Adams, who has consented to serve as our vice-chairman for the coming year.

Safety Measures in Cold Storage Power Plants

By T. A. ADAMS, Chairman

The Manhattan Refrigerating Company, New York City; Union Terminal Cold Storage Co., Inc., Jersey City; Kings County Refrigerating Co., Brooklyn

It is the duty of the executive of a company operating a power plant to take every possible precaution to prevent accidents. An executive must consider it his responsibility to seek out the dangers to the lives of his employees. It is his duty to act immediately upon the discovery of these dangers.

If we know how to save a life and if that knowledge is not given to our employees, we are responsible for the life lost through our neglect.

The executive must provide every mechanical means for the avoidance of accidents. He must do more than this—his employees must be chosen for physical fitness and qualification for the work, and they must be taught and drilled in the most modern methods of care, and be continually reminded of their personal responsibility for the safety of themselves, their fellow-employees, and the plant.

Any power plant offers many possibilities of accidents, because of the use of high pressures, and because of the moving parts of machines. All the precautions necessary in the ordinary plant are doubly necessary in the power plant of an industry employing gases under high pressure. A broken water pipe may be a serious thing sometimes—but an ammonia break is always a potential hazard not only in the plant, but throughout a considerable area around the plant. This fact increases the need for care, and measures for safety are required which would be uncalled for in the ordinary plant.

Ammonia Should be Confined to the Powerhouse

Because of the danger from ammonia leaks, I am strongly opposed to direct expansion of ammonia in the cold storage rooms. The greater the quantity of gas in use and the greater the distance it travels from the power plant, the more likelihood there is of serious accident. Aside from a possible property damage from leaks, the use of brine is absolutely safe. I believe that ammonia should be confined to the power plant.

The suggestions for safety which I now offer have been boiled down to fit into the time at my disposal.

Ammonia Compressors

Pressure Relief Valves (Figures 1 & 2 Photograph No. 1)

In order to prevent dangerously high pressures in the ammonia compressors, pressure relief valves should be installed on both high pressure and low pressure sides of the compressors, between the cylinder and the discharge stop valve. These valves should be set to open at given pressures. In case compressor is started while the stop valves are closed, or in case the stop valves are closed while the compressor is running, the pressure relief valves automatically open and discharge into the low pressure system.

Pressure Limiting Device (Photograph No. 2)

The loss of condenser water or the accumulation of foul gases in the condenser may cause dangerously excessive pressures. These excessive pressures would operate the pressure relief valves, but the addition of a device called "Pressure Limiting Device" avoids the necessity for the action of the pressure relief valves. The Pressure Limiting Device, is a pressure controlled switch for automatically stopping the operation of the ammonia compressors, at a lower pressure than the setting of the high pressure relief valves.

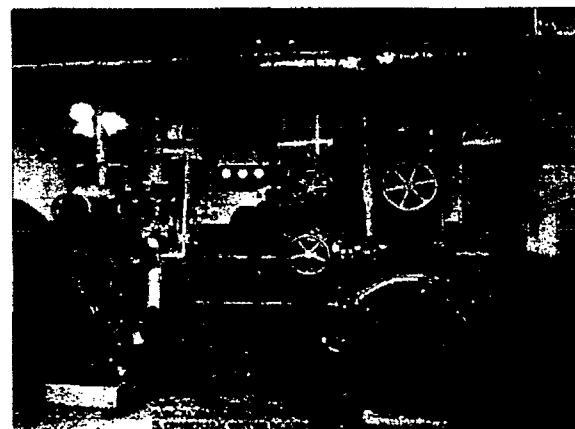
Ammonia Compressor Lubrication (Figures 3 & 4 Photograph No. 1)

Care should be used in the selection of lubricating oil for ammonia compressors. It should be capable of withstanding a high flash test, and at the same time flow freely at a low temperature. An oil of low flash point would be dangerous on account of the high temperatures due to compression. An oil that congeals at low temperatures would, of course, be unfit for use.

Main bearings, cranks, and crossheads of the compressor and any other moving parts of machinery lubricated by the gravity system, should be so designed that failure of the oil pump to pump oil to the reservoir through breakage of the pump belt or other cause would be made known by the ringing of an alarm.

Remote Control of Compressors

Automatic devices may fail or an accident may occur which the automatic devices cannot prevent. For this reason, it is necessary to have a manual control at a point easily accessible from outside of the machinery room, preferably at the door of the



Photograph No. 1

machinery room. This device, called a "Remote Control Switch", is used only in case of serious fire or accident. Prominently placed, easily read signs should be hung to direct attention to the location of this switch.

Ammonia Gauges

Ammonia level gauge glasses should have automatic closing gauge cocks and should be protected by wire mesh or slotted steel casings.

Rotating Parts

Rotating parts of all machinery should be guarded by railings or gratings.

Air Compressors

Lubrication

Explosions occur in air compressor receivers usually because of the super-heating of oil and of impurities in the air by the heat of compression. The ignited mixture

of oil and dust is carried over into the receiver from the compressor and explodes the oil already in the receiver.

To guard against such an explosion the receiver should be made to comply with the standards of the American Society of Mechanical Engineers. A pressure relief valve should be installed, set and locked.

The air should be taken from outside the building at a high point, away from gasoline or other fumes. An air filter should be attached to the intake to prevent dust from entering the intake pipe.

Pressure Shells

Pressure Relief Valves on All Pressure Shells

Pressure shells such as condensers, receivers, intercoolers, separators, brine coolers, evaporators, or any other vessel under pressure, should be equipped with pressure



Photograph No. 2

relief valves of the type already described. These relief valves should discharge into the air above the roof, or into that part of the low pressure side of the system protected by the ammonia mixer.

Withdrawal of All Ammonia from the Power Plant

In extreme conditions of fire or of breakage, it is sometimes necessary to discharge all of the ammonia in the system into the sewer. It would be a dangerous thing to discharge the ammonia without thoroughly mixing it with water.

For this purpose an ammonia mixer should be connected with the water supply and with the low pressure side of the system and also with the sewer. The ammonia mixer may be a steel cylinder, made of 8 inch or 10 inch pipe, depending upon the capacity of the plant. Such a mixer is controlled by manually operated valves, which when open mix the ammonia with water and discharge the mixture into the sewer. The valves are opened only in case of fire or serious break. The water pipe connected

with the ammonia mixer should have a check valve between the mixer, and the manually operated water valve. The check valve should be set against the ammonia pressure.

Failure of Condenser Water (Figure 5 Photograph No. 1)

If the condensing water is cut off from the condensers through failure of pumps or other causes, the ammonia pressure in the condenser will become excessive. It is important that the failure of condenser water should be made known to the engineer in charge immediately. For this purpose a condenser water alarm, sounding through a klaxon, or bell, should be installed.

Electrical Equipment

Protection of Electric Transformers

The use of combustible materials in the insulation of electric transformers and machinery is generally unavoidable. The combustible material so used may become a fire hazard if the operating temperature of the electrical apparatus becomes abnormally high owing to overloads, internal short circuits or because of inadequate or interrupted ventilation. Transformers, whether oil insulated or of the dry type, should be installed in the manner prescribed by the National Electrical Code, Articles 11 and 50.

For indoor installations the transformer vault should also be divided so that each transformer is placed in a separate fireproof enclosure provided with automatic fire doors equipped with fusible links. These doors will automatically close in the event of fire. Each enclosure should be connected with a ventilating duct so that the heat of ordinary use of the transformer may be quickly led away to the outer air. An automatic fire door with fusible link should be installed in the ventilating duct at each opening into a transformer enclosure. In case of fire in a transformer the duct door will also close and confine the fire to the one enclosure and exclude air, thus smothering the flames.

Each enclosure should have floor drains to discharge the oil into the sewer or buried tank in the event of fire. A door sill of ample size should be provided for each enclosure to hold the oil within the compartment.

Transformer vault doors should normally be closed and locked and only qualified persons should be permitted to have access to them.

Switchboard Protection

Switchboards should be "DEAD FRONT" and should be so placed as to leave safe working space on both sides. The live side should be protected by wire screen and should be accessible only to those in charge. Oil switches should be inspected at least once a year. The oil pot should be dropped because the contacts are not visible while submerged. The oil should be examined as to cleanliness and quantity. The contacts should be cleaned and adjusted. Rubber matting at least 38 inches wide, should be placed before the switchboard for its full length.

As a protection when testing fuses or circuit, a test lamp box should be used. This box should contain enough lamps in series to equal the highest operating voltage. The box should be placed on the floor some distance from the switchboard while the engineer is testing. If a lamp explodes its glass is confined to the box.

Inspections of Electrical Equipment

Monthly inspections of electrical machinery in the power plant and other buildings should be made by the chief electrician, and his findings and recommendations should be reported on printed forms, which forms enumerate all electrical equipment.

Machinery Room

Ventilation

In order that air in the machinery room may be quickly freed from escaping ammonia, exhaust fans should be installed with ducts in the machinery room leading to the outer air, at a high point. Ample window space, door or shaft ventilation to the roof is advisable, whether or not an exhaust fan is installed.

No Open Flame in Machinery Room

Because of the fact that ammonia gas when mixed with a certain proportion of air is highly explosive, no illuminating gas, blacksmith's forge, or other flame should be permitted in the machinery room. If boilers are installed in the power plant they should be in a fireproof enclosure, supplied with air through ducts from outside.

Exits

More than one exit from the machinery room is necessary so that the men will have more than one way out in case of a break or explosion.

Electric Lighting

If the lighting system is taken from the same electric service as the power system, a breakdown in the system would throw the entire plant into darkness, and this is a situation to be avoided at any cost. A separate, independent electric service from the Power Company would provide current for such an emergency. This service need be used only in a small way except in cases of a breakdown to the main electrical system.

Pipe Color System

Throughout the machinery rooms, a system of pipe coloring should be employed to distinguish from one another the different purposes of the pipes. Arrows painted on the pipes would show the direction of flow. The pipes may be painted as follows:

High Pressure Ammonia Pipes	red
Low " " "	black
Brine Pipes	black with colored bands
Water Pipes	green
Electric conduits	white

This avoids delay in emergencies and is convenient at all times. All valves should be labelled with metal tags to indicate what they control.

Ammonia Masks

The United States Bureau of Mines has investigated the designs of Ammonia Masks, and has published a list of the manufacturers whose products it approves. A sufficient number of such masks should be located in the machinery room, and another set at a place outside the powerhouse. Additional canisters should be kept in reserve. Monthly inspections and tests of the masks should be made, and all parts kept in proper condition.

In Case of Fire**Fire Protection**

Fire extinguishers of the carbon tetra-chloride type and of the carbon dioxide type, both approved by the National Board of Fire Underwriters, should be installed in the machinery room and other places where there is electrical machinery. The extinguishers should be mounted at points easily accessible from any part of the room and where they may be easily seen. The practice of hanging clothing over wall-mounted fire extinguishers or of obstructing access to extinguishers by piling material in front of them should be avoided.

Carbon tetra-chloride is a non-conductor of electricity. It does not freeze but gives off large quantities of irritating and suffocating fumes when it comes in contact with heated surfaces or burning material. Certain types of gas masks are effective in protecting against these fumes and should always be worn when carbon tetra-chloride extinguishers are used in confined spaces.

Carbon dioxide extinguishers consisting of portable cylinders with appropriate hose and nozzle fittings are now available. Carbon dioxide gas is a non-conductor of electricity, does not freeze and is a very effective extinguishing medium for oil fires or fires in electrical equipment. It is necessary to use a non-conducting extinguishing medium because of the danger of electric current following the stream and killing or

injuring the person using the extinguisher. The use of conducting fluids in extinguishing fires in close proximity to energized conductors might cause short circuits which otherwise would not occur.

Emergency Measures

Cabinets containing wrenches, hammers, screwdriver, and other tools that will suggest themselves, and a medical cabinet containing bandaging materials and antiseptics should be installed in the machinery room. The tool cabinet should be covered by glass doors so that all of the tools may be seen.

As much care should be given to the cleanliness and to the completeness of the first aid supplies as would be given in a hospital. The danger from infection caused by improper dressing of wounds is often more serious than the injury itself.

The precautions and devices of which I have spoken may be of no value whatsoever unless the men employed in the power plant are trained for Safety, and have been taught the necessity for care. The ammonia mask is a protection when it is in proper order, and contains fresh chemical. It is an added cause of trouble when it is not in perfect condition, and if it is not properly adjusted. For this reason it is necessary to put the men through monthly drills in caring for, adjusting, and using masks.

Sometimes a man's breathing is stopped and he becomes unconscious from the effects of ammonia gas before he is able to get a mask, or a similar condition may be produced by electric shock. In such cases, the man may be restored just as a man is restored from the unconsciousness preceding death from drowning. The Shaefer Prone Pressure Method of resuscitation advocated by the American Red Cross is one of the simple means of restoration. It should be taught to every employee of the power plant, and occasional lectures and demonstrations given by an expert. Drills in resuscitation should be held monthly and each employee should be obliged to act both as subject and as operator.

CHAIRMAN WAKEFIELD: The next item we shall consider is the topic, "Safety at the Platform." Our speaker is Mr. W. M. O'Keefe.

Safety at Platform

By W. M. O'KEEFE

Executive Secretary, Cold Storage Division, American Warehousemen's Association, Chicago

The paper which I have to present is not based on my own personal knowledge of the manner in which platform services are conducted. It is, however, an expression of some of the conditions related to me by men employed at the plants of several warehouses in Chicago, and I hope that it may be of some little value in connection with the work of the Council, looking to the prevention of accidents.

I am told that one of the common causes of accidents on loading platforms is the improper use of bridge plates to cover gaps between platforms and freight cars. In a number of cases investigated, pieces of boiler plate were used which were not of sufficient length to cover gaps and, not being securely fastened, would slip out of place by truck striking same, causing the load to overturn and resulting in strains or sprains to the employee, and often more serious injuries caused by the employee falling between car and platform.

Fastening bridge plates by means of nails to floor of loading dock or car also presents a condition which is responsible for a large number of accidents and this method of fastening plates should be discontinued. When cars are loaded or unloaded and the plates removed, nails are many times left protruding, causing the stumbling hazard which quite often causes puncture wounds. The storage of bridge plates in an upright position against walls is also bad practice, as there is the possibility of fracturing a toe or leg when the plate is hit by a passing truck. Leaving

bridge plates flat on the floor of the dock also presents the tripping hazard because many plates become bent in the center, thus causing the ends to bend upward.

Bridge plates should be of sufficient length to over-lap six inches at each end, with angle iron guides at the sides, and securely fastened in place at car door by means of pins or hooks. It is suggested that special racks should also be constructed to hold bridge plates in an upright position when same are not in use.

Handling of Goods and Materials—This feature is another very important item that necessarily comes under the heading of safety at the platform. Employees handling products to be placed in cold storage should be properly clad to withstand low temperatures and new employees should be cautioned against the danger of washing hands in warm water or warming hands over steam coils because this practice may result in the freezing of hands or fingers.

The use of safety shoes in handling goods into cold storage is recommended because they help to eliminate toe injuries. Occasionally the party carrying or lifting cartons or boxes drops them, and in such cases toe injury may develop if safety shoes are not worn. Recently the superintendent of a local cold storage warehouse talked with 76 employees concerning this feature and 69 were prevailed upon to purchase safety shoes immediately and the balance did so later on. In this case, the danger of fracturing toes was practically eliminated.

Goods are received in storage in boxes, barrels, casks, cartons and various other containers so that the possibility of accident while handling into or out of storage is ever present. With this in mind, it can readily be seen that the shipper can assist in eliminating the accident hazard so far as warehouse employees are concerned by giving a little attention to the proper nailing and/or wiring of containers so as to prevent the tearing of hands by projecting nails and loose wiring or handling.

The foreman of the platform, the receiving clerk or the checker can aid the cause of safety by seeing to it that projecting nails are removed from packages or containers. The same thing applies to insecure wire-bound crates and strap iron boxes which also present a serious hazard and which sometimes cause puncture wounds, followed in some instances by infection and blood poisoning.

The furnishing of a pair of pliers to the car man would be of great help in eliminating these types of accidents.

The handling of goods on cold storage platforms is quite often by hand labor or by tractors, but in either case the foreman of the "gang" is responsible for the safety of his men. We know of a recent case where the head of a barrel of goods had been opened for inspection and the nails were allowed to protrude, with the result that one of the men while reaching into the barrel received a bad tear in his arm while the foreman was watching the operation. Needless to say, the nails were removed after the accident, but the point is that had the foreman been on the alert the injury would have been avoided.

Equipment and Housekeeping

Equipment—Trucks should be inspected regularly and be kept well oiled. The use of nails for cotter pins in axles is a source of danger which cannot be overlooked. Quite often the washer between the wheel and cotter pin is lost and the man handling the truck does not realize that the friction of the wheel against the make-shift pin will break or cut same, thus causing the wheel to come off and topple the load, with resultant injury in some cases to the trucker.

The platform or loading dock is another source of trouble if not kept in proper condition and repair. Some concerns will allow platforms to wear until depressions appear in them and this source of trouble is not cared for until after employees complain of strains or other injuries.

Housekeeping—It is suggested that in order to sell safety to the employees working on loading platforms, cleanliness and orderliness must abound. You cannot hope to achieve safety when platforms are permitted to become dirty and have broken

axes, refuse, rags, and other materials scattered around. Very often one will see cars swept out and the paper and other refuse dumped between the car and loading platforms, causing a very untidy appearance and a decided fire hazard. An orderly kept loading platform with clean, pleasant surroundings will go a long way to prevent accidents and injury to the workmen.

Car Loading and Unloading—Men working on cold storage platforms should be instructed to exercise great care in the loading and unloading of cars. In some cases it has been observed that truckers, particularly new men on the job, will attempt to back out of a car onto the platform with a loaded truck. This should always be avoided, particularly when the bridge plate between car door and platform is one the decline because the weight of the loaded truck will cause the truck to run over the man and thus cause serious injury.

It is also suggested that employees should exercise care in opening car doors because there are several cases on record where the contents of the load in the car had shifted, and when car door was opened, several of the packages fell upon the man who performed the operation and injured him.

There are also cases of record where the switching of cars without warning to the men working in the cars resulted in accidents. It happens occasionally that men are working in a car at a time when other cars are switched onto the same track and there have been instances where cars were pulled out while men were still working therein.

Men employed at cold storage platforms should also be instructed not to close car doors without first looking into the car to see that there is no one in it. My attention has been directed to one case here in Chicago where a man went into a partly unloaded car to inspect the contents and while therein another employee came along and locked the car door. The first party was confined in the car for several hours before he was found.

There are times when the icing of cars is performed at cold storage platforms and great care should be also used in this operation so as to prevent accidents.

CHAIRMAN WAKEFIELD: The next feature under this general topic of "Safety at the Platform" pertains to the ice industry, and this discussion is to be presented by Mr. Paul R. Pearson.

Ice

By PAUL R. PEARSON

General Manager, Ice Operations, Consumers Company, Chicago

The subject "Safety in Handling Ice at the Platform" is a very interesting one but much more variegated than the mere title suggests. The activity we have experienced during the recent warm months calls it particularly to our attention.

There are many ways in which a person can be injured at and about the ice platform. Certain rules are fundamental and should be vigorously enforced.

Platform men should be required to see that no small pieces of ice are left lying on the platform. Stepping on them can cause serious falls. Tools should never be left lying around. Provide proper places for them and keep them there when not in use.

When a vehicle arrives to be loaded it should be backed up squarely against the platform. Do not permit a vehicle to be loaded while parked away from or at an angle with the platform. Leaving a space between the vehicle and platform is a serious source of danger.

After a vehicle has been properly backed up against the platform it should be braked or checked so that the act of loading cannot cause a forward motion. Great care, however, should be observed while backing up to the platform to see that the

way is entirely clear. Serious injuries have been sustained by persons having been squeezed between vehicles and platforms.

Tongs should be handled carefully while preparing to load. The practice of hanging them over the shoulder with the point against the back should be strictly prohibited. The proper manner in which to carry tongs is in the hand with the points together.

Pulling ice on the platform is bad practice. Tongs, even with sharp points, may slip or pull out, especially if the ice is brittle. And this is frequently the case when sales are heavy and actions are hurried. Right here it is proper to state that no platform man should ever be required to perform his work in such a hurried manner that it cannot be done safely. The cost of one serious accident can offset the profit on many tons of ice.

The wearing of proper shoes is a safety measure which should be observed, as a slip on a wet platform (and ice platforms are always wet) can produce a disastrous result. Safety shoes are recommended.

Due, no doubt, to the necessity for economy, in this district at least, so-called "jitney" sales at the platform have shown a tremendous increase. By this we mean sales to customers who call at the platform for their ice. This method presents a new and much more serious problem—public safety. Many of these sales are made to children who call for ice with little wagons, baby buggies, push carts and all sorts of contraptions. For delivering ice to this type of customers we have long handled tongs so that ice may be placed in these conveyances without the necessity of leaving the platform or stooping over awkwardly. A space at the platform is set aside for this trade so that children may not come near or in contact with wagons or trucks. Supervision of a gentle, careful type should be adroitly exercised over the youngsters who are perhaps rather careless in their youthful enthusiasm. Remember, they are on your property at your invitation and their safety is in your keeping. The fact that we haven't injured a child at any of our plants for many years proves conclusively the effectiveness of care.

Then, too, we have the problem of delivering ice to automobiles which are driven to the platform for ice. Care must be taken to see that the ice is safely deposited in or about such vehicles, and that the finish is not marred by tongs. Train your men to respect the property of your customers. Safety and courtesy create good will.

On the Platform

Anyone who has ever observed the activity about an ice platform on a warm day can readily understand the attractive lure or fascination of people in general and children in particular, in spite of its dangerous aspect. Therefore the necessity for general safety becomes quite obvious. This applies not only to the platform but the adjacent territory as well.

Many platforms are not fenced in—by that I mean they almost adjoin the public sidewalk when the gates are open, and this presents another hazard. Children are very apt to stroll upon the premises to pick up pieces of ice and to mingle about the wagons or trucks. This requires particular attention upon the part of the drivers when they are starting away from or while they are backing up to the platform. The canopy shading the platform, the moisture on and about it, and the general coolness are features which make an attractive playground for youngsters. It may seem like an undue burden to watch out for the public who might stray upon your premises, but such a mere thought does not correct the situation. It is up to you to watch out.

Some plants, which can conveniently do so, locate their scoring machines on the loading platforms, and this presents a rather new and unique hazard. These machines, no matter how well guarded, are a dangerous contrivance even when operated by experienced operators. If pieces of ice become broken from a cake and are dangling

about the saws, the machine should be stopped before any attempt is made to remove such fragments. The machine should also be stopped before any attempt is made to lubricate it, adjust it or clear away the "snow" which it creates. Any machine which makes a singing noise and creates "snow" must be considered an attractive nuisance so far as the public is concerned and no one except employees should be permitted on the platform at any time and particularly while these machines are in operation.

If you will insist upon neatness and orderliness on or about your platforms you will note a tendency on the part of your men to be just a little more careful. These features, psychologically, create a greater feeling of obligation upon the part of employees. A person is always much more careful about a fine piece of furniture immaculately kept, then he is of the coarse finish of an old chair which may be used in the yard. Such is human nature.

With proper and sincere training, it should be no difficult task to cause your men to become safety minded, and the man who is not capable of observing at least simple safety rules, which are created for his protection, is not worthy of his hire. Posters are a splendid reminder and should not be overlooked in your safety program. Consult the *National Safety News* and order posters which are apropos to your situation.

I fully realize this talk is short, but it is action rather than words that produces real results.

CHAIRMAN WAKEFIELD: Safety at the platform as it is carried on in car icing will be discussed by Mr. A. L. Blatti, of The Railways Ice Company, Chicago.

Safe Practice in Car Icing

By A. L. BLATTI

Assistant Chief Engineer, The Railways Ice Company, Chicago

The subject of initial icing and re-icing of refrigerator cars is one that involves a number of detailed operations. With the increasing demand on the part of transportation companies for speed in getting the trains through the terminals, it is essential that a great deal of thought and care be exercised in the design and construction of car icing platforms and the various cycles of operation with a view to eliminating the hazards and thereby increasing safety to the personnel.

In a well designed conveyor system, the ice need not be permitted to move by gravity except when passing from one conveyor to another and then the distance should be minimized. Ice may be transferred from the storage room to a location on the platform opposite refrigerator cars by means of chain conveyors which should synchronize as far as possible. By so doing, the danger to workmen will be materially reduced.

Hazardous places, such as curves, transfer points, declines, etc., should be well guarded. All wooden structures should be inspected regularly and all defective material replaced at once. Mechanical and electrical equipment should be inspected by experienced mechanics once each day. Comparative low voltage electric current should be employed for power as icing platforms usually retain excess moisture which may result in casualties should a short circuit develop with high voltage. All equipment should be well grounded including conveyors.

Good lighting is one of the best forms of insurance in designing platform lighting systems. It should be borne in mind that in addition to general lighting it is also essential that light be reflected into the bunkers of refrigerator cars where the breaking of lump ice is performed.

Car icing tools such as pusher and breaker bars should be kept well sharpened and provided with strong handles. Skids for lump icing should be of the proper

length and breadth, of strong material and yet light in weight. They should be secured to the platform while in use if possible.

Lump ice moving from the platform to the bunkers of cars should be of such size as to pass freely through openings of car bunkers. Workmen using breaker bars on top of cars should stand clear of ice being passed to the cars and away from the end of the car. The workmen pushing ice from the platform to the car should see that workmen using the breaker bars have removed same from the bunker before additional ice is started on its way to the bunker. When the icing operation is finished all bits of broken ice should be removed from top of cars to prevent them from falling and injuring workmen on the ground. Workmen opening or closing hatch covers should use a strong bar or piece of pipe to assist them. Where platforms higher than 14 feet 6 inches are employed, a piece of strong rope about three feet long secured to the platform and projecting downward over the edge will assist the workmen in going from the cars to platform and vice versa.

In icing brine tank cars requiring crushed ice, ice crushers are usually employed. Ice crushers are dangerous and should be well guarded. After the ice is crushed, it is drawn in two-wheeled carts to the desired location on the platform and discharged through movable chutes to the bunkers of cars. A strong bumper should be provided to prevent the cart from falling from the platform should the operator lose control of it. The ice chute should be permanently secured to the platform and mounted on rollers or wheels so that it can be moved easily.

Hazards in Carrying Sharp Tools

Workmen employed in the icing of cars should be properly instructed in the use of tools and equipment. When carrying sharp tools, they should be regarded as a soldier regards gun or bayonet to protect his fellow worker. The point should project forward and down and about 12 inches from top of platform. When they are not in use they should be placed in an orderly manner in suitable racks provided for them. Sharp tools should never be stuck in car roof running board or top of icing dock. Workmen performing car icing should wear safety shoes as it is not uncommon for a piece of ice to fall on the foot, or a careless workman to open a hatch cover and permit it to fall back on the foot resulting in mashed or broken toes.

Workmen should be instructed never to pass from the platform to cars until the switch engine has been disconnected and moved a safe distance from the nearest car and a blue flag or red light displayed to warn trainmen that the icing is being performed. If trainmen desire to add additional cars or move existing ones, they should not be permitted to do so until all workmen have passed from the cars to the platform and the blue flag or red light removed.

A number of serious accidents have occurred from failure to observe the foregoing rules.

Regular workmen should be thoroughly coached in safety work and the subject kept constantly before them by the use of posters, safety meetings, etc. While the foregoing is general in the scope of car icing, for the most part it applies to all typical systems. There are additional hazards in individual plants that are peculiar unto them-selves and must be dealt with accordingly. By so doing, much can be done to promote the cause of safety.

CHAIRMAN WAKEFIELD: Some two years ago, the chairman was very much impressed with the fact that we needed a new method of holding conferences, something that was different, to interest plant employees in safety meetings. The old method was to bring a number of men into a meeting, sometimes on their time, sometimes on ours. A number of people were asked to prepare papers which sometimes were prepared in a proper manner and sometimes not. The men listened to these papers as they were read. Perhaps there was some discussion, but it was usually

a rather frozen affair, depending more or less upon the ability of the man who conducted the meeting.

I think there has been a constant search throughout the United States to find out the way to conduct a safety meeting to secure the greatest possible benefit for those present. During my searching for such a method, while I was connected with the work of the Kansas City Safety Council I had the great pleasure of coming into contact with the gentleman now about to address you. He has had a vast experience in industry and as a result of our discussions of this problem, he has evolved a method that I believe is superior to any method heretofore found.

It is with a great deal of pleasure and confidence that I present Mr. O. H. Day, Director of Vocational Education, Kansas City Public Schools, Kansas City, Mo.

The Conference Method of Safety Instruction

By O. H. DAY

Director of Vocational Education, Kansas City Public Schools, Kansas City, Mo.

It is a truism to say before this group that improved safety practices will come only as a result of improved safety thinking. The effectiveness of safety devices, rules, and regulations depends largely on how much the human beings working with them keep their minds constructively active.

It has been said that all accidents are preventable and that those which occur are due to a thinking failure somewhere, perhaps on the part of the workman who is the victim of the accident, or it may be the engineer who designed the piece of equipment. We will have safety largely in proportion to the number of workmen and executives we have who think safety and who use this thinking as a basis for safety action; therefore, any device, scheme, or plan which will stimulate or improve thinking by industrial workers, in their relation to safety, merits our careful and thoughtful consideration. In this discussion an effort will be made to bring you a picture of the conference procedure as a means of stimulating and improving thinking among workmen and executives.

There are three general types of educational procedure recognized, each of which has as one of its major objectives stimulating people to think and teaching them how to think. These three procedures are the informational, instructional, and conference. Each of these is useful under certain conditions but no one of them will suffice for all situations or conditions.

The informational procedure is characterized by quite formal methods in which the teacher or lecturer is practically the sole source of information. (The term "teacher" is being used in this discussion in the broader sense and refers to *anyone* who is attempting to teach another. It may be the general manager of an industry, the safety director in a city, or it may be a classroom teacher). It is common practice with this method to seat the group in rather formal array and for the teacher to stand before the group and broadcast, as it were, the information he wishes to communicate to the listeners. The learning group sits before him absorbing as much of the content of the lesson as they can or wish. The members of the group do not participate in so far as their opportunity for direct reaction is concerned, and furthermore, they need have no previous experience in the subject under consideration nor need they have any knowledge of it. They are essentially hearers and not doers. It is readily seen that the informational procedure is principally useful in giving out news, policies, or other information which the informer wishes his hearers to absorb. In industrial organizations this method is frequently used and takes the form of bulletins, foremen's meetings to inform them of plant policies, and the like. The principal difficulty in its use is to get the learners to think constructively with what they hear and not merely to absorb.

The instructional procedure is different in several of its elements. The teacher

remains practically the sole source of instruction but presents it in a considerably less formal manner. The objective of instruction is to develop in the learner the ability to do something. For instance, a shop foreman may inform his workers that beginning the following week there will be a ten percent reduction in working hours, but he gives a new workman instruction on how to do a certain piece of work or how to operate a machine. This procedure differs also in that the one being instructed participates in the activity under consideration, although he may have had little or no previous experience. In the case of the informational procedure the material being taught goes from the teacher to the group as a whole but when instruction is given it must go from the instructor to individual learners.

Our principal interest in this discussion is the conference as an educational procedure. The usual notion of a conference is a formal meeting with speakers, papers, and previously prepared discussion in which the members of the pseudo conference group sit as sponges to absorb what they may of the material presented. This is not a conference at all as we mean it, but rather an informational meeting. All of you have been present at such conferences at one time or another in which, perhaps, the boss may call a conference of his group and when he gets there he proceeds to tell what is going to be done. That is not a conference. It is a formal meeting. From Webster's dictionary we find that a conference is a meeting for consultation, discussion, or interchange of opinions. Our interpretation of the conference plan is a systematic, though informal, thinking through of problems by a group of experienced persons. Persons with no experience related to a point or problem under consideration cannot confer; they can only theorize or speculate. The experience of the group members is the principal and most important element in the work of a conference. There is no subject matter to be taught, no news to be disseminated, no instruction to be given, but the basis of every true conference is a problem to be solved in which the experiences of the group members are used and the resulting solution represents the group thought rather than the opinion of one individual.

The Conference Is Informal

A conference, as we are thinking of it, is quite informal. A small group of fifteen to twenty or twenty-five persons are called together under the guidance and leadership of a conference leader. It is not the function of the leader to teach the group anything and he certainly must not lecture them. In fact, it is generally recognized as desirable for him to avoid expressing his own opinion in most cases. It becomes his task to stimulate and organize the discussion of the group by questions, problems, illustrations, cases, or any other device so that they will think in an orderly manner on the problem at-hand. He "pulls out" facts, data, experiences, or any other matter pertinent to the discussion and organizes these contributions of group members on a blackboard so all may see and evaluate. He guides the discussion but does not dominate nor control it. It is his business to see that the conference does not degenerate into a "gab fest" nor take a side track which will lead away from the main question under discussion. The skilled conference leader capitalizes on the experience of his group in such a way that every member participates and points of difference are discussed and settled by the group. From this it is evident that the experiences of the conference members are the foundation of the conference and the success may be measured in terms of the constructive and progressive thinking done by the group.

Perhaps the ideal situation for conducting a conference is a group of fifteen to twenty-five individuals having mutual interests in the problem to be discussed and each of whom has had experience in it, who will be drawn together in a meeting preferably held in or near the place where the group works. It is desirable, where possible, to have the people sit about a table with the leader as a part of the group and with such a spirit of informality that the group members may come directly from their work and sit at ease with no feeling that they are being watched or checked upon by the big boss. They should be encouraged to express their thoughts freely

quently and completely and they should be made to realize that perfect grammar and beautiful diction are secondary to the thought they are expressing. No man's thought nor experience should be barred from the group—rather they should be encouraged to give it full expression but they should also understand that in the last analysis the group opinion must prevail over that of any individual. On the other hand, the group must realize that everyone's thought merits consideration and all must be weighed before the final decision is reached. Plant politics, prejudice, and closed minds have no place in a conference. Since this is a discussion group called together for thinking out some problems, such subjects as religion, social affairs, individuals' moral and ethical character, reputation of firms, establishments, etc., should not be permitted to become a part of the discussion. There are likewise some potentially dangerous situations to be avoided in conference discussions of which the following are typical:

1. Panning the management.
2. Panning company policies.
3. Making comparisons discreditable to the organization.
4. The matter of the closed versus the open shop.
5. Personalities between group members.
6. Personal criticisms directed at higher-ups.
7. Antagonistic groups within the organization.
8. Prejudice to certain classes of workers.
9. Antagonistic individuals utilizing the conference to dig at each other.
10. A comparison of the value of different individuals in the organization to that organization.
11. Comparing the values of special departments.
12. Situations where one member of the group is trying to frame another member.

It should be clearly understood that the conference procedure is not presented as a panacea nor is it implied that it will meet all training situations. However, there are many uses to which it may be put of which these are typical:

1. Securing a composite opinion in order to formulate or modify a policy.
2. Modify the viewpoint of some or all the members of the group in order to get better teamwork.
3. Analyze a job, identify responsibilities and discover better ways, means, and methods.
4. Assist individual members of a group to organize their experience by coming into intimate contact with other workers in their field.
5. Analyze situations involving joint responsibilities.
6. Discover real source of troubles or difficulties and bring the experience of the group to bear on elements of the causes.
7. Analyze accidents which have occurred to discover not only the immediate cause of the accident but the fundamental equipment or human weakness which was back of it and thus develop needed remedies.

Six Steps in the Conference

There are six recognized steps in the process of the average conference:

1. Assembling data or facts bearing on the problem. These data or facts may be assembled from the experience of the group members or from any other source available.
2. The selection of those pertinent facts or data having a direct bearing on the solution of the problem.
3. Evaluation of these facts or data with perhaps some rearrangement into a sequence of importance.
4. Making a decision by the group based on these selected and evaluated facts. It is obvious that a group should not be asked to confer on matters where their decisions or recommendations carry no weight and change of practices cannot grow out of plans developed by the group.

5. Formulation of a plan to carry out a decision or solution reached. The conference is of little value in a one-man organization.
6. The execution of the plan which is frequently done outside the conference meeting.

From these six steps it is obvious that there is little room in a true conference for speculation or theorizing, not that theory has no place in industry but rather that it is not a part of a real conference.

Perhaps the conference method can be further exposed for your consideration by reviewing the steps in planning and conducting a specific meeting for the consideration of a definite question. A certain company was having difficulty getting the active interest of its foremen of delivery, whose men were in direct contact with the customers, in handling customer complaints. These foremen were inclined to place the larger part of the responsibility on the customer which was not conducive to developing satisfied customers. It was decided to hold a conference on this topic and about twenty foremen were asked to attend. Superintendents or superior officers were not included in the group and the conference leader was a man from outside the organization who was unacquainted with all members of the group. The men were assembled in a room in the plant where they would not be disturbed and where they might smoke and be perfectly at ease. A blackboard was provided and the physical set-up was complete. When the conference leader appeared on the scene his pedigree was not given to the group to strike them dumb with awe or disgust as is so frequently done. He was merely introduced as Mr. So-and-So of such-and-such an organization who will serve as our leader in this discussion.

The Leader Gains Interest

In his opening remarks the leader sold himself to his group by a few short, well selected statements about his own work, experience, and his understanding of some of the problems confronting the average foreman. He also made it plain that he was not in a position to settle the question in hand but he had perfect confidence in the ability of the group to do so. He took a few minutes to ascertain the total years of experience in the business of the group members and showed the absurdity of stacking his experience against theirs. He stated frankly that the success of the meeting depended largely upon the active participation of each member present. All of this took perhaps ten minutes and it was easy to see the feeling of formality and restraint leave as he proceeded.

He then made a statement something like this, "Practically all companies dealing directly with the public have their troubles and get complaints from their customers, do you?" A considerable nodding of heads gave him his cue and he said, "I know practically nothing of your business and I would like to know what some of these customer complaints are. Give me some as they come to you"—and the conference was on. A lengthy and comprehensive list was given and written on the blackboard where all could see and study. When it seemed an adequate list had been made the group was asked to give the causes back of these complaints and after these were listed beside the complaints the discussion went on to fixing responsibilities and offering ways and means of eliminating both the cause and complaint.

In a few minutes after the discussion opened practically every member was contributing of his experience and soon men were exchanging experiences with each other to the extent that the leader more or less sat on the sideline acting as a guide only. The discussion of this topic went through two or three meetings and many time plans, criticisms, and suggestions on the foremen's level came out. In a very short time all formality and timidity was gone and the group was devoting its entire thought to solving this very vexing problem which so vitally concerned their everyday job.

The most common field for the use of conference method has been in the training of foremen and minor executives; however, this procedure is equally useful in dealing with the workmen, provided the workmen have a hand in the solution of the problems which affect them. Safety is certainly one such typical problem and the conference procedure is very effective in promoting safety thinking among the workers as well as with the executives.

We will cite one specific example among a great many in which the conference procedure has been adopted in dealing with employee participation in the solution of company problems. The City Ice Company of Kansas City, Missouri, had been holding regular safety meetings at which some individual was brought in to speak to the workers on some phase of safety. The workers wanted to make a good safety record but they regarded these meetings as a sort of nuisance which they were forced to tolerate. They listened respectfully to the talks and promptly forgot most of what they heard. There was little in the meetings to challenge their active interest. The experiment was tried of conducting these safety meetings on a conference basis in which accidents, which had occurred during that month or a recent one, were analyzed by the group for causes, responsibilities, and remedies. These discussions were followed by group discussions of more general phases of safety affecting this particular group of workers. The result has been almost revolutionary. The men now look forward to safety meetings with pleasure because they can participate and because they realize their experience is considered of value by their company of which they are justly proud.

Some of the Advantages

Thus, if we were to attempt to state some of the advantages of the conference procedure in dealing with industrial workers they might be as follows:

1. Facts and not opinions are the basis of consideration.
2. Experience and not theory or speculation furnishes material for the solution of a given problem.
3. Every member is made to feel that he is an important part in the solution of the problem at hand.
4. Members are stimulated to think about their problems and company problems.
5. Participation is the keynote.
6. Cooperative thinking and planning is encouraged.
7. A democratic spirit in doing things supplants the autocratic idea of accepting orders.
8. The conferees are talked with and not talked to. The employer gets the full benefit of the employees' experience.

These are only a few of the obvious advantages of the conference procedure in dealing with the solution of problems in an industry but they are sufficient, I trust, to excite your interest and curiosity. If you care to follow this matter further in connection with your industry you may wish to read a book entitled "Foremanship and Supervision" by Frank Cushman, published by John Wiley and Sons, or "The Training of Foreman Conference Leaders," bulletin No. 125, issued by the Federal Board of Vocational Education of Washington, D. C. Your state or local director of vocational education will be glad to go into the matter with you in considerable detail and would perhaps be able to conduct a demonstration conference in your plant so you might see the procedure at first hand under actual working conditions.

From the description of the conference procedure just given it would seem that its application to safety work should be evident. Instead of having safety meetings at which more or less high powered speakers pour information and inspiration over the heads of their listeners, by the use of the conference procedure the safety meeting is transformed into a period of thoughtful study and consideration of safety problems. Accidents which have occurred can be analyzed and preventive plans developed. Policies affecting safety can be discussed and recommendations made in view

of the experience of the group. Experience is a very valuable asset with any concern and a conference is a device for capturing this experience and converting it into useful constructive thinking which will stimulate interest in the worker in his job and in the welfare of the company which furnishes him a living. It is not a panacea nor a cure-all, but it is a practical, common sense device which will lead to more thinking and consequently to an improved standard of safety in the mind of the industrial worker where safety records are really made.

Demonstration of Conference Method

Now, for the benefit of those who are unfamiliar with this procedure, I would like to conduct a short demonstration by which we hope to show you how a whole series of conference discussions can emanate from one subject.

We have asked for the assistance of some gentlemen here who, by the way, I have never seen before, nor have they seen me. We are total strangers. I want you folks out there to sit still as long as you can. If you just can't keep still, then pipe into the conference. I hope you can't keep still. Feel perfectly at ease, and do just what your mind dictates that you shall do. The surest way to spoil a conference is for you to sit there with an idea in your head and keep it there. There is no man's opinion that is not worth considering. You may be afraid to say what you are thinking because you feel, "Oh, what I think doesn't amount to anything. Everybody knows what I am thinking." Whereas what you are thinking may be the very point that the other fellow has been looking for for a long while. So let's have general participation.

I want to begin by asking a question, one that, while it affects any safety program, vitally interests us all no matter where we are, whether we are in an ice plant, whether we are icing cars at a dock, whether we are working in a public school system, whether we are managing a manufacturing institution or what. We are all vitally concerned in this question. "What is it that makes poor safety records?"

What is the first thing? I want a rapid-fire statement from these four employees from the Consumers Company; what is the first. You say, "Bum thinking?" Well, what do you mean by bum thinking? You say, "When your mind isn't on what you are doing."

All right. Somebody suggests, "Failure of men and management to acknowledge hazards." Another suggests, "Unsafe conditions." Somebody just now remarked that the average man won't admit he has an unsafe job. Then, "Failure to recognize or admit a hazard."

"Carelessness"

You say, "Carelessness." What do you mean by carelessness? "Not taking the proper precaution to observe safety measures," somebody has replied. You mean where a man knows his safety regulations but doesn't pay attention to them. Somebody back there says that is recklessness, not carelessness. Another says, "That is violating rules."

"There is no such thing as carelessness," I heard someone say just then. Why is there no such thing as carelessness? Let's go back to the first man: Do you think there is such a thing as carelessness? He says, "Yes, I do. It is failure to be careful." Do you think this is carelessness—poor thinking, or lack of thinking? "Yes," Well, then, let's put that out here as a bracket to No. 1 and No. 2: Carelessness.

A man is always caring whether he gets hurt or not. Carelessness is a bad term. You care whether or not you cut off your finger. That is bum thinking to start with. That is what is being said by the man who is arguing there is no such thing as carelessness. Will you explain that? "Every man cares if he cuts his finger off,"

he says, "but a lot of people who don't care anything about safety violate the rules, and that is carelessness."

May I tell you a story? This is about the fellow who sold a horse to a farmer. The farmer took the horse home and brought his wife out in the yard and said, "Look, what a fine horse I bought."

"That is a pretty good looking horse," his wife replied. "Turn him out into the pasture and let's see what sort of stride he has."

So the farmer took the halter off the horse, and puff! the horse tore away and ran right square into a tree.

"Gracious," the farmer said, "that is a great note. That horse is blind!"

He proceeded to take the horse back to the fellow from whom he had bought it and he said to him, "You didn't play fair with me. You sold me a blind horse. I turned him loose and the first thing he did was to run pell-mell right into a tree."

"No, Bill, he's not blind. He just don't give a damn!"

I suppose that is what you mean by the fellow who knows his rule but just knows too much to follow it. So carelessness, you think, might be poor thinking, and perhaps it might be recklessness. Someone suggests that we add another thing to carelessness, and that is, ignorance, taking into consideration the man who really doesn't realize the hazards.

I should like to ask these four employees from the Consumers Company: if when you don't know your job is that a sign you are careless; if no one taught you to use ice tongs rightly, is that carelessness?

"No," one of them replies, "but you must be careful in keeping your tools properly cared for."

But I may not know how to use them properly and so I can't care for them properly. The point I am trying to get at is that a man is not careless when he is not properly trained.

"Carelessness on someone else's part." Yes, lack of proper instruction. "Lack of training," someone suggests. Another says, "Carelessness is mostly an alibi." Here is one of the employees of the Consumers Company who says, "Carelessness is more evident in an experienced person than it is in an inexperienced person." Someone else says, "The experienced person may be careless through overconfidence." I will write down "Overconfidence."

"Mental Worries"

Now what is something else that will cause you to make poor safety records?

One of the members in the back of the room asks, "How about the man who has trouble in the home, sickness and such, who is apparently careless through worry?" All right, I will write, "Bad home conditions."

I think the man who suggested overconfidence had a little different thought. For instance, if a man is driving a truck down the street and sees a beautiful girl and by looking at her crashes another car against a curb.

How about fatigue? Poor health? Dissipation or late hours?

Now we have gone far enough to see how much we have accomplished. We could increase the list to forty or fifty or a hundred other things that may cause one to make poor safety records. For instance, we have not said a thing about equipment, not a thing about the design of equipment, not a thing about public opinion. Out in Kansas City it is almost an unheard of thing for a man to run by a sign that says, "School—stop," and why? Because the public has demanded that drivers stop at intersections where children cross. That is the power of public opinion. We have not said a thing about that, but the list has gone far enough so I should like to do this: I wonder if you can see that all we have done here is to open up the difficulty. Then what is the next logical step? Why, it is a very simple thing for us right here to take, for example, this question of dissipation.

Here is a workman coming into a meeting who says it is not any of his company's business if he stays out until two o'clock in the morning. It is all right for the boss to say, "Any man who says that should be fired." It is easy to say, but here is a man whose record is beyond reproach who says out of his own experience that a man can't make the progress he expects if he insists upon dissipating.

You can see that as we go into that, there is an opportunity for another meeting in which we can have a discussion with the men on training, discipline, etc.

A Device to Stimulate Thinking

In other words, gentlemen, the conference procedure is merely a device to get you and me to think about our own problems, and it doesn't make any difference whether we are the men who actually do the work or whether we are higher-ups, so-called. I have a call to conduct a series of conferences with a large organization. The vice president wants me to sit down with them and discuss their problems. It is not that I know anything about that line at all, but just that through this kind of conference some problems may be solved through open discussion.

I should like to ask each man from the Consumers Company how many years he has worked in the ice industry, and how old he is. Here are five men with a total of ninety-three years' experience that can be used in the solution of their problems! So you see if you have twenty men, what a total experience that would be. You can't tell me that twenty men with 200 or 300 years' experience on their jobs don't have, somewhere in their group, experience that will settle most of the difficulties with which they meet.

That is the conference plan. That is what we mean: Simply getting the group together under the direction of a man who knows how to guide the discussion, who keeps them interested in thinking out a problem.

It may interest you to know that I have over here, covered up, a list of answers to this very question we have considered, and every suggestion written on this blackboard is down there on this sheet of paper that I worked out and brought up here. I worked it out a long time ago. I don't think, though, that any of you will say I prompted you what to say. The experience is there, the thought is there, if you can get the men to think, but too many times we hire a man from the neck down instead of from the neck up.

One of the representatives of the Consumers Company asks, "Suppose there is something broken on a truck and it is reported to the foreman, but no action is taken. What should the man do?"

Something "Wrong" with the Foreman

Mr. Wakefield says there's something wrong with the foreman, then, and that's right. The foreman should get busy at once. One of the members here says the man would be justified in going to the next higher officer and make his complaint, but the employee from the Consumers Company says no. Would he be justified? Mr. Wakefield says he would be justified, but that it would practically lose him his job.

Someone has asked me, "What do you think of the conference method where you have only three or four or five men on one operation?" Of course, if you get two people only, there are only two experiences to contribute. If you have too small a group, there is not enough combined experience to solve a thing. On the other hand, it is just as dangerous to get too large a group. This group is entirely too large for a conference: that is, you soon get to thinking you have so much experience you can't use it all. I have found that a group anywhere from ten to twenty-five is all right. If you get under ten, it is hard, and if you get over twenty-five it is hard.

One of the members in the back of the room has asked if the conference method

is anything more than an improvement of the old-fashioned experience meeting. That is true. In the last two or three years this conference procedure has been used only with foremen and executives. I don't know why, for we are finding it just as successful with the worker, for he is just as interested in his job as the foreman.

I have enjoyed this a great deal. I wish we might have had a couple of hours in which to carry one of these suggestions on the board through to a logical conclusion so those not familiar with the conference method might understand it better. At any rate, I recommend the procedure to you as an excellent way of stimulating thinking.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Chemical Section

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Tuesday Morning Session

October 21, 1931

Joint Meeting of the Chemical and Refrigeration Sections

JOHN ROACH, Chairman

Deputy Commissioner of Labor, State of New Jersey, Trenton, N. J.

The joint meeting of the Chemical and Refrigeration Sections was called to order by Mr. John Roach, vice-chairman of the Chemical Section.

VICE-CHAIRMAN ROACH: On behalf of the general chairman, Mr. John Shaw, who is unavoidably absent on account of illness in the family, I want to welcome you to the Chemical Section. We will commence with a paper by Mr. George H. Miller, of the E. I. duPont de Nemours and Company, Wilmington, Delaware. Mr. Harold Miner will read this paper.

Safe Practices in Entering Tanks

By G. H. MILLER

Safety and Fire Protection Division, Service Department, E. I. duPont de Nemours & Co., Wilmington, Del.

Work inside of tanks or other confined places is always more arduous and difficult than work in the open. This may be due to limited working area, insecure footing, poor light, excessive heat, or any one or more of numerous causes. But when the tank or enclosure contains substances which, by virtue of any of their characteristics—toxicity, flammability, corrosiveness—may be harmful to human beings, or which contain machinery such as agitators or insufficient oxygen to support life, then the work in these enclosures is not only arduous and difficult but may be actually dangerous to life and limb unless suitable and sufficient precautions are taken.

While this discussion will concern itself principally with tanks or enclosures which are now in service and must be entered from time to time, the purpose of this paper would not be approximated if attention were not called to the necessity for more careful consideration, in future installations, of designs which will permit at least routine cleaning and repairs to be carried on from the outside wherever practicable. If possible, manholes should be installed in both the top and bottom of tanks to facilitate cleaning and draining and to provide ventilation for cleaning or repairs. The size of manholes should also receive more consideration. There are in service today many tanks with fourteen inch manholes, whereas eighteen inch manholes should be the minimum and preference should be given to twenty inch.

The subject will appear to confine itself to tanks, but it will be recognized that the scope of this discussion actually has a much broader application and should include all enclosures such as tubs, vats, barrels, pits, and even rooms under certain conditions from which safe exit may be seriously retarded. However, to permit brevity in future references to the subject, the word "tank" will be used.

Entrance and Supervision

No person should ever be permitted to enter a confined place where his life may be endangered until all hazard has been removed or protected as far as it is practicable to do so, and then only with suitable protective devices and with adequate means of exit for any emergency which may arise. This is the principle from which safe practices in entering tanks are drawn.

It is necessary, whenever it is required for men to enter tanks, that a man selected for his competency be placed in charge of this work. He should be thoroughly familiar with the hazards of the process and not below the rank of supervisor. One operating official on a small plant, or one operating official in each area of a large plant, providing a satisfactory arrangement. He should be specifically designated to supervise all tank work in his area by whomsoever performed and he should be given full responsibility.

At least once each month, the supervising official should personally satisfy himself as to the completeness and condition of all equipment necessary for this work.

He should supervise the designation and training of a sufficient crew of workmen for tank work, and the men should be selected with due consideration to their stability, good judgment, and physical fitness. They should be able to speak and

understand English and be without recognized susceptibility to any of the hazards likely to be encountered. Before being assigned to tank work, they should be given a regular physical examination and should be re-examined with reasonable frequency thereafter. When unwell they should not be permitted to enter tanks, and after sickness should be re-examined.

Tank men should be trained through regular drills:

- (a) In resuscitation by the prone pressure method.
- (b) In the fireman's carry.
- (c) In the adjusting and using of gas masks, hose masks, life belts and the other necessary protective devices.
- (d) In removing the body of a man from the bottom of a tank and through a manhole.
- (e) In the characteristics and dangers of fumes, gases, poisons, etc., likely to be encountered.

On large plants, one or more tank squads should be organized and drilled in this work. On smaller plants, or those where there is little of this work to be done, process men may be used if properly trained. The use of unskilled labor in this work should never be permitted.

Preparation before Entering Tanks

Conditions vary so that it is not possible to prescribe a procedure which may be definitely followed in all cases, but the following will apply to conditions in general.

(a) Place a sign on the tank containing the following warning: "Danger—Do not Enter."

(b) Next, the tank should be cut off. This may be accomplished by locking the valves shut or by disconnecting the lines and placing blank flanges over the tank inlets. The latter method is preferred. If the former method is used, it is better to provide an arrangement of double valves with bleeders between, in which case both valves should be locked closed and bleeders locked open. If the tank contains agitators, or other such machinery, the belt or other drive should be disconnected. The practice of merely pulling fuses and particularly the practice of hanging signs on starting equipment of electrically driven machinery are not sufficient precautions. However, fuses may be pulled if the switch box is locked. This is often necessary on equipment directly driven.

It is not only important to see that the connections to the tank are blanked off, but also important to see that there is no possibility of harmful substances entering the tank from any source.

An example will serve to explain the necessity of this precaution. Two men were inside of an open vertical tank which stood partly beneath another one. Due to improper operation of the pumps supplying acid to the overhead tank, the overhead tank overflowed, spilling into the tank in which the men were working, with the result that they were severely burned.

(c) The tank should be cleaned as far as it is practicable to do so. This may mean washing with water, steam or some neutralizing agent, depending upon the previous contents. Residue may be washed out with long handled implements. Tanks should be vented at both top and bottom if possible.

(d) After the tank has been washed and if necessary filled with water to drive out any vapors and drained, it should then be determined what the conditions inside the tank actually are and what they are likely to be while the tank work is in progress, because certain substances may cling to the side of the tank and give off harmful vapors after the first tests have shown the tank to be free of them.

There are instruments on the market today for measuring the toxicity and flammability of atmospheres. The conditions within the tank will determine what protective devices are necessary; but, wherever there is any doubt about the contents

of the tank, the maximum of protection should be provided, and in all cases an oxygen deficiency must be guarded against.

Entering the Tank

Before granting authority to enter the tank, the supervising official should himself inspect the tank and determine what procedure is to be followed and what equipment is to be worn. In respect to the latter, while having sole authority, he should take no chances with the safety of the men.

The supervising official should first see that all proper equipment and the requisite number of men are provided and then remove the "Danger—Do Not Enter" signs. He should remain until the tank has been entered and long enough afterward to assure himself of the safety of the operation. On leaving, he should see that a competent foreman is left in charge. He should leave directions as to where he, himself, may be reached in case of an emergency. Under these circumstances, the person left in charge should not leave so long as there are men in the tank. When the men are withdrawn, he should replace the danger signs or close the manholes.

No one who has not been trained should enter a tank. Furthermore, no one should enter a tank without permission and direction from the supervising official or without knowledge of the foreman in charge. No one should enter a tank which does or may contain harmful substances without the following equipment:

- (a) Standard life-belt and line (except only in case of shallow open tanks or pits less than four feet deep and readily accessible.)
- (b) Standard gas mask or air mask when and as prescribed.
- (c) Rubber boots, goggles, gloves, or other protective clothing as prescribed.

A duplicate set of equipment should be brought up and made ready for emergency use.

Under these circumstances, there should be in the vicinity within call at least two men in addition to those at work on the tank.

Men should be assigned to tend life-lines, and no man should be assigned to tend more than two lines. These tenders should remain at the manhole and should perform no other duties while men are in the tank. Tenders should watch their men closely, and, if necessary, be protected from fumes at the manhole by masks.

Masks should be tested and put on outside the tank. If men enter without this protection, but require it later, they should leave the tank in order to put it on.

No mask should be taken off inside tanks. If this is done, the foreman should at once order the man to leave the tank, and, if he fails to do so, should immediately have him drawn up on the line. If a life-line or belt is removed, the man should be ordered out, and, if necessary, brought out. Any hilarious or otherwise irrational conduct should be cause for instant, and, if necessary, forcible removal from the tank.

Men inside the tank should occasionally assure themselves of the presence and watchfulness of their tenders. In case of doubt, they should leave the tank.

If masks are supplied from hand-blowers, a separate man should be assigned to operate each blower. Care should be taken to see that the air supplied to air masks is not contaminated.

Tanks should be entered by means of ladders, and such ladders should not be removed while there are men in the tank, except only while drawing a body through the manhole. If there is a tendency for a ladder to slip, it should be secured so as to remain stable without being held in place. Special ladders with hooks may be used.

The use of a compressed air hose discharging fresh air against the face as a substitute for masks should be prohibited.

No tools or other articles should be thrown or dropped into tanks in which men are working.

These same precautions apply to conditions brought about by substances which may be introduced into a tank for any purpose, such as for painting, rubberizing, etc. It is sometimes possible to ventilate the tank by discharging fresh air into it or by exhausting vapors and gases to keep them below the explosive range.

Equipment and Its Condition

Life-lines should be $\frac{3}{4}$ -inch manila hemp rope in good condition. Rope should be kept coiled in dry, well ventilated boxes. If wet, it must be thoroughly dried before being replaced, and if subjected to acid, etc., must be washed, dried and tested. When new, this rope should carry 4,000 pounds. If it falls below 1,200 pounds, it should be discarded. Substitution of light chain for rope is acceptable for use in acid tanks, but not where flammable vapors may be present.

The free end of a life-line should be made fast to a fixed object and the slack should never be allowed to drag on the bottom of a tank.

Life-belts should be kept in good condition. To retain its life, the leather should occasionally be treated with harness soap or dressing. Under no circumstances should a life-line be attached to any other place but to the ring on the cross straps between shoulders. The use of an ordinary belt or a rope knotted around the waist should be prohibited. Rope should be attached to ring of belt by thimble and splice.

Gas masks and air masks should be of approved type. Under no circumstances should the use of government ex-service masks be permitted. Equipment should be kept clean and in first-class condition. Face pieces and hose should be discarded as soon as rubber or elastics have lost their life or fabric is broken or rotted. Face pieces should be adjusted to fit wearer and withstand deflation test.

Canisters for gas masks should be of approved type, and great care should be taken to see that special canisters are used for only those gases for which they are intended.

No canister gas mask should be used where gas concentrations exceed 2 per cent or where an oxygen deficiency may exist. For this purpose, an air mask should be used.

Masks should be kept hung up in clean, dry, dark, ventilated cabinets, properly labeled. (If subject to fumes, they may be placed in paraffined paper bags.) After use, the interior should be washed with soap and hot water, and aired for at least one hour.

Extension lights used in tanks should conform to requirements of the National Electrical Code for Hazardous Locations, Class I. These requirements include outside vapor-proof globe, guard, insulated keyless handle and approved three wire cord, which should always be protected from the sharp edge of manholes, etc. Before the light is lowered into a tank, the strength of connection at the receptacle and at the socket should be tested. Portable electric tools should receive the same rigid inspection.

The frames of electric drills or other electric tools should be electrically grounded before they are taken into the tank. The use of a cable carrying a ground wire—three wire cord—is recommended for this purpose in order to obviate the necessity of another separate wire within the tank.

No lanterns, or flashlights should be used in tanks or brought near their manholes except those approved by the Underwriters' Laboratories, Inc., or the Bureau of Mines for use in flammable atmospheres.

General

Where flammable vapors are likely to be present, no hammers, drills, or other tools likely to strike a spark should be taken inside tanks.

Riveting, electric or gas welding or cutting and ordinary soldering should not

be performed on the interior or exterior or near the manholes of tanks which contain flammable substances or vapors.

The possible hazards from gas leaks from torches or flanges, the evolution of carbon monoxide from charcoal furnaces and depletion of oxygen by torches, flames, or furnaces in closed or partially closed places should be understood and guarded against.

Men who have been exposed to gases or fumes, or appear weak, nauseated, coughing, intoxicated or with nose-bleeds, or cramps, or who exhibit other unusual symptoms, should be placed at once under competent medical supervision.

We realize that the details of this discussion cannot be applied as they are to the individual requirements of the varied industrial conditions to be found today. Yet, it is hoped that they will be useful as a basis upon which practices may be founded for each plant or perhaps smaller unit.

The National Safety Council now publishes a safe practices pamphlet, "Petroleum No. 6—Safe Practices in Cleaning Petroleum Still," but it is felt that a pamphlet on the more general subject of safe practices in entering tanks and other enclosures might well receive the consideration of the Council at this time.

Our recommendation is established practices for each local condition with definite rules to follow.

VICE-CHAIRMAN ROACH: We have a few minutes for discussion. In our state where large quantities of chemicals are produced and large numbers of tanks are used, we know by our statistical records of fatal accidents that improper tank practices are common and very dangerous.

As Mr. Miner was reading the paper, my mind went over a period of the last five years and I thought of at least six fatal accident cases that might have been avoided if practices similar to those recommended by this paper had been followed.

Only two weeks ago the foreman in a plant in northern Jersey went into what he called a sour tank. He was an experienced man. He had been employed in the plant for many years and he understood perfectly the nature of toxic gases. For some reason, when he went in he had no life line on, no mask, and no air line, and when they dragged the man out he was dead.

This instance can be multiplied many, many times, so much so that I feel we ought to give the very widest possible publicity to a paper of this kind that outlines safe tank practice. The floor is open for discussion.

C. L. JONES (Hercules Powder Co., Wilmington, Del.): In connection with Mr. Miller's recommendation for the drafting of a safe practices pamphlet on this work, I think it would be advisable if we could add to that pamphlet some sort of case history of the accidents that have occurred. We read a general treatise, which is of a great deal of value to us, but for the man who is just beginning to consider a problem of this sort, if we can prepare a brief history of a number of the more serious accidents that have occurred it will mean a great deal more and enable him to visualize what it means in his own plant. Take the experience for a period of five or ten years, or any period you may like. I think it would add a great deal to the value of the pamphlet.

P. W. GUMAER (Consulting Engineer, New York City): A similar problem that wasn't emphasized so very much was the painting of interiors of tanks, particularly where entry has to be made from the top. Very often they are painted with a bituminous paint where gasoline or benzene, or some other hydrocarbon is used as a solvent. Those vapors are heavier than air and remain in the bottom of the tank. Many, many cases of acute poisoning have occurred from that source.

W. D. PATTON (North Continent Utilities, Chicago, Ill.): I recall an accident which I witnessed some years ago. A Mexican was painting a closed redwood tank about five feet high and about twenty feet in diameter. He was given a bituminous paint dissolved in naphtha and told not to carry any matches or anything inflammable into the tank with him. He was given soft shoes to wear.

Contrary to orders, he had taken some matches and some cigarettes, and after he had painted for a while he sat down and lit a cigarette. Naturally, there was an explosion, and a jet of gas came from the top of the tank followed by the Mexican scrambling hurriedly out. The accident was not fatal, although it might have been, but every exposed portion of his body was severely burned. Even where he had a hole in his shorts or pants, that spot especially exposed was very severely burned and his hands and face swelled probably twice their normal size. It took months to cure him.

Such an accident could have been prevented by the supervisor searching the man and seeing that those who are liable to disobey the rules do not carry materials which may cause accidents with them.

VICE-CHAIRMAN ROACH: It is too bad we haven't unlimited time to discuss this paper because I think it is one of extreme importance, but we have a limited amount of time to give to each subject.

The next paper is by Mr. D. H. Killeffer, of the Dry Ice Corporation of America. It will be read by Mr. George C. Cusack, of the same company.

The Safety of "Dry-Ice"

By D. H. KILLEFFER

Dry-Ice Corporation of America, New York City

Experience covering a period of five years and the use in refrigeration of tens of thousands of tons of solid carbon dioxide, best known under the trade mark, "Dry-ice", has definitely proved its safety. The introduction on a large commercial scale of a material having such unusual properties, its use in the hands of thousands of unskilled workers in the ice cream and meat industries, and the development of a program of manufacture from nothing to hundreds of tons daily in the short period of six years has provided a basis for sane conclusions as to the safety of the material itself and the adequacy of methods of handling developed to meet its peculiarities.

In the experimental development of equipment we have had two accidents, but records of our own company show only five lost-time accidents, due to the peculiar nature of the material handled, in the six year period ending June 30, 1931. The only real source of accidents in this new industry has been the practical joker whose whims and overpoweringly perverted sense of humor are beyond human control. Of even these there have been only a half-dozen serious enough to be reported. This highly satisfactory record proves that fears entertained by some when "Dry-ice" first appeared on the market were hazards only and unwarranted in fact. For example, general distribution of a material having a normal temperature of -109.6°F. was looked upon as a probable cause of wholesale frost bite; the generation of huge quantities of carbon dioxide gas at high concentrations as a result of use of the new refrigerant was expected to be a source of danger on account of smothering or drowning of persons by the gas; and the pressure generated by the evaporation of a solid directly to a gas when accidentally or intentionally confined within refrigerators was believed by some to be a possible fruitful source of dangerous explosions. None of these possibilities has materialized, thanks to simple, safe, obviously logical methods of handling.

To understand the circumstances, it will be necessary to review briefly the basis of this new industry and its recent rapid growth. Although many previous attempts to commercialize solid carbon dioxide for refrigeration purposes had failed, a new effort launched in 1924 on the basis of material advances in the method of using it has finally reached a position of considerable commercial importance. The material itself is the same healthful gas used to give vitality and piquancy to carbonated beverages, converted to the solid state by intense cold. Not only is it the same gas prepared and purified in the same way as that used for food purposes but at the

present time much of that used for refrigerating purposes is manufactured, purified and solidified in the same equipment and at the same plants as the food product. The temperature of the solid is the lowest of any commercial material and is below those met by Commander Byrd and others in the long polar nights at the top and bottom of the world. Solid carbon dioxide is manufactured in cubical blocks ten inches on the edge weighing fifty pounds. Each block as made is packaged in an individual kraft paper bag bearing the trade-mark and a warning notice calling the user's attention to the intensely low temperature of the material and warning him to handle it with gloves to prevent frost bite.

From the point of view of frost bite, the manufacturing operation takes place in two stages in our older plants and in one in our more modern installations. In the two stage process, cold liquid carbon dioxide is fed into a chamber where it expands to further cool itself to form snow and this snow is shovelled out by hand into molds to be pressed in hydraulic presses to solid blocks. In the latest process the entire operation of solidification and pressing is done in the same vessel, thus preventing the loss from handling. In either case the pressed blocks are immediately put into paper bags and afterward are handled into storage and to the point of use with this protection. At the time of use, the bag is removed and frequently it is necessary to cut the blocks into smaller sizes to adapt them for particular purposes. This cutting operation is carried out with either hand or power saws, and the small pieces may be bagged again if circumstances require it.

The minimum handling through which a block of "Dry-ice" must go is once from the press to the customer's storage box in which it is delivered to him and a second time from this box into the refrigerator where it is used. In practice the blocks must frequently be handled as many as half a dozen times, exposing someone to the possibility of frost bite at each handling. During 1929, some 15,000 tons of "Dry-ice", equivalent to nearly three quarters of a million blocks, were made and handled a probable average of four to five times each. Nearly double this amount was put to use in 1930 and it is probable that this year's total will be even larger. It is obvious from this that there has been plenty of exposure to develop any real hazard to an extent satisfactory for observation.

It is also pertinent to note that our manufacturing and distributing program had developed from three plants and a single distributing warehouse in 1928 to eighteen plants and twenty-seven distributing points in 1930. In addition to these, storages capable of holding 13 million pounds of "Dry-ice" are in operation and a fleet of forty specially designed refrigerator cars has been actively transporting "Dry-ice" itself from point to point throughout the country to equalize production and demand from Coast to Coast.

Such rapid development has required assimilation of untrained labor in large groups as new plants and warehouses have been opened and this with the haste always accompanying new operations has supplied the most favorable conditions for increasing industrial accidents from any specialized conditions inherent in the operations of this new industry. No question can exist as to the value from a safety study standpoint of the data to be gathered from our own safety records extending back over a period of five and a half years into the earliest commercial exploitation of "Dry-ice".

In five and a half years only four cases of frost bite have been serious enough to require an employee to be sent to a physician, and only two of these required that the employee lose any time from his regular work! That record is submitted with a sense of real pride, but it also must be admitted that it could not have been achieved had the actual hazard been really great. Of course, there have been many smaller casualties, unpleasant and annoying but not serious enough to require more than first aid. Three injuries have been caused by rapid escape of carbon dioxide gas from snow making machines caused by stoppage, and none of them caused a loss of more than three day's time by the worker.

To get a clear picture of the situation, it is desirable to study carefully the actual hazard and the conditions surrounding it. The temperature of "Dry-ice" is farther from the temperature of the human body than that of steam and the effect from a purely physiological point of view of exposure to one is very nearly the same as to the other. Danger from serious scalding by steam or hot water is primarily due to the inability of the exposed person to remove himself from contact quickly enough to avoid damage. A person drenched with hot water or steam is in immediate, intimate contact with a temperature sure to injure him even though he makes an immediate effort to escape. In the case of water escape is sure to be unsuccessful if one is already wetted with it.

Solid carbon dioxide, being a solid, permits easy escape because it cannot flow as a hot gas, steam, or a hot liquid, water, can. Also its essential peculiarity, that of evaporating directly from a solid to a gas, prevents intimate contact of a warm object with it on account of a cushion of evolved gas which is continuously maintained around it by evaporation. The low specific heat of the evolved gas makes it practically harmless as a possible source of frost bite and it is only when contact with the solid itself is established by breaking down the gas cushion with pressure that injury can result.

With this in mind the protection required is simple to devise. All that is necessary is to insure the continuity of this gas film between the person's flesh and the "Dry-ice". This can be most easily done by wearing gloves of any ordinary variety. While even the customary paper wrapping is helpful, thin canvas or cotton gloves offer sufficient protection to a person intermittently handling "Dry-ice" for short periods and workmen whose occupation brings them in contact with it continually are amply protected by ordinary leather gauntlets.

The real hazard from the low temperature, if indeed there is a real one, comes from the handling of metal which has been in contact with "Dry-ice". For this reason particular care is taken to provide wooden handled tools to be used where accidental contact might cool them to a dangerous extent.

When accidents do occur from contact with "Dry-ice," the most effective treatments are those ordinarily prescribed for burns. The similarity to burns is so great that it is quite customary to refer to such accidents as "burns" rather than as frost bites, since the result is localized as a burn ordinarily is rather general as most frost bites are. Unguentine, picric acid gauze, bicarbonate of soda, caron oil, and all the other burn remedies are effective as first aid.

The hazard from carbon dioxide smothering is almost non-existent so far as our experience has gone. Unlike carbon monoxide, carbon dioxide is in no sense a poison. Actually, according to authorities on respiration, it is the change in carbon dioxide concentration in our lungs which keeps us breathing when we are asleep. The lungs are sensitive to even the slightest change, especially an increase, in the concentration of this gas produced either internally or introduced from the outside, and it has even been suggested that the exhilaration from drinking carbonated beverages is the result of the stimulating effect on breathing of the gas inhaled from above the bubbling drink. The only effect upon a human being which high carbon dioxide concentrations can have is stimulation of breathing in an effort of the lungs to void the gas and if so much of it is present as to limit or cut off the customary oxygen supply a person may be smothered by it. No after effects are produced and the residue of carbon dioxide in the lungs after being brought into the air is its own best cure. The use of carbon dioxide to stimulate the breathing of persons overcome by breathing foul air has become general to replace the more harmful and unnatural pulmotor.

Under ordinary conditions the quantity of carbon dioxide introduced into the atmosphere from a "Dry-ice" refrigerator is negligible and can be easily handled by even the most inefficient ventilating arrangements. To be specific, an ordinarily active person will exhale an average of about two cubic feet of carbon dioxide per

hour, while a five gallon package of ice cream refrigerated with "Dry-ice" will under ordinary conditions exhale less than three and often as little as two cubic feet of the gas per hour. It is thus obvious that the ventilation required by a person will readily take care of such a refrigerated package without allowing an increase in the carbon dioxide content of the air to take place. At the present time paper packages of this type and refrigerated automobile trucks consume practically all of the "Dry-ice" manufactured.

In some cases it is desirable to fill the refrigerated body of a truck or other refrigerator with carbon dioxide gas of high concentration. The anticipated danger to persons entering such spaces has also failed to materialize. The effect of the gas on breathing is immediate and is so evident to the person that he will not enter a high concentration of it. The gas being much heavier than air immediately rushes out and is dissipated. Our own experience in the storage handling of immense quantities of "Dry-ice" in storages which must be frequently entered has resulted in no single instance of trouble from this source. Where storage spaces have been built with the entrance through the top, workmen are provided with gas masks connected to fresh outside air and are able to supply their own air without the use of pumps or other means to bring it to them.

When a person is for one reason or another exposed to too high concentrations of the gas, the remedy is simple and extraordinarily effective. A minute in the fresh air and all trace of the exposure is gone.

The danger from explosion of refrigerators in which carbon dioxide is being continuously given off is also quite non-existent. In spite of the best efforts of refrigerator builders no practicable structure has yet been built whose natural leakage of gas is not amply sufficient to allow the escape of gas at a rate ample to prevent the creation of measurable pressure. An automobile truck for the transportation of 500 gallons or so of ice cream consumes about 60 pounds of "Dry-ice" in twenty four hours. The gas generated from this amount of solid is about 510 cubic feet, a little over twenty cubic feet per hour. This can easily be vented through a hole a quarter of an inch in diameter without the generation of any measurable pressure. In ordinary construction practice the difficult problem is to prevent the escape of this gas before its full usefulness has been realized, and not to get rid of it without creating dangerous pressure conditions.

VICE-CHAIRMAN ROACH: I think before we discuss this subject, we will hear from Professor Ward V. Evans, Professor of Chemistry, Northwestern University, Evanston, Illinois, who will present a paper on "Other Refrigerants". Then we will have discussion on both papers.

Other Chemical Refrigerants

By PROF. WARD V. EVANS

Chemistry Department, Northwestern University, Evanston, Ill.

Great strides have been made in the art of refrigeration in the past thirty years. Many of us can remember when the milk can was hung in the well and the day's supply of drinking water was cooled by evaporation in an unglazed jug. The general principle of refrigeration, however, has not changed, only its mechanical application. The chief principle in refrigeration is the utilization of the latent heat of change of state for cooling purposes. Absorption is simply a modification of the same principle. Refrigeration is secured by allowing a substance to change its state and mechanically arranging the mechanism so that the latent heat is supplied by the substance we wish to have cooled. The substance changing its state is the refrigerant, and this change of state may be accomplished by motor driven machinery, thus necessitating moving parts, or as in absorption machines by the use of heat supplied usually by a gas flame.

Flammability	In certain proportions	No	In certain proportions	In certain proportions	Yes very	No	No
Explosiveness in air	Slightly	No	Slightly	Slightly	Yes	No	No
Odor	Yes	Yes	No	No	No	No	No
*Toxicity (immediate)	5	6	4	3	1	2	1
*Toxicity (delayed)	1	1	6	1	1	1	1
Leak Detection	HCl easy	NH ₃ easy	Cu and flame	Cu flame	No	No	Cu flame
Stability	500° almost completely decomposed	Stable to 2000°	500° decomposed slightly to C ₂ H ₂ Cl ₂	Decomposed 520° to Ethylene 55%	Stable to 600°	Stable to 2000°	?
Formation of Toxic substances in flame	No	No	HCl gas	HCl gas	No	No	HCl HF

*The toxicity of these substances is rated from 1 to 6. No. 1 being least toxic.

We note from our table that the boiling point limits of the ideal refrigerant for small machines is from about -30° to +30°. We also discover that two of our common refrigerants are corrosive, four are flammable, and three are explosive in a degree. Only two have a marked odor and, as previously stated, all would be toxic in certain concentration. We also note that two are easy to detect, three would be recognized only by an experienced person, and two only by a chemist. In regard to stability, two are very stable and the other five would be rated as unstable. It is also notable that while four would form no toxic substances in a flame, three would very likely do so.

Another table rates these seven refrigerants in order of their conformity to certain desired characteristics. The lower the score, then, the nearer a given refrigerant approaches the ideal standard.

TABLE IV

	Ammonia	Butane	Carbon Dioxide	Ethyl Chloride	Methyl Chloride	Sulphur Dioxide	Dichlorodifluoromethane
Immediate toxic effects	6	1	2	3	5	7	1
Delayed toxic effects	1	1	1	1	7	1	1
Flammability	4	7	1	6	5	1	1
Efficiency	2	5	6	2	4	1	3?
Pressure developed	6	2	7	1	4	3	5
	19	16	17	13	25	13	11

Journal of the American Medical Association, June 7, 1930, Vol. 94, pp. 1832-1838 and 1842 and 1843.

So averaged, none of these substances achieves a perfect rating, and it must be remembered that this rating may be very deceptive since one characteristic is omitted; namely, the chemical behavior in contact with an open flame.

Carbon dioxide is little used in small systems because of the heavy machinery necessary to liquify the gas. In other words, too great a pressure is required on the high side, one thousand pounds per square inch is not uncommon. It is non-corrosive. Its toxicity is small. We find from .03 per cent by volume to as much as 20 times this amount in crowded rooms. This concentration produces no ill effects. The only effect of excessive concentration such as 3 to 7 per cent is to augment breathing and produce fainting. When the oxygen content of the air has been reduced to 14 to 15 per cent, ill effects appear, and a reduction to 8 or 10 per cent becomes dangerous to life. Carbon dioxide is not flammable, in fact smothers fire, is quite stable to 2000°, and is non-explosive. Leaks, on the other hand, are difficult to locate and there is no warning odor. It is easy of production, quite cheap, and cannot possibly be a fire hazard. Carbon dioxide would be a desirable refrigerant if it lent itself to use in a small machine.

Methane, propane, butane, and isobutane are hydro-carbons, belonging to the paraffin series. They are simply asphyxiants with possibly some anaesthetic properties. They are stable, non-corrosive, have suitable boiling points, and are non-toxic. However, they are flammable and explosive in proper air or oxygen contact. They have no odor and are hard to detect. These substances are far from ideal.

Ammonia ranks high as a refrigerant and is largely used. This gas is not particularly stable, is corrosive only to copper and brass, and has a suitable boiling point. It is easily detected, has a warning odor since it is highly irrespirable, and is quite toxic. It is combustible when mixed with air in the proportion 16 to 26 per cent by volume. It is unstable. High heat above 500° will decompose it to N₂ and H₂, and increase the pressure and an explosion under such conditions will liberate large quantities of H₂, a highly explosive substance. It is easily detectable and economically feasible. With hydrogen chloride gas leaks could be readily located.

Sulphur dioxide is the most widely used refrigerant and has the best rating of the accepted refrigerants. It is stable and has a suitable boiling point. From the point of view of refrigeration efficiency it ranks first. It also stands first in ease of detection for it is a violent respiratory irritant and gives warning of the slightest leak. It is corrosive if in contact with water, forming acids that act vigorously on iron and steel; therefore, it must be carefully dehydrated. It is quite toxic and there seems to be no foundation to the theory of its being a cure for respiratory lesions. It is known to aggravate bronchitis. Its leaks are easily located with ammonia. It is stable, inert to flame, and non-explosive.

Dichlorodifluoromethane seems to rate very high as a refrigerant. Its production is a tribute to the research chemist, producing in his laboratory a definite substance having proper physical characteristics for use in a certain capacity. Its thermodynamic properties and its physiological properties seem to mark it as an ideal refrigerant. Its toxic properties have been investigated and at present its performance seems entirely creditable in this respect. However, there is one aspect on which further investigation seems desirable before this substance is adopted as a refrigerant that might be placed in quantities of as much as 1000 pounds in apartment houses and similar places of human occupancy. That is, the matter of its chemical properties—its stability, and conduct in flame. It is known that carbon tetrachloride, a well known fire extinguisher, is not a suitable substance to use in hot flames. This substance will extinguish a small flame, but in a hot flame gives quantities of COCl₂ and HCl. Its use has had to be prohibited in fighting laboratory flames, for instance. Now CCl₂F₂ escaping in the region of a fire will produce quantities of HCl and HF. These are extremely toxic substances. To have a large quantity of any chemical refrigerant except CO₂ located so that it may escape in time of a fire is a hazard. Small machines give less trouble but large quantities should be introduced certainly only after careful investigation and thorough safeguarding.

In regard to the introduction of warning substances into otherwise odorless refrigerants we can only say that this is a doubtful expedient at best and should be used only after thorough investigation. A small amount, say 10 per cent, of sulfur dioxide introduced into methyl chloride for instance; any water present may cause this percentage to become so low that no warning will be given and a false sense of security lead to disaster. Suppose, for example, that the original 10 per cent becomes 5 per cent. If the solution contains 5 per cent SO_2 , there is no reason to suppose that the content of the escaping gases will be 95 per cent methyl chloride and 5 per cent SO_2 . In fact we are quite sure that the gaseous phase will contain less than 5 per cent of the high boiling constituent which is SO_2 . It might contain no more than 2 per cent of the SO_2 . Now a toxic concentration of methyl chloride will contain only a very small concentration of SO_2 , and since this gas is heavier than methyl chloride and diffuses more slowly, it would be found in the greatest concentration near the floor. It might be quite possible to be so poisoned with methyl chloride that the warning gas would be of no avail.

Again there seems some basis for the opinion that small amounts of sulphur dioxide mixed with methyl chloride corrode pipes very badly.

The use of other warning agents without proper research is not to be recommended. Some of the substances recommended polymerize readily and in the course of time would very likely cease to function, giving again a false sense of security.

With the ordinary refrigerants in common use, of course the grave danger appears only when large quantities of the refrigerant are involved, as in multiple systems, where a leak in one unit may precipitate at that point the entire gaseous content supplying many such units.

VICE-CHAIRMAN ROACH: The next paper was prepared by Mr. E. B. Besselievre, of the Sanitary Engineering Division of The Dorr Company, Inc. It will be read by Dr. G. P. Edwards, chemist, Sanitary District of Chicago.

The Hazards of Chemical Wastes and Their Safe Disposal

By E. B. BESSELIEVRE

Sanitary Engineer, The Dorr Company, New York City

Pure air to breathe, pure water to drink and clear skies for clear vision are the natural heritage of mankind. Any encroachment upon these prerogatives is not consistent with the spirit of true civilization.

In the tenseness of modern life and the urge to forge ahead in this industrial age and nation, these things have been forgotten, or perhaps we may better say side-stepped. This attitude is not intentional or with malice aforethought, but is an unconscious contribution of our fast moving times to the problems and perplexities of life. In the face of keen competition, industries have striven to live and grow, and in order to show a profit to their owners and stockholders, have at times neglected to consider public comfort or the inherent rights of others in nature's products. The human body was conceived on the basis of pure air to fill our lungs and maintain the purity of our blood. Those of us who reside or work in localities where the air is unsullied do not think of the dependency of our health upon this factor. But to those who are forced to live in those localities where the air is tainted with the fumes of industry, the shorter life, the prevalence of diseases of a pulmonary nature are mute evidence of the dangers that exist.

Pure water is another necessary fluid that was provided by Nature to flush our systems of waste products. Until comparatively recent years, little thought was required to procure this "Adam's Ale" pure and safe to drink.

Increasing density of population and the indiscriminate discharge of human and industrial wastes into the waters of our streams has made it necessary for municipalities to spend millions of dollars to install filtration plants to prepare the water

for fit use as a beverage. Before this widespread adoption of filtration, hundreds and thousands of lives were lost in the typhoid toll, due entirely to drinking of polluted waters. Modern science has made it possible to remedy this condition and make the waters safe to use, but this is wrong in principle. The common law prescribes that a man is entitled to a supply of water pure and of sufficient quantity to supply his needs, and calls upon the man above him on the stream to return the water to the stream in that condition. But rarely does he do this. The manufacturer takes the water from the stream, uses it in his plant in the numerous and complex processes of manufacture, and discharges it to the stream again carrying its unholy burden of poisons, color and other matter obnoxious to the nasal and visual senses of man. The man downstream says nothing, thinks a lot and spends his good money to filter this water and make it fit for use.

Since our first days, we have been taught to look upon the clear blue of the sky as a criterion of all that was pure and beautiful. In the early history of our country one could go out and look at the sky and really appreciate its beauty, but in many sections, now, it is a myth. Even on the clearest of days, when the skies are unclouded and the sun should shine through with its beneficial effect upon our health and the life of our flora, some sections are overcast with a drab, dense, impenetrable cloud of smoke or fumes from nearby industrial plants. Regardless of the proven lack of harmful effect of leaden skies on health, the sunshine and clear air are synonyms of health, activity and the joy of life. The mental attitude of one living in such an environment cannot help but be stilted and warped. Crimes and vice are the outcome of depressed and mentally warped humans. I repeat that this pollution of our air, our water and the defiling of our atmosphere and vision are not deliberate on the part of our industrialists.

On the other hand, I know from experience that many of the high-minded men who have developed these giants of our industrial age deplore this condition and are willing to do their share toward its alleviation. But measures of remedy cost considerable, and frequently it is a question of continuing a given factory at a profit by allowing the pollution, or of stopping the pollution at an expense which may force the offending plant to close down. Localities depend for their continuance upon their growth, for their prosperity upon local or contiguous industries, and to shut them down blindly would be to reap irreparable damage to many. No, the remedy is not indiscriminate demands for cleaning up pollution, regardless of expense or without regard to the best things for the majority, but it rests in the intelligent study of these problems by those with knowledge of all the determining factors. It calls for the whole-hearted cooperation of those in power to compel action with those who are the offenders, unwittingly or not, and with those who are qualified to advise as to means of remedying these problems at a cost consistent with possible continuance in business.

Modern medical science has demonstrated that the direct rays of the sun are beneficial to health, but in many industrial centers the pall of soft coal smoke mollifies the strong actinic rays and makes the wan sunlight of these places less beneficial than seashore or mountain resorts.

The dangers to health attributable to industrial pollution are legion, and in the short period allotted to this paper one cannot do more than give a brief resume of these dangers and a suggestion as to their remedy.

Industrial wastes are discharged in three general forms: solids, gases, liquids. Each of these has its definite effect on the health and comfort of those resident nearby. There is a fourth sub-class of wastes that are chiefly liquid, but carry a certain proportion of solids, both components being deleterious in different ways. It is best to take each one of these classes separately and consider the sources and components, and their effect. Solid wastes are usually the scraps remaining from the process work in the plant, or by-products of the plant. Some are thrown out in a solid form and remain stable, the problem of their final disposal being a place to put them out

of sight. Combustible wastes in the solid form may be readily burned in municipal or private refuse incinerators, depending upon the quantity, the proximity of the public incinerator to the plant and the charges made by the municipality. Some solid wastes, such as saw mill refuse, may readily be used as fuel and some revenue be derived from them by savings in the purchase of other types of fuel. Usually, also, wastes of this type may be suitably disposed of by dumping in low spots and covering with earth.

Wastes of a solid nature, that are in themselves decomposable or contain decomposable elements, are a far more serious problem and require different handling. If such wastes are allowed to lie around in uncovered piles, they will soon cause obnoxious odors in the vicinity and arouse complaints and causes of civil action. Organic solid wastes may be adequately disposed of in some instances by putting them in closed receptacles and allowing them to undergo their natural process of decomposition. Under certain circumstances, such solid wastes as cannery refuse, meat packing plant waste may be thus digested, and in the process of this digestion produce a large volume of gas. This gas has a high calorific value and may be utilized in producing power or used as fuel under boilers, etc.

Solid wastes, such as slag from furnaces, scraps of iron and other metal, tailings from metallurgical operations, may be disposed of as fill. If this is done sensibly, low, swampy places may be reclaimed and be the source of considerable revenue for factory sites. Judicious piling of this material to a height consistent with the surrounding ground elevation will neither cause obstructions to traffic nor be obnoxious to the eye, and, on the other hand, may open up new avenues of approach to land developments, thus saving time for those who reside or work in the vicinity. A noteworthy example of this type of disposal of a solid waste is at the plant of the Martin Dennis Company, at Kearny, N. J., where, by means of a system of industrial railways, they have reclaimed a number of acres of swamp land adjacent to their plant, thus making for themselves and their neighbors a much more presentable terrain, reducing mosquito nuisance and adding valuable building areas. Their potential disposal grounds are immense, as there are thousands of acres of the low land close to their plant, and it is probable that the owners of this land will be glad to grant the Dennis Company the right to fill their swamps on the same basis.

Indiscriminate piling of wastes serves no useful purpose. The huge piles of waste phosphate rock in Florida, the tailings piles at the copper mines, the waste piles at Syracuse, N. Y., are mute evidence of misplaced disposal. There is low and waste land in the vicinity of any of these places that could be restored to useful and productive purpose by careful and studied dumping. Health officials can have no jurisdiction over such affairs, but municipal authorities can logically, and should exercise some measure of control over these waste dumps.

Gaseous wastes are those emanations of plants which are usually the result of processes involving combustion, either of fuels for power and heating purposes, or for roasting of ores, smelting of metals, gas manufacturing, acid manufacturing plants, incinerators and the like. In many of them the gases thrown off are visible, being colored the familiar yellow of sulphur, black when soft coal is used, and the white ash-laden smoke of an incinerator improperly operated. Flora in the vicinity quickly show the evidence of such pollution, trees and plants dying, and soon there is a dearth of foliage round about. Seeing the effect on foliage, one must needs appreciate the great danger there must be to the human system from such fumes and gases. Pulmonary diseases are always intensified in such places, where the air is sullied. Children show the result in stunted growth and mentality, and the ratio of death is high. Inhalation of these noxious fumes cannot be helped, and surely, the inhabitants of a vicinity should not be compelled nor expected to go around with gas masks clamped to their mouths all the time because a manufacturer is either too short-sighted to see the advantage of protecting public health or is too avaricious.

This is one field where the health authority may, and usually does, assert his jurisdiction, and the result is a clean-up.

Municipal refuse incinerators are in many cases notorious performers in the discharge of smoke carrying odors of unconsumed garbage, many small particles of ash which settle in a pall over the country-side and constitute a fire menace, as well as a menace to comfort and health. Where the incinerators are one of a recognized group, this is due entirely to faulty operation. Experience has proven that when the furnaces of municipal garbage and refuse incinerators are kept at a heat of between 1200 and 1400 degrees F, perfect combustion of the refuse will result, there will be no smoke, no odors and no powdery ash. Allowing the heat to drop below the danger point of 1200 is due to carelessness, insufficient combustible material to maintain the heat or lack of care in the mixture of garbage and rubbish.

All gaseous wastes may be readily controlled. Frequently a check-up in the plant itself will disclose leaks and sloppy operations, which, when corrected, will modify the trouble to a marked degree. Odor-destroying devices have been developed and are in successful use. Washing of gases and fumes will frequently suffice to remove solids in suspension in the gas. A number of successful plants are now functioning where plain settling tanks have been employed to recover fine dust, and several types of scrubbers are in use in gas plants that will reduce the odor nuisance. The use of chlorine has been found effective in a number of cases in preventing stack odors. Usually, a scrubbing or washing operation will remove sufficient of any

Liquid wastes are, of the three main types, the worst to handle, are the greatest in number and present the greatest problems to the engineer and chemist. Because the nearest stream is usually the means of disposal first considered, the pollution is immediately transmitted to an innumerable body of innocent humans and animals who either depend upon these streams for their source of potable water, or for industrial purposes or for watering stock. What may appear on the surface to be a small volume of waste from a relatively small industrial plant may easily destroy the value and safety of a water supply for thousands of people. This entails great expense on the part of the officials of these communities in which those people live, to provide filtration plants to remove the pollution and the danger. Fortunately, our health authorities now recognize that the inherent rights of the multitude are the governing factor in such cases and do not permit a single industry to endanger the health and well-being of a large population.

Liquid wastes are usually large in volume and contain a great array of materials which may be classed as pollutants. Some of these elements are in suspension, some in solution and vary in color and concentration. It is not necessary that the large volume of water usually discharged from industrial plants be diverted from the stream because of pollution, but, rather, it is essential that the pollution be removed. Large volumes of water taken from a stream and used in the various industrial plants that line its banks should logically be returned to that stream after use. The common law says that it must be in the same volume and condition. An example of this policy of diverting water from a stream was evident in the Passaic River, in New Jersey, until recent years. The large textile mills at Passaic, Paterson and the other towns along this river required enormous volumes of water each day, one plant alone taking 15 millions of gallons each day, enough water to satisfy an ordinary city of 150,000 people for its normal uses. The total reduction of the river flow through the pipe line used by these textile mills was so great that, except at flood times, when the dam overflowed, the river bed ran almost dry and was a sore sight, being the recipient of all manner of debris. Regulation of this by requiring the users to return a certain proportion of the water used to the river has again resulted in the Passaic being classable as a river.

It is true that in many plants a large volume of water is used in cooling and other purposes which may not entail contamination. This water can be, and usually is,

discharged directly to the stream, if found to be safe. On the other hand, it is sometimes more economical to treat wastes which are highly charged with pollutants than a highly concentrated waste, and in a number of instances it has been found advantageous to combine some of this clear water with the wastes, in order to obtain the reaction that an alkaline water will produce on an acid waste. This method may be shown in certain cases to save considerable money for a client. For instance, where color removal is the desideratum, and as in dye manufacturing wastes or textile plants, it is difficult and expensive to remove the last trace of color by chemical means, the lighter shades of color may be entirely dissipated in a large volume of clear water, so that the resultant discharge to the stream is safe and unnoticed. To overlook this when advising a client on treatment is perhaps to put an unwarranted burden of expense on the client.

Many liquid wastes are menaces to health because of their content of organic solids. These settle out in the stream, and, due to their avidity for oxygen, soon make the stream odorous and destroy the use of the water for potable purposes. By reducing the oxygen content, fish life is endangered or destroyed and bi-valves are rendered unsafe to eat. Many of the famous oyster beds of the country have been closed down, due entirely to pollution, either from industrial plants or municipal sewage.

The wastes from tanneries, meat packing plants, glue factories, canneries and milk products plants are notorious offenders against the purity of streams. Usually, these industries concentrate in given localities, so that the pollution problem is intensified, due to excess concentration. Until recently, it has been the custom for tanning to locate in country and wooded districts, mainly because of the need for oak and chestnut bark for tanning materials. Consequently, most of the small streams of those states, such as Pennsylvania, Wisconsin, Michigan, Massachusetts and Virginia, which are the tanning centers, have been rendered useless for drinking purposes or for fishing.

Steel and wire mills, coke plants and large textile mills are polluting in that their wastes contain large quantities of mineral salts, acids, chemicals, dyes in solution, and not only do they pollute by discoloring the streams, but they actually poison the water. Coal mines produce large volumes of pollution known as "acid mine water", which, flowing through the opened veins, gets into the streams and renders them unfit for steam purposes. To neutralize these acids, large quantities of alkalies are needed, and these in turn harden the water, thus entailing a second operation of softening to render the water useful for laundries, boilers and even for human consumption. Mine drainage is a natural function and is expensive to control, and it seems a travesty of fate that some of the worst offenders from this source are abandoned mines. Having no one interested in them, there is no one to spend the money to cure the disease, and unless public funds are available, nothing is done.

A noteworthy effort to control such pollution was worked out in Pennsylvania by a number of mines whose discharge eventually found its way to Indian Creek, a stream used by a large railroad system for its water for its engines. Faced with suits and an adverse decision in the courts, the companies banded together, and, instead of putting in neutralization plants, they constructed a tunnel quite a few miles long, through a mountain, at an expense of over \$100,000, and thus eliminated the particular source of trouble. But all they did was to transfer the pollution from one stream to another—a temporary expedient. Sooner or later the pollution in the stream now used will increase to the danger point, and it will then be necessary to spend more money to go elsewhere, or in the end treat the wastes.

Where there is concentration of industry in a given locality, splendid results may be obtained by the provision of a common fund, by the members of the industry, to finance the experimental work necessary to develop a successful and economical method of treatment for the wastes of a given industry. Cooperation of these groups with state health officials is usual, and it is a wise move, as it serves not only to forestall

action, but to call the attention of the state to the problem and to keep them posted as to the efforts of the polluters to find a remedy.

The tanners of Pennsylvania, in combination with the State Water Board, have done a noteworthy piece of work in investigating the treatment of wastes from tanneries located on small streams. The coke manufacturers, due to the intensified pollution caused by the phenols in their wastes, have spent large sums in endeavoring to find means of relieving this trouble. Processes of absorption and evaporation have been the result. The paper and paper pulp manufacturers, who have a problem of large volumes containing high percentages of waste fibre and sulphite liquors, have been working for years under intelligent guidance and in harmony with the officials of Michigan and Wisconsin, and have had marked success.

The meat packers have done a great deal of work in Chicago, Fort Worth and other places to develop a means of handling their wastes. In one instance this has resulted in the development of a method of treatment which, at the plant where it was originally developed, shows a considerable annual profit in the recovery of valuable by-products and their use as hog feed and fertilizer. More and more of this concerted action will undoubtedly be done in the course of time, and eventually all large industrial organizations will be brought to see the advantages of research properly conducted.

The ramifications of methods that may be employed to treat wastes of a liquid nature are so wide that it cannot possibly be more than touched upon in a broad manner in this paper. It must suffice to say that in the writer's experience in dealing with a total of several hundred waste problems of all kinds, he has never found it impossible to treat a waste to produce the desired result. However, it is the writer's belief that success in waste treatment is only success when it is economical. Many times it has been found that wastes could be treated to reduce the color or the suspensa to a minimum, but that when all the figures were cast up, it would be business suicide for the plant owner to attempt to carry out the treatment. That is why intelligent investigation of a problem is so important, research is a cardinal factor and thorough cooperation between the health officials, the plant owners and the consultant will eventually produce a result satisfactory to all.

In general, it may be stated that wastes containing fibrous matter, such as tannery, canneries, glue, textile, beet sugar, etc., may be treated primarily by means of screens to remove these fibres. The solids in suspension may be readily reduced by means of sedimentation basins, usually mechanically cleaned. The solids in solution usually must be precipitated chemically or filtered out, and this entails equipment for adding chemicals, mixing and the following quiescent sedimentation period. Some waste containing fibres, suspensa and dissolved materials may require a plant embodying all three methods of screening, sedimentation and chemical precipitation.

The main effort should always be to produce the desired result at a reasonable cost. Reasonable cost means a price that will be considered within the range of possibility by the plant owner. A sum that would sound small to one man would be a considerable item to another. All of these points are taken into consideration by the consultant or technician who goes in the right direction—toward the light.

The problem of wastes from industry, and their effect on health, is a great one for the safety engineer to face, and the writer considers that it is as much a part of the work of the safety counsellor to an industrial plant as it is to see that the fire-escapes are safe or elevator doors are closed or machines properly guarded. An epidemic or disease or illness caused by pollution of the air or the water may cause time loss in a plant which, in the long run, will be more serious in a financial way than one or two accidents within the plant.

Cooperation between the safety engineer and the public official, especially the health official, to work out solutions for this phase of safety work, will result in widespread satisfaction to a greater number of people—lives will be saved—homes protected and in general everyone will be better off.

VICE-CHAIRMAN ROACH: Is there any discussion?

DR. W. D. McNALLY (Consulting Chemist, Chicago, Ill.): I want to discuss the phase of the excellent paper given by Dr. Evans on tracer gases.

I want to give you some figures from the actual use of tracer gas in the city of Chicago, where we have had so much trouble from the refrigeration industry. Electrical refrigeration is here to stay and we should encourage safe chemicals, safe apparatus, and the refrigerants now in use should be made safer by any means at our disposal.

One of the things at our disposal is the addition of a tracer gas, such as sulphuric acid and acrylic aldehyde. Sulphuric acid when mixed with methyl chlorid can easily be detected in the air in parts two per one million. Five parts per million in the air is an irritating gas.

I have a drum of methyl chlorid with acrylic aldehyde which is now two and one-half years old, and there is still enough acrylic aldehyde in there to drive you out of the room. So it does not polymerize easily in the presence of methyl chlorid. It will polymerize in the presence of moisture and some metals and other substances, but in the refrigerating system it has proved a very efficient means of the manufacturer checking up his apparatus.

I will give you some figures to illustrate that from a practical standpoint. From November, 1928, to November, 1929, in the city of Chicago we had 205 people made ill by refrigerating gases. There were ten deaths. There were 879 people driven from their homes. This included 539 leaks reported to the Fire Department and to the Health Department. In contrast to that, for the period of 1931, lacking one month, there have been only 88 calls or alarms on account of leaks in electrical refrigeration. There have been no deaths and there have been no serious illnesses. This I attribute to the safer use of electrical refrigerating equipment, made safe by the use of these tracer gases.

VICE-CHAIRMAN ROACH: I hope you won't let that paper on chemical trade wastes pass by without some discussion. We have been trying for seven years to get somebody to write a paper of that kind, but the subject seemed to cover such an extensive field that we were never able to do it until this last year.

Most of us who have lived a normally long life know the stigma that for many years has attached to the chemical producing industry because of careless and unwise and thoughtless production practices that permitted corrosive gases to pass out into the air to injure people's lungs, foul fluids, to pollute water courses that made people sick, and last, but not least in my judgment, these obnoxious, unsightly heaps of waste, trade refuse, that were just as offensive to an ordinary person's sense of fitness and beauty. We have a right to a decent landscape, and I question the right of anybody, ethically or legally, to pollute the air or the water or the landscape.

During the war in our state, when industry was speeded to its highest pitch, trade practices in the chemical industry in many places were far from being above criticism, and only the exigencies of our situation at the time permitted the authorities to allow those practices to continue.

There is no reason why chemical plants can't be made orderly if not beautiful. There is such a thing as orderliness in the arrangement of industry. I have in mind a plant that ten years ago was a most unsightly place for anybody to see. They discharged their gases in the air, their waste fluids out into a field, and their waste solids were permitted to accumulate into heaps. But that condition changed. Along the entire front of the plant they have graded and beautified with landscape gardening on the premises so that one of the oldtimers wouldn't really believe it was a chemical plant.

I can take you to tanneries now that are operated in such a clean way that they are no more obnoxious than a well-run kitchen. But twenty years ago there were tanneries in the city of Newark that were so unsightly and obnoxious to the ordinary run of people that no one would live in their neighborhood, except the workers who were accustomed to the odors and waste heaps during the course of their employment.

That is an important subject, because civilization in our country is becoming more complex all the time. We can't discharge waste products out into a stream and expect the water to carry it out into the ocean. That is not possible any more. We have to use scientific, intelligent, chemical engineering to recover these wastes before they become obnoxious to anybody.

I should like to hear the members of our Section discuss that subject now.

A. H. ZIMMERMAN (Ventilation Engineer, Chicago Health Department, Chicago, Ill.): Along that line, I think it might be wise to say that within the last five or six years we have had some very satisfactory results in Chicago in reducing atmospheric pollution from industrial processes, aside from smoke pollution.

I think one of the outstanding industries has been in metal smelting, or the recovery of waste scrap metals; that industry particularly handling brass, copper, and lead. They have always been a source of contention because of the fumes especially from the metals and acids which are given off, and it has been quite a problem to know just how to collect these waste products. The main thing was to get somebody started. After we got one or two of the plants started, things went along rather smoothly. Today I would say most of the larger plants either have complete installations or are in the process of putting in installations for the collection of these waste products.

I can name one plant in particular where the biggest item was the smelting of brass and copper which produced immense amounts of zinc oxide that was given off as a waste product. It was located in an industrial neighborhood, but there were quite a few people living there. Not only were the residents complaining, but the industries were complaining. They worked on the problem, and now have installed a collecting system whereby the zinc oxide is filtered out. We don't know how much was discharged in the air three or four years ago, but we do know that within the last year they have collected over 1,000,000 pounds of zinc oxide that has a market value, when times are right, of about one and one-half or two cents a pound. I believe their total installation amounted to about \$35,000 or \$40,000. When they are going full blast that system has more than paid for itself in a short time.

Since they have started, the others have gone along in the same manner. Of course, some have had a little different problem, as in the case of a battery company where they have the acid. There were two problems there, collecting the lead oxide and also some of the acid fumes, but they have installed acid neutralizers which use straight lime, and they are now collecting lead oxide which will pay for the installation.

IRA V. KEPNER (Pennsylvania Salt Mfg. Co., Philadelphia, Pa.): Mr. Chairman, I wish to move that inasmuch as our Chairman, John Shaw, is detained at home on account of the severe illness of his wife, we send an appropriate telegram to him expressing our sentiments.

VICE-CHAIRMAN ROACH: A motion has been made that we send a telegram to Mr. John Shaw expressing our regret at his absence from the meeting.

(The motion was regularly seconded, was put to a vote and carried.)

VICE-CHAIRMAN ROACH: Mr. Kepner, will you prepare the telegram?

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Rubber Section

Officers 1930-31

General Chairman—E. R. LAWLER, Woonsocket Rubber Co., Woonsocket, R. I.
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Chairman Publicity Committee—R. A. BULLOCK, Corduroy Tire Co., Grand Rapids, Mich.
Chairman Statistics Committee—H. W. LOW, The Miller Rubber Co., Akron, Ohio.
Chairman Health Committee—DR. J. N. SHURLEY, Hood Rubber Co., Watertown, Mass.
Chairman Engineering Committee—M. H. KILGORE, The Goodyear Tire & Rubber Co., Akron, Ohio.
Chairman Slides and Safety Kinks Committee—H. A. WALKER, The Goodyear Tire & Rubber Co., Akron, Ohio.
News-Letter Editor—A. P. REGAL, Akron, Ohio.
Executive Committee—THE OFFICERS AND
J. T. KIDNEY, The Goodyear Tire & Rubber Co., Akron, Ohio.
E. W. BECK, U. S. Rubber Co., Passaic, N. J.
H. T. MARTIN, The Fisk Rubber Co., Chicopee Falls, Mass.

Tuesday Afternoon Session October 13, 1931

C. L. HUNGERFORD, Chairman
The Firestone Tire & Rubber Company, Akron, O.

The first session of the Rubber Section convened with General Chairman C. L. Hungerford presiding.

CHAIRMAN HUNGERFORD: Gentlemen, I would like to extend my appreciation to all our members who have shown such a wonderful way of stepping into a job and giving full cooperation when it was needed this past year. When Mr. E. R. Lawler's company closed, it necessitated my assuming the Chairmanship. We next lost the services of Mr. T. G. McKenna, The Goodyear Tire and Rubber Company, when he resigned. He is now with the Industrial Commission of Ohio. His job was very well filled by Mr. Walker on the Slides and Safety Kinks Committee. In the Engineering Committee, Mr. C. B. Mitchella left the Republic Rubber Company. His job was filled by a very capable man, Mr. Kilgore, the Goodyear

Tire and Rubber Company. I think some of the finest spirit that I have ever seen was manifested by Mr. A. P. Regal, formerly of the Philadelphia Rubber Works Company, Akron, Ohio, who, when his services were no longer required there, continued with us and put out the finest kind of a News-Letter—one of the best that I have ever seen.

I have the report of the Membership Committee. Mr. W. L. Schneider, chairman of our Membership Committee, has done a good job. He reports that the number of members in the Section as of September 1, 1930, was 56. New members during the year were five. Members from other Sections who transferred during the year were two—a total of 63. There were 10 members cancelled, and this leaves a membership of 53. I think this is a very good report considering conditions generally. I think Mr. Schneider has done a very good job and deserves congratulations for his work.

Mr. Roland Kastell, U. S. Rubber Company, chairman of our Poster Committee, is not with us but he has sent in a report which he has asked me to read. It says: "The usual practice of issuing one special Rubber Section poster per month was followed throughout the year. I would suggest that we consider, in future use of the material for posters, that it not only apply throughout our industry but to other industries as well in order to increase the Rubber Section's poster circulation. I would urgently request that each member submit to the Poster Committee photographs that he thinks might make good posters or suggestions as to suitable illustrations for copy."

For your information, the posters which we secure from the National Safety Council, if we had to buy them ourselves or have them made, would cost about \$400 for 100 posters.

We have with us Mr. Kilgore, chairman of the Engineering Committee.

Mr. H. KILGORE (Goodyear Tire and Rubber Company, Akron, Ohio): I have written to the different members of the Section on the subject of "Safety for the Maintenance Man." I would like to have cooperation in getting up a pamphlet on that item. I should like all the information possible on what to do to protect maintenance men. Just now I am working on mill lines—on calendars or the repairing of motors and things like that and how they take care of their chain blocks and chains and what inspections they make on those.

CHAIRMAN HUNGERFORD: I am sure that we all can appreciate what safety for maintenance men means and I urge you to assist Mr. Kilgore. Our next report is from Mr. H. W. Low, chairman of the Statistics Committee. His report.

H. W. LOW (The Miller Rubber Company, Akron, Ohio): I want to thank the members for contributing their records. I think we have eleven more companies this year in our report than we had the previous year and the Rubber Section is nearing one hundred per cent. The Rubber Section stands about sixth in the report of the National Safety Council as far as the frequency of accidents is concerned. As plants get larger, the frequency rate is lower. In other words, the larger the plant, the better job of accident prevention is being done from the standpoint of frequency rates, closely following the experience of all industry.

The larger the plant the lower the severity rate as a whole in all industry, but when you get down to the Rubber Section just the opposite is true—the larger the plant the higher the severity rate. We tried for some time to find something to explain that and I can tell you frankly that we do not know the answer and rather than try I would like to call upon the members who are here to give their opinions of what might be the reason for the severity rate in the larger plants being so high—or anyway higher than in the smaller plants? One of the important things that the National Safety Council's Statistics Division brought out was that the manufacturer of tires has a somewhat higher severity rate than the manufacturer of mechanical goods. We went through the figures on that basis, splitting tires from mechanical goods, and that picture actually holds true. It may be that the larger

plants give a little more hospital service and would be more likely to keep people out the hospital list a little longer trying to get them fixed up entirely. Then again, they use heavier equipment and larger machinery and things of that kind and you must remember that they are more prone to serious injury.

CHAIRMAN HUNGERFORD: Can anyone give any opinions or experiences along that line?

Mr. LOW: The number of injuries, I might add, in the Rubber Section just about follows the total of all industries and they are considerably better than the average of all industries as a general picture. We stand sixth in frequency and fifth in severity.

Most of the rubber industry is carried on in large plants. I think that that is more generally true than in the average of all industries.

We also went into the possibility of there being one plant with an exceptionally large severity rate and that by taking out this one plant we could swing the rate but this is not the case. We still paint the picture that we are painting right now.

What I am trying to find out is why the man working in the large plant has more chance to lose time than the man working in the small plant?

W. L. SCHNEIDER (The B. F. Goodrich Company, Akron, Ohio): I pondered over that question and spent some time discussing it with our chairman, Mr. Low, and I am at a loss to know the exact cause but I do know that in this case, as Mr. Low has said, the better medical emergency equipment provided in the larger plant has some relationship. I believe there is a great deal more care given to the rehabilitation of a worker in the larger plants than there is in the smaller plants. They seem to go to the limit in order to get a man back in the shape, or nearly so, that he was prior to the injury.

R. A. BULLOCK (Corduroy Tire Company, Grand Rapids, Michigan): While our plant is one of the smaller ones, last year I had the privilege of going through one of the larger plants and I think possibly one reason for that chart showing this information is the fact that the larger plants have more machines operating than the smaller ones. Work that we are forced to do by hand because of small production, the larger plants do by machines and I think that most of us realize that accidents by machines generally are more serious and involve more lost time than hand operations.

Mr. LOW: There is probably a whole lot in that. The man working on a hand operation is more likely to have an accident but it is not likely to be so severe.

CHAIRMAN HUNGERFORD: In some cases, however, that is not wholly true. For instance, when tires were built on the old solid metal core they rolled them across the floor by hand and they rolled them four, five and six at a time and we had a good many accidents due to that. That has been eliminated in a good many of the larger plants but I think some of the smaller plants still have that operation—and those were very serious accidents. We had a good number of fractures from that source.

Mr. SCHNEIDER: We do not want to overlook the fact that many large plants have many operations that are changed so rapidly that the men hardly have the opportunity to become familiar with them. That is partially true in our industry. We have certain jobs that involve only a day's time in which thousands of articles are made and it is gone tomorrow. I believe that that has a distinct bearing on that particular point.

Dr. J. N. SHIRLEY (Hood Rubber Company, Inc., Watertown, Mass.): I think there are two points there. Your smaller plants are probably fabric plants and make raincoats and sundries—things like that where there is very little machinery. In the larger plants, too, the labor turnover is a factor. The small plant usually has a few men that it can call in who are experienced while the larger plant may have to depend on 50 green men who must be trained and protected. I am led to believe that it is the man recently employed who is likely to lose a lot of time when

there is an accident. He is very apt to be hurt to a much greater extent than the long-term man.

MR. SCHNEIDER: That isn't true in our plant. We have found that some of our men who have been with us from fifteen to seventeen years have sustained very serious injuries this past year.

E. W. BECK (U. S. Rubber Company, New York City): I was dumbfounded a while ago when I asked all of our factories to give me a report regarding persons in our employ who have permanent disabilities. Of course, we are a large company and we have been in business over sixty years. I am convinced that we have evidently followed the policy of taking care of our injured men, because that list was a mighty long one. It was pathetic to me to see in our company so many permanent disabilities. It set me thinking.

I believe that there are a number of gentlemen here who are having that same experience. Some of you are trying to find out "Why did it happen?" In the majority of cases, if we can find out why it happened and where it happened, we are in a position to do something. In other words, you must get your statistics and list them in order to get the basic cause.

I don't think that you can state that the accidents are happening in any one particular department, nor to any particular class of employee. During the last few years we have had fatalities that I am satisfied have happened not so much due to the nature of the operation as to the method of operation. The method was wrong. I know of cases where superintendents of engineering departments have gone into the other departments of the plant and one case in particular where one tried to take off the head of an engine and it smashed his foot. I know of one case where some old employees went into a hydraulic elevator well in order to take care of an adjustment. The piston came down the elevator shaft and dropped on them, killing them. They had not been careful and the water had come out of the pistons. I know of cases where men have handled jobs out of their department, thinking they were working for the good of the company; rather than call the maintenance department, they tackled the job themselves. They suffered and paid the price.

The Human Element

In other words, gentlemen, I think that the more we study it, the more we get back to the human element. That is the basic cause of the accidents.

I do think we can reduce our fatalities. In our company we haven't a one so far, I am glad to say. We have been going through a great deal of change, changing a lot of equipment and moving a lot of the men. As you know, the morale of a rubber plant is more or less disturbed by that particular time and I think the reason for it is that we are placing more and more emphasis on the man himself. It is true that we have hazardous equipment in the rubber industry and especially in the larger plants. The big rubber manufacturers have gone to conveyors during the last several years on a large scale, and you all know that conveyors are dangerous. I think our conveyors are responsible for quite a few of our accidents.

We can't put a fence around all those things. What we must do is to put our time and thought and our energies on the individual.

CHAIRMAN HUNGERFORD: The next speaker happens to be my boss. There isn't a lot I can say about him. It wouldn't do to give him a lot of bouquets because he wouldn't take them. He is only interested in results. He made a statement, though, that I am going to take a crack at. He said, "The Safety Engineer of the Firestone Tire and Rubber Company is not responsible for accidents." That is true; but I wish I could really feel that I wasn't responsible, sometimes I wish that very heartily. I think that there are a lot of us who feel that they would like to get rid of that feeling of responsibility for accidents. But the more this man is around Firestone, the more we all feel that we are responsible for accidents.

Without any more words, I am going to introduce Mr. Gross.

Where Safety Stands in Our Organization

By R. R. GROSS

Factory Manager, The Firestone Tire and Rubber Company, Akron, O.

I hardly know where to begin in a discussion of safety. But there is a little history connected with our safety work that I might bring up. It is just as bad to be over-organized as it is to be under-organized.

Back in 1920 and 1921 we had a safety organization of quite some proportions, but due to the urge of the times, (either wisely or otherwise) it was necessary to release a number of those people and to do what we thought was a very radical curtailment of our safety program. Since that time we have been organized with a safety department which consists of only one man. That one man is Mr. Hungerford and while we are sure that he is an unusual individual in that type of work, we feel that in a plant the size of Firestone he can very readily and very ably cover the safety work that is necessary. Our experience in the reduction of accidents has been so pleasing to us that that is why I bring up this point. It is just as bad to be over-organized as it is to be under-organized, and that applies to a lot of things besides safety.

You may ask, "Well, how do you regard safety at Firestone?" I can only say that in the factory organization we are primarily interested in three things. The first is that we produce a quality product; the second that we produce it at good cost; and the third that we get it out in sufficient volume to meet our demands. Nevertheless, we feel that safety is an integral part of that program; we feel that a man or a workman who is careless cannot produce the best quality goods. It is hard to put your finger on something tangible in proof of that, but nevertheless it is indicative—it is a measuring stick. Those of you who are in large companies appreciate that it isn't always possible to know all about every man in your organization, and as a consequence we have to tell largely by impressions. By that I mean, you can go into a department or a division or a storeroom or any place in the plant, and some sixth sense—I don't know what it is—will tell you that that place is either running well or it isn't doing so well.

We regard the safety angle not only with relation to quality but also to costs and to volume; and it is so inter-related to all of those things that if anyone is not specifically and definitely on his toes regarding safety, then that creates the impression that that individual is not on the job as he should be. And if he is letting that thing go by, the question comes up in your mind as to how many other things are slipping through his fingers and how many things could be done better if he were paying attention to all of those small details. In dealing with people and dealing with them when it is necessary to operate largely on impressions, we often get into difficulty and quite frequently we make mistakes. It has been done. I am sure that in dealing with certain situations that have come up in our organization, where we felt that some drastic action was necessary, that we have made mistakes.

Let us take the case of some inter-departmental friction that comes along whereby the organization isn't functioning just right, and two fellows or three fellows are having a hard time to get along together. We have cured such situations at times by firing the lot of them. Perhaps they weren't all at fault, and that is why I say that sometimes we make mistakes. Nevertheless, the cure has been positive and it has never failed to correct the situation and restore good order.

In getting around the country and in visiting different plants, I get the impression at times that there are some folks who have safety committees just for the fact. They are sort of go-between between them and the Industrial Commission, so that if they should be so unfortunate as to have a case come before the Industrial Commission they can step up with a lot of pride and point to their apparent efforts toward the reduction of accidents. I feel that there are cases where just such things exist.

When we get right down to it, folks who operate on that basis are kidding themselves, because accidents are a waste. They are just as much a form of waste as the binding wire that comes from the tire and that goes out in the scrap heap, or any other form of waste that is carried out of the plant. Accidents represent the waste of dollars and cents—maybe not so many of them, but nevertheless that dollars is just as big when it is in the bank as any other dollar the company ever made in its life.

Mr. Firestone has remarked a number of times in the past two years, and we have had an opportunity to demonstrate it very definitely, that in these hard times it is much easier to save a dollar than it is to make one. I don't know whether that has been your experience or not, but it has been very definitely demonstrated in 1930, and thus far in 1931, that we could save a dollar with apparently less effort than we could go out and make one in the competitive market.

Mr. Hungerford repeated my remark yesterday that our safety engineer was not responsible for accidents, and I did say that, but I am not going to let him off that easy. He is not responsible in the strict sense of the word, but nevertheless somebody must be responsible at least to the extent of heading up such an operation. When it comes to placing the very definite specific responsibility for an accident it must be placed on the supervision of that unit where that accident occurred. We don't deviate from that. It starts right with myself; and when a man gets hurt in the plant I feel just as much responsible for that as I hold anyone else to be, because I have me geared the organization up to the point where the hazard could be corrected before the accident happened.

Specifically, in my opinion, it gets down to the foreman. The foreman is the real fellow who can make or break a safety program, and as I said a while ago, if he is not the type of an individual who bores right into everything and doesn't overlook a thing, then he will not have a good safety record. If he is an individual who is indifferent to safety, then that is indicative that he is in all probability careless and indifferent toward a lot of other things—and we must bear in mind that a foreman is handling a tremendous amount of your company's money every day in the year. It is going right through his fingers in material, floor space, pay roll, machines and all of the things that he has there; and while I sometimes feel that we don't regard them quite as highly as we should, nevertheless, we place the responsibility first directly with the supervision in charge.

That gets us around to the point where we ask, "What makes a good foreman?" I haven't seen anyone yet (although I understand it has been tried) bring a man into your employment office and make him stick out his tongue and wiggle his ears and say "Ah" and a few other things and then tell you whether he ought to be in the machine shop or in the curing room. I haven't seen anybody yet that was as smart as that. I never have figured it out.

This gets us back to an analysis of man. We all have our ways of doing it. There are certain things that you look for in an individual and there are certain things that I look for in an individual. I think that first of all a factory foreman, and this applies to all supervision, and everyone for that matter, must have, if he is going to get any place in this world, one thing—character. Without it he has handicapped himself in such a way that he will trip himself quickly and in a very short time. Further than that, and this might apply to some of the smaller companies (I think it is a more difficult problem in the smaller companies)—I think that the foreman, and all supervision for that matter, should maintain about itself that zone of respect through which no man is allowed to penetrate. I will give you an example of that which bears on my own experience.

I was in my office one afternoon and a fellow came in from the outside. He was a salesman. He was a very high-pressure salesman, if there ever was one. I sat at my desk on one side and he sat on the other side, and he started to give me the works. He tried to get me cornered—it wasn't anything else but that. He tried to

get me cornered and he got up and came around the desk and got right over me and about that time our vice-president went by and looked in. I didn't say anything to him, but a couple of days later he said to me, "I saw that fellow laying over your desk the other day." I said, "Yes, I was much embarrassed about that." Then he went on to recite to me some of his experiences.

We talked it over and came to the conclusion—and I have had to use it a number of times since and it is always effective—that when a man comes in and sits down at my desk, he had better stay over on that side because I am going to keep him over there. When he starts around my desk I put him right back and say, "Now you stay over there." If he has anything to say I can hear him, and if he has anything he wants to show me I can see it, and I make him stay there and present his case. It is surprising how well it works, how much it disarms the individual who is putting on the "high pressure." That is why I say that a foreman or a good supervisor should maintain a zone of respect about himself. He should maintain about himself that zone of respect through which he allows no man to penetrate. In other words, he is in a position to say either "yes" or "no" to anyone at any time.

Now, assuming that a man has those qualities (and you can't tell whether he has or whether he hasn't simply by looking at him), then the next question is, how does he spend his time? I am thinking of his time during working hours and not of his time out of the plant. To me the most impressive thing (and I said sometime ago that we are dealing with impressions) is for a man to get his work organized. We all know that it is better to spend one day planning your work than it is to spend a week in plunging and floundering around and wondering what you are going to do about it. I would much prefer that a man should sit down and do absolutely nothing but plan his work, and then come in in the morning early (don't forget that, to come in in the morning early) and know before he gets to his office what is the most important thing he has to do that day and then do it. It is just as simple as that.

You know, it would be surprising the results we could get in any corporation if every man would come in with that one thing in mind and know what his most important job that morning was and do it, and then go home. Suppose you have a supervisory force of five hundred people. There would be five hundred definite and specific things that were concluded early in the day. The foreman must get himself so organized, and when I say that I mean all supervision. I can't get my work done in any other way. When I go to the office in the morning I know what my number-one job is. There may be twenty things that need getting into, but I have arrived at the conclusion in my own mind before I get there what my number-one job is, and unless there is some extreme pressure brought I will get that done before I do anything else—before I even think of anything else.

Now, in order for a foreman to do that he must be resourceful. He must be resourceful within himself and if he is not resourceful he is pretty apt to run out of a job. Any man who isn't resourceful within himself is apt to run out of a job and then he becomes a "shadow boxer." We have them. I think every company has them. They are individuals who do anything but work—but when it comes to shadow boxing and putting on the show they are right there. In order for a man to know and avoid that classification, he must be resourceful. When he is resourceful then he has generative powers that drive him on and keep him going and keep him figuring out new things and new ideas without a lot of direct supervision.

There is just one more thought, and I think it applies to all of us. We have found (it isn't original with me) that the important thing is to get the facts. I am sure that your experience has proved to you that any six-year-old boy could answer almost any given problem that you meet provided he had the facts. The great difficulty comes in getting those facts and knowing that you have all the facts, all of the correct facts. We have a very simple form that we apply not only to our foremen and our inspectors but also to our plant managers and production superintendents

and all else. When they bring in any sort of a situation or problem we get down to the very simple form of "What is it?" We let them state their case. "How do you know it?" Here we let them prove it. And "What of it?" You would be surprised how many of them get stuck on that "What of it?" Most of them say that they can't answer it. It is just one thing they hadn't thought of. Now, I would like to ask you, "Isn't that essential?" "Isn't it necessary?" That is the question, "What of it?" and when you get to the "What of it?" and when you answer the "What of it?" then it is you can very readily separate the important things from the unimportant—which gets you back to the knowing of the important things to do and then doing them.

E. W. BECK (U. S. Rubber Company, New York City): Inasmuch as you place the responsibility on the foreman, what, if any, method of discipline do you use in order to enforce your accident prevention work on the part of the foreman?

MR. GROSS: We only have two kinds of discipline at our plant; we either give to that particular man a better job or we fire him. We don't take any half-way stand on those foremen. If he is the right kind of a fellow and is deserving of a better job and is capable of a better job, then it is our duty to put him in that job if we have to produce that job for him. We are not fair to him if we don't do it. On the other hand, if he is not that type of an individual then he is holding back the progress of our company, and some other individual in our company, by occupying his position and the best remedy is complete and total removal.

MR. BECK: Have you ever fired a foreman who had been with you for ten or fifteen years?

MR. GROSS: I might answer that in this way. Bear in mind that I said, a while ago, that we deal largely in impressions, and one thing might not be sufficient to create the impression that would bring about that situation that you mentioned; but that one thing with some other things might be sufficient to justify such action.

I recall a case of just a few weeks ago where one of our foremen who had been with us for twelve or fifteen years resigned. They brought in his removal card and wanted it signed and they would pay him off, and the reason given on this removal card was that he had a better job. Well, in my own mind I knew better, and I began to inquire into it (bear in mind that when this happened I didn't know anything about it). The real facts of the matter were that this particular individual had created such impressions that he felt that the balances were tipping not in his favor and he felt that he was only two jumps ahead of the fellow who was going to fire him. That is how these situations can sometimes be handled.

PAUL VAN CLEEF (Van Cleef Bros.): I can point out an example where, in my mind, it would have been a great mistake to have discharged a man because of an error in connection with safety practice. We had an underground tank that apparently was leaking, and foolishly, if you will, the assistant foreman went down to investigate. He had been told not to go in there, but he thought that he knew more about it than the one who had instructed him, and the consequences were that he was overcome by the fumes in that tank and with great difficulty he was saved. He had taken a chance. He has been the chairman of our safety committee for several years now since that incident, and our own record covering the last two years shows that he has only had one lost-time accident and that was for only a very short time. He has become one of the most enthusiastic safety men that I have ever met. I think it would have been a mistake to have discharged him.

MR. BECK: I am inclined to agree with Mr. Van Cleef. We are all human. We know that the majority of our accidents are due to human causes. Sometimes we can do more with that man by not discharging him. Sometimes the lesson is in the accident itself.

One of our best foremen, who had been with us for some twenty years, in order to save five or ten minutes tackled a job with a conveyor and a bar and paid the price with his own life. Now suppose he had only broken the chain in the sprocket,

would we have fired him? It would have been an accident but probably no one would have been injured.

I am thinking of another case where a man, in order to get production going on Monday morning, went into the shop on Sunday to do a job and didn't take enough men with him; in order to save a dollar or two and thinking he was working for the interests of the company, he went to work and he met with an accident. Now, would you fire a man in a case like that?

MR. GROSS: I would like to clarify my remarks. I am afraid that they are being misconstrued. Not in every case do we fire foremen; by no means. The biggest job the management of any plant has is the building of the man, and if, in the process, he goes through an experience that creates in him the idea of safety and makes him a better man, then it certainly would be poor judgment on the part of the management to arbitrarily fire that man. Good men in business are just as scarce as they ever were and the only way that we can get them is to build them. This gets us to the matter of balance. There is no arbitrary rule that can be written and I only want to convey the thought that where a man is careless about accidents and where that carelessness was instinctive, then he would be careless about other things.

MR. BECK: Would you lay him off for a week or some days?

MR. GROSS: No.

MR. BECK: Have you ever discharged a man who had been with you for about twelve years, a good foreman, for gross negligence?

MR. GROSS: I can't answer your question because I don't deal directly with the foremen.

CHAIRMAN HUNGERFORD: We had a very specific case of that kind. This man was foreman of the yard gang, in charge of brick masons and painters and work on the outside. We have a tunnel leading from the plant and connecting with another tunnel which goes over to our club house. That tunnel is roofed with non-shatterable glass. This foreman had some conveyors to erect inside the building and some brickwork outside. He sent his men up over this tunnel without first protecting it in any way, and nothing was done to protect the men who were removing the bricks. The result was that in taking a few bricks out about fifteen bricks fell down on the tunnel and broke through. The piece narrowly missed hitting one of our office employees who was passing. That happened at two o'clock and at three o'clock that foreman was no longer connected with the company—and he had been with the company, I think, about nine years.

There was no accumulation of other things, but this one thing was so outstanding and he had been told so specifically by the supervisor to take the necessary precautions that it was thought best to discharge that foreman.

MR. VAN CLEEF: In our organization when an accident occurs the individuals involved are called in before the safety committee for close examination and they are put through quite an unpleasant experience from the standpoint of the employees. This appears to be so distasteful to the employees in general that they don't like to go before this safety committee and that is one way we have of disciplining those people for carelessness.

H. T. MARTIN (The Fisk Rubber Company, Chicopee Falls, Mass.): I was very glad to hear Mr. Gross say that he held the foremen responsible for accidents. I have always maintained that the best safety men in the world are those men that are working toward the end where they will no longer be necessary in their organization. The sooner we can get the plant in a state of efficiency with regard to safety and as soon as we can get management to realize that they are responsible for the accidents, then the sooner will the safety man's work be done. The reason they have to keep paying a safety man is that they won't accept it as part of their job.

Rules should be enforced but there is a great group of people who place the responsibility on the foreman and then do nothing about it. That is the very thing

we are talking about. I have seen instances galore where everybody agrees that the foreman is at fault but they don't do anything about it. It is true, I think, that the case just mentioned was an unusual accident and I think that the proper disciplinary measure was taken, but I know of a great many cases where the foremen are always excused.

W. L. SCHNEIDER (The B. F. Goodrich Company, Akron, O.): I would like to ask our Chairman whether, in his particular case, the reason for the foreman's discharge was recorded on his hiring record?

CHAIRMAN HUNGERFORD: Yes, Mr. Schneider, it just happens that the safety department and the employment department are practically in the same office in our organization. In other words, when I am in the office I see every man who is interviewed by our employment department. Regardless of whether a man is an employee in the shop, a chipper, a tire builder or an hourly inspector, every accident that he has is included in his folder. Recently we had men seek to get back into the organization and they have been refused because of the number of lost-time accident slips in their folder. I might say also with regard to this that we have a ruling in our organization that no man can be discharged unless a very definite reason is placed upon his removal notice and that becomes a permanent part of his record.

B. J. BOSTWICK (Industrial Relations Department, Gillette Rubber Co., Eau Claire, Wis.): We made a check-up of our accidents and we found that the foremen had more duties than they really should have and that had a direct bearing on their safety work. We brought that to the attention of the manager of the plant and a correction was made. I think that is a mighty good thing and possibly you will find that in a good many places. A good safety man should be able to bring a condition of that kind to the attention of the supervisory force.

A. M. DIETZ (Pennsylvania Rubber Company, Jeannette, Pa.): Recently the statement was made that when the safety division was taken into the office it was weighed in dollars and cents. Here is an incident probably you will never hear of again and it has a bearing on discipline in safety.

The safety men of our town were making an inspection tour and they were going through the various factories, and when they got into one of our factories they came to a floor that was very slippery and this was brought to the attention of the safety inspector of the plant. He said that he had already brought it to the attention of the supervisor. Well, sometime after that one of the big men of the organization visited that factory and he had his young girl with him and as she went tripping across this slippery floor she fell and broke her arm. They made a revision of that safety department and they haven't a single one of the old members at the present time. Is that discipline? Is that justifiable discipline?

CHAIRMAN HUNGERFORD: It seems to me, Mr. Dietz, that it all depends on the reasons that the management gave for it. I will admit that I have shown poor judgment in a lot of the safety devices that I have turned down which were really necessary, but I think everybody has these things happen.

I think it is a good question to bring up. Who here has not had to consider whether or not he should spend the money for safety work? Who has not had to assume the responsibility of saying "Yes" or "No"? There isn't a day in the week that I don't have that problem presented to me. We should do something about that. We just can't do everything that is suggested.

We have a system in our plant whereby I get a lot of safety suggestions. I don't accept them all and whenever I turn one of them down I feel that I must take an added responsibility because if something should happen they would say, "Well, Hungerford turned it down."

J. M. KERRIGAN (U. S. Rubber Reclaiming Company, Buffalo, New York): I am, by profession, an industrial engineer and only recently got into safety work, but I find that progress is being made in getting at it from an economical stand-

point. In figuring what to present to the Board of Directors in the way of an analysis sheet, the safety dollar is getting to be as important as any of the other dollars.

I have been called into various plants, and in many cases my analysis has shown an excess of accidents, causing a tremendous bill for medical and accident compensation. I think Mr. Gross is right, from the standpoints of the plants for which I have been an advisor, in holding the foreman absolutely responsible for accidents. Wouldn't you fire a foreman, or at any rate demote him, if he broke one of your valuable machines? Is the human machine less valuable?

In one case where it was definitely found that the foreman had violated the rules on operating this particular type of machine and thereby causing an estimated damage of about \$35,000 he was demoted immediately although he had had about twenty-seven years' experience in that particular work. If a worker was injured and broken down physically or mentally by an accident wouldn't that be a cause of demotion just as though valuable equipment had been broken?

I think that a lot of our safety engineers aren't hardboiled enough. When a man comes in hurt, a lot of these gentlemen just get fussed and pass over it and let the foreman ride by. Probably the next day some of the mechanical equipment goes haywire in his department and you put him on the carpet proper and he is told where to get off. I think that accidents to a human being should be treated the same as an accident to a piece of equipment and I think the foreman should be judged on the same basis. I think it will save a lot of dollars in the different plants.

I know of a case where a fourteen months record with no lost-time accidents was broken because of a foreman not paying attention to his job. The injured man told me that he had told his foreman of this particular hazard. That foreman had been with us twenty-nine years but I don't think he will be with us next week if the investigation bears out the injured man's testimony. We are going to discharge that foreman and he is the best man we have in the mill room. We feel that in this accident he is absolutely responsible. We certainly would demote him if he broke one of our new machines and if he is not qualified to take care of his men he certainly is not qualified to take care of those machines.

CHAIRMAN HUNGERFORD: There is one other thought that I would like to bring out before we pass on to the next speaker. We should investigate an accident where no one is hurt with the same care as we do where a person is injured because it is only a fractional difference whether a man is injured or not.

Another thing I have found is that on different occasions the foreman didn't know any better and if it was about safety then I figure that it was my fault. I didn't get the stuff across to the foreman in the right way. If you have accidents where the specific instructions covering the equipment are not carried out then a certain definite program should be worked out.

The foreman has considerable responsibility and it is not only our responsibility to make him responsible but it is also our responsibility to teach him the right way to do the job. We can't criticize him for not doing the job right until he has been taught how to do the job right. We say that a foreman should instruct a man how to do a job, then follow through and see that he does it, and I think our principle as safety men is to instruct our foreman in safety methods and how to do a better safety job, and then follow through to see that he does it the same as we ask our foremen to follow through on the men under their jurisdiction.

When we have an accident of a general nature I immediately see that the experience of that accident and the method of correction is broadcast not only to our own organization but to all of the subsidiary companies so that the knowledge may help in preventing further accidents.

H. A. WALKER (The Goodyear Tire and Rubber Company, Akron, Ohio): I have been wondering if the foreman realizes in a great many instances just what the costs are to the company in case of accidents? In other words, does he receive any information acquainting him with the cost both in compensation and hospitaliza-

tion? Does he get any detailed reports showing, not what the direct labor costs are, (he knows what they are) but the indirect labor cost? He knows practically every other cost but I wonder if, in most companies, the foreman knows the cost of an accident in his department? We can quote statistics showing that for practically every dollar you spend in compensation and hospitalization you spend four dollars in contributory costs, but does the foreman know that? If he did know it would be more energetic in cutting down that cost to his department?

CHAIRMAN HUNGERFORD: Mr. Walker has given us an important thought. Perhaps we are not giving all that information to the departments. I think that that information would be very valuable.

The next speaker is Mr. C. W. Greenfield. He is an authority on fire prevention and I am sure that he can give us some very constructive thoughts.

Industrial Fire Protection

By C. W. GREENFIELD
Dupont Viscoloid Company, Arlington, N. J.

This subject is one of such vital importance and great magnitude that I could not commence to explain in the minutest detail all that applies to fire protection and fire prevention in industry.

I do not want to quote statistics, but when we realize that each year more than five hundred million dollars—more than a half-billion dollars—is lost by fire each year and that industry pays the greater part of it (one more figure I would like to bring out is that we have lost seven and one-half billions of dollars because of fire since 1912), it is time that we give some thought to this important subject. Some companies do, and a great many depend upon the insurance inspection and say, "Let George do it." George happens to be the insurance company, but they know that, when they give careful thought to the subject, their insurance is added into their cost, and when they can show a good fire record they can show a reduction in their insurance premiums.

Let us go along with a little something to illustrate this great job of preventing fire. First we must have proper organization, and I mean by proper organization, the manager of the plant or the president of the company must be sold on the idea of proper fire prevention methods being used in the section of the industry of which he happens to be at the head. He should see that the proper man is chosen to head the movement and he should see that the fire prevention and protection department is properly organized, with a great deal of thought given to the qualifications of that particular man to head the movement. Has he experience? Is he a student? Is he familiar with the hazards of that particular industry? Is he a disciplinarian? Is he a man that can keep his head at a time when most people become panicky? Remember that the time of fire is a time when men will do things that they ordinarily would never think of doing. I have seen men, in my experience (and that is most of my life) run helter-skelter at the time of a big fire, running around in circles, yelling something that no one can hear or understand—and I don't think they do themselves. I have seen men climb ladders yelling at the top of their voices. They don't know why and after the fire is out and they are told that they climbed the ladder, they absolutely don't know a thing about it.

A fellow may be an excellent worker and may have been with the company a good many years, but at the time of a fire he becomes excited. Many times it is done because the boss is looking. They are trying to make themselves prominent by trying to play an important part in working for the interest of the company, while all the time they might far better have left the plant and gone into the street and not attempted to interfere with the progress of the department that has been organized for the purpose of extinguishing the fire.

We must have such an organization and there should be cooperation on the part of everyone. There should be harmony between the fire protection division and the other divisions of the plant. If you have no such cooperation you cannot expect to get far.

There should be the proper inspections. I would like to give you a thought or two here about those inspections. First, the inspector should start at the top of the building and observe a few points right there: (1) Means provided to allow the occupants to leave the building quickly and safely. (2) Construction and exposure. (3) Accessibility of the building to the fire department (I am speaking of the public fire department). (4) Possibility of the spread of the fire from its place of origin. (5) Care in maintenance. (6) Whether there is sufficient fire equipment. (7) Processes and contents. (8) Special hazards.

I am not going to attempt to go into the details of each one of those points but I want to call your attention to the importance of a careful inspection. When an inspection is made it should be made by one qualified to judge whether there exists a severe hazard. You must have one who will use good judgment. There is such a thing as overdoing fire prevention. When an insurance man comes into a plant and picks out points that will cost a great deal of money, in his ignorance (and I don't hesitate to say that there are a great many men who do make these inspections and who are not qualified) he will tell the management of the plant that they should or must spend several thousand dollars on something that you know is absolutely unnecessary and you will just have to use your own judgment.

A great many points can be brought out by your own inspection and by your own department. I would offer as a suggestion that a book be provided for inspectors so that when they find something wrong they can make a notation in the book and have the book built of complaints in red, pink, white and blue with carbon paper between. Give the white copy to the foreman of the department or to the supervisor of that department. The pink copy should go to the head of the fire division or the safety division or whoever he reports to, and the blue copy stays in the book and should not be torn out. The next time he goes through, if he finds that it has not been attended to, just put the words on it that it has not been attended to and show that it is the second complaint by placing a large "2" on it and send that through. He should give the third to his supervisor and write him a strong letter and make it just as strong as he possibly can and send a copy of it to the manager of the plant and the other heads of divisions, bringing out the point that that foreman has failed to comply with the rules and regulations laid down. It has been necessary to send him complaints and still he has not complied with the request.

There is another important point that you must take up if you expect to have a strong fire-fighting organization and that is that they should be properly trained and drilled. To successfully drill your department you must have some way of notifying them when to appear. Ordinarily we would assume that you have a fire alarm system, fire boxes, whistles, gongs or bells or some way of making a noise indicating that the fire is in a certain location and that it is time for your department to respond promptly and efficiently and go into action and put out the fire without a great loss. They cannot be expected to do that unless they have been properly trained.

The personnel of that department, as was explained a moment or two ago, should be men that are cool and in whom you have the greatest confidence—men who are willing to take orders, men who are good thinkers, men who do not lose their heads at a time of excitement and danger and who are willing to take a risk and who are not cowards. Remember, at all times, in fighting fire there is a certain amount of risk. There are times when men should take risks and there are times when risks are taken that are absolutely unnecessary because it might be better to have the building destroyed than to lose even one life.

I speak from experience, men, because I have gone through the experience of injury from fire, not once but several times, and I have been confined as an invalid for many weeks and for months.

There are different times for drills. Fire drills should be held regularly at least once every month.

I should like to bring out the thought of equipment. Equipment has been placed in the plant at a great expense. Is the proper care and maintenance given to that equipment? Is your hose ready to go into action? Will it stand the pressure that will be required at a time of fire? Are your pumps in good working order? If you have no pumps is the pressure in the plant sufficient that you will be able to put on two or more good fire-fighting streams? Are the nozzles the proper nozzles, and have they the proper orifice? I have seen where the orifice has been so long that instead of getting four good streams from a one thousand gallon fire pump it was only possible to get two and they wondered why.

Care should be taken that proper equipment is provided. Remember that there are all kinds of equipment on the market. Remember that a good salesman can sometimes sell things that should not be purchased. I remember a case of a plant where a salesman sold thirty-eight foamite extinguishers. I want to say that foamite is a wonderful extinguisher for the purpose for which it was made, but it was not the proper kind of equipment for that particular job and they might better have purchased some acid extinguisher.

Then again, we must give some thought to the sprinkler systems which have been installed at great expense. We have the "wet" and we have the "dry" and we have the system that goes off thermostatically. How do you know that your system is in working order? Do you test it regularly so that you know that you have water in the system? Do you know how much pressure you have got, and do you know that there is water up on the highest part, or is there water only down in the lowest parts where it enters the building? If you do know that the pressure is the suitable kind, do you know that you have the right kind of extinguisher in it? Is the water black as ink? When it goes off in the main office will it smear the valuable papers on the president's desk with water as black as ink so that the papers might just as well have been burnt? If it comes down into a division where cleanliness is the watchword is it not carelessness on the part of someone that that system has not been flushed out?

Records should be kept for reference on the actions of the departments to show just what they are doing and to show every time they make an inspection or have a drill. These records should list up the numbers of complaints, so listing them that each department may have a report monthly as to the number of complaints made against that individual department.

We always have the possibility of loss of life, and to help to overcome that great risk we should have fire drills by the employees. Employees, as a rule, do not like fire drills and this holds true especially in the case of men. Girls can be handled much easier. When those drills are held it should be the last word in discipline. They should march out in an orderly manner in groups of two each and going just as fast as their feet can take them without running. There should be no fooling and no tripping. No one should speak a word. They should continue to go out until they are stopped by the one who is held responsible for their behavior. There should be one such person at the front of the line and one at the rear.

The men folks will tell you that they can take care of themselves. To a certain extent, they can, but women are much easier to handle at a time of fire than men because a woman will do just whatever you tell her to do and a man, in a great many cases, will do just the opposite, just trying to play the big fellow or trying to make himself prominent in the eyes of the boss. He wants to become a hero in the eyes of the female employees. He doesn't want to be marched out with a lot of girls as though he were a child. But that same man who would hesitate to

enter into a fire drill with enthusiasm may be the father of a daughter or a son who is working in that plant or in some other plant and for some other company, and when it is explained to him that his cooperation is needed and when it is explained to him that if his daughter lost her life in a plant where they had no fire drills he would be the first to criticize, he will do some thinking on the matter. It is up to him to set an example for those who depend upon strong, able-bodied men for protection.

I should like to say a few words about equipment. Let us start with mains. Mains are installed many times without a lot of consideration given as to whether they will have the maximum capacity from those mains at a time when they are needed. Then again, those mains may be attached to domestic connections with the use of a fire pump or you may not have a fire pump. If you have a fire pump, we will say, of one thousand gallons capacity (which is supposed to supply four good streams with one and one-eighth inch nozzle orifice at about 1125 pounds pump pressure), and you have several connections, possibly domestic connections, to your fire mains, and the valves of those domestic connections should happen to be open, the question is, "How much water are you going to get out of your nozzles?"

We also have the problem of incrustation in the mains together with the problem of leaks and many other things. Is your main deep enough to prevent freezing, or is it in close contact with acids that may be seeping down through the earth? Are your mains controlled by valves of the proper kind?

How sure are you that your valves will work at the time of fire? I can tell you of one fire at which I was present only as a spectator and at which they lost more than three million dollars worth of equipment because of two things. The first was the fact that the pumps were located at a remote distance from the power station and the power for the pumps came through electric wiring that was fastened to the buildings. The other point was that the valve supplying water to the firemen was half closed. And I might say, thirdly, that there wasn't anyone in the plant that knew the exact location of the main control valve because the master mechanic, the man that did know, was away from the city. Let me give you another case of a large plant where they had a fire at which I happened to be present and had charge of the extinguishing of that fire.

It was a small insignificant fire at five o'clock in the morning and as I rolled down the street and saw that small fire it looked like a little bonfire outside of the building. When I pulled in there I found it was only a small fire but it was inside of a building so heavily charged with smoke in the passages between the lanes of barrels of material that a man could easily get lost. We went quickly to the equipment. They had fire pumps, they had hose houses and they had thousands of feet of hose and they had mains of six, eight, ten and twelve inches. But when we pulled out their equipment to use (just one small stream for three minutes would have put out the fire) we found that we had not a drop of water. We went to the next unit of equipment and found the same thing and we kept that up until we found that there wasn't a drop of water in their mains. It took a long time to hook up the fire engine when the nearest supply from the city was eighteen hundred feet, and it took time to lay hose across that distance by hand and to get those streams into action. As a result the loss was \$750,000. We found from our investigation that the valve controlling this main was in a pit and I had sent a man there to find out if that particular valve was open and he had reported that it was. I had sent a second man a few minutes later and this man was a mechanic and he had reported that it was open. Then later on, when the fire was spreading from building to building, one man jumped down into the pit with the water up to his waist and he found that the valve was closed because it was a left-hand valve and there wasn't a man in the plant (I had no connection with the plant whatever) that could tell us that that was a left-hand valve.

Perhaps that will give you a thought for your inspections. If you have any left-hand valves in your plant I would suggest that they be changed. They are dangerous. Even though they are marked they are dangerous because an inexperienced man will get hold of this valve and in trying to open it he will close it, and then when he does get it straight he will find that he can't work it because he had been using an iron bar to pull it for all he was worth and all the time he was jamming it tighter and tighter until it is impossible for anyone to do anything with it. It is impossible for anyone to see whether it is a right or a left-hand valve unless it is properly marked.

This brings us down to another thought, "How can we tell an outside yoke and stem?" With an outside yoke and stem you can tell at a glance whether the valve is open or closed and whether it is right or left.

Again, how sure are you that your threads are right and that the city department can come in and connect up to the threads of your fire equipment? There is just one answer. You can go up into Portland, Maine, and buy a three-quarter bolt, and you can go to San Francisco and buy a nut to fit it. You can get a one-inch or a three-eighths bolt here in Chicago and you can go to New Orleans and get a nut to fit it because it is a United States standard. It has been only recently that such a thing was created as a United States standard for fire equipment, but there it is now. We have seven and one-half threads to the inch and three and one-sixteenth outside diameter. We found on investigation that only about ten per cent of the fire equipment, on an average, in each state was carrying that standard thread and the plant could change with the city fire departments. The effort has been made to change that condition and conditions have now been changed a great deal. The question for each of us to ask ourselves is, "Are the threads on our fire equipment in our plant the same as the threads on the hose of the city fire department?"

Then again we might say a word or two about hose. Has a careful study been made to determine whether you have the proper kind of hose? I know that I am talking to rubber men now and I am going to say that a cotton rubber-lined hose is the only kind of a hose to use in fire equipment, and when an effort is being made to install just linen hose, in my own honest opinion, it is spending money foolishly.

Then again, is the proper care given to this hose? In some cases, it is but in some other cases it is not. If you expect to get a good life out of the hose and get full value from it care must be given to it. It is one of the most important parts of your fire equipment. Without a good hose you cannot expect to combat the fire successfully. If your hose is rotten and has not been tested, it will not stand the required pressure and the time to find this out is not when the plant is being destroyed but before the fire occurs and that can only be done by testing. Also, that hose must be properly installed and properly located in the proper rooms and a proper temperature maintained. You are rubber men and you know that I am telling you the truth when I say that. The rolls will last many years longer if this is done than if the hose has been subjected to extensive heat.

And how often is too little care given to the important subject of friction? Remember that there is a great deal of friction loss and care should be taken to eliminate kinks. Care should be taken to eliminate curves going over roofs and buildings to make the degree of friction as low as possible.

I also want to bring up the problem of extinguishers. There are many kinds on the market. Most of them are good but some of them are poor. Without mentioning any names whatever I would like to go into them a little more fully. First we have the carbon-tetrachloride and most of you men are familiar with that type of extinguisher. It is the small one quart type of extinguisher that is used on automobiles and things of that kind. Then there is the acid-and-soda, the two and one-half gallon type that you are also familiar with. That is the type that you see

in office buildings and throughout your factories. Then there is the foamite, and then again we come to the carbon dioxide CO_2 extinguisher.

Each extinguisher has its own specific purpose and each one is built for a specific kind of work. Carbon tetrachloride is one of the best cleaning materials known and far superior to gasoline or naphtha. I am told it is used most extensively now by tailoring and dry cleaning establishments. It is good for small fires and with flammable liquids, but give one thought to carbon tetrachloride. In a closed room one should not expose himself to the fumes.

Then we have the acid-and-soda extinguisher which is generally known. Everyone seems to know just what it is but in it we have sulphuric acid, bicarbonate of soda and we have water. Any of those, you know, would not make a fire extinguisher but with the combination of the three, the action of the sulphuric acid coming into the bicarbonate of soda water generates a pressure whereby you can get that material out of the extinguisher. The acid comes out also but it plays no important part in the extinguishing of the fire. That is done by the bicarbonate of soda and the water.

Then we have the foamite which is used for the extinguishing of oil fires and flammable liquids and things like that because it forms a blanket and destroys the oxygen. We need oxygen to sustain life and so does fire and without oxygen it will die out of itself. Therefore, foamite is used to destroy the oxygen. This is accomplished because the foamite is composed of millions of very small minute bubbles which cannot be seen by the naked eye but they can be seen with a strong microscope and in each of these bubbles, CO_2 carbon dioxide, the great enemy of oxygen, takes in this oxygen and destroys it. Then we come along to the CO_2 carbon dioxide extinguisher, formerly called the snow extinguisher because it makes a lot of snow and it is used for fires on generators.

Fire is man's greatest friend. We can't get along without it. Life could not be sustained in this part of the world without it and still again this fire can descend upon us and become our greatest enemy when it gets beyond our control.

A. M. DIETZ (Pennsylvania Rubber Company, Jeanette, Pa.): I would like to ask Mr. Greenfield if he has had any experiences with the grounding of static? Is there any reason why static should be harder to ground on a higher level than it is on a lower level? If Mr. Greenfield cannot answer the question perhaps someone else in the room can. We have considerably more fires on the higher floors than we have with the same equipment on the lower floors.

MR. GREENFIELD: That is a very big subject and not much is known about it. We do know that it is good fire practice to ground against static, no matter where it may be. I have never heard that it was more difficult to ground for static at higher levels than lower levels.

MR. DIETZ: I cannot explain it but our records show that our fires are occurring on the higher levels and they are increasing in number.

CHAIRMAN HUNGERFORD: I think that is something new, Mr. Dietz. I have never heard of that nor have I ever had that experience myself. Does the humidity vary on the two levels?

MR. DIETZ: No, and we have the same floor space. I think that the higher level would be the safest but it is just the opposite.

E. W. BECK (U. S. Rubber Company, New York City): Have you adjusted the ground?

MR. DIETZ: Yes.

CHAIRMAN HUNGERFORD: We could spend a whole afternoon on the subject of static. The subject of fire prevention seems to be broken up into different propositions. Mr. Greenfield said that he had just started to cover the subject. One thing we have found necessary was to mark all of our soda-and-acid extinguishers "Not To Be Used On Electric Fires." We found on several occasions that the current was transmitted from the burning piece of electrical equipment back into the soda;

the only time we use that type of an extinguisher is when we are sure that there is no electrical conduit to carry it back to the extinguisher.

Mr. GREENFIELD: I wanted to leave one more thought and that was on the subject of automatic fire doors. You know what they are. You know that they are supposed to be a balanced door with a fuse link in the rope or chain. There is a tendency on the part of a great many to believe that if that door is self-closing it answers the purpose and that is all that is required for good fire prevention. Well, suppose an operator is coming through the building with a large box in his hand or a truck with a case on it. He pulls the door open and then drops his box and then goes back for the truck and takes that through and then goes back for his box and then the door is closed. He repeats that two or three times and then he says, "I will find a way to keep that door open." The result is that he puts a brick under it or a wedge under it or he may tie it back because he "is only going over to the end of the building." But after he gets to the far end of the building the whistle blows twelve o'clock or the boss comes and puts him on a different job and he has left the door open and instead of that door being an automatic fire prevention door it is only a door blocked or tied up.

I would like to make the suggestion that inspections be made to see that doors are properly balanced and no matter where you put it it will stay there.

CHAIRMAN HUNGERFORD: Thank you, Mr. Greenfield. That is just an example of the many ramifications of the fire prevention program. It is a big subject and there are so many different items connected with it that one person cannot cover it. For instance, many industries want to know whether to use a voluntary fire department or to pay their men for this service. We might go into the problem of whether to tie up with the city fire department and of what types of alarms to use and what methods to use in training and handling the men.

R. A. BULLOCK (Corduroy Tire Company, Grand Rapids, Michigan): We are beginning to feel that our plant might be at present a little stale on fire prevention. Have you anything to recommend that we can do to wake them up without actually starting a fire? We have our fire prevention meetings and we have our inspections, and personally I can't think of anything that would help that we have not already done.

Mr. GREENFIELD: On the impulse of the moment and to give the gentlemen an answer, I would suggest, if you have a fire brigade, they be called out on drills and that you use the regular fire alarm for the drills. Let the employees drill out at the same time the fire department is responding. Let the fire department make a spectacular display by throwing hose streams. That is one way of stimulating interest. If you have several companies and you have fire brigades in all of them let them make a contest of it and give prizes for the best company. That will help to stimulate interest.

Mr. BULLOCK: We have even gone so far as to think that we might, possibly when the wind is away from the rest of the plant, have a little opportune fire in our back yard and have a regular alarm and have the fire extinguished by the department. We have the same thing to contend with in our accident programs. After we have gone along pretty good for a while we begin to feel that there is something bound to happen because things have been going too good.

E. W. BECK (U. S. Rubber Company, New York City): If you want to find out something do just what you said—start a fire. I have started several and I would like to tell you about one fire in particular.

We went to the dump and took a lot of rags and gathered a great number of bean stalks (and you fellows know how bean stalks will burn when soaked with gasoline) and we took every bit of rubbish we had around the plant out there. We had a lot of the executives and even the fire inspector happened to be there—and he said that he had learned a lot.

We found that we had bad hose—that when the fire burned up it was too large—

that it was too far away from our source of pressure—that we were losing our pressure—that we could not use certain extinguishers because when we did we only made a bigger fire—that when the flames were forty feet high we couldn't get near enough to play it. Automobiles that were seventy-five or eighty feet away had to be moved.

Mr. DIERZ: I would like to offer Mr. Bullock a little advice. When we have our drills we turn in an alarm that goes all over the city and the fire departments respond. We have a twenty-seven dollar bill from them every month but we believe that it pays.

CHAIRMAN HUNGERFORD: You have to have fire-fighting equipment and it is better to have it before the fire and test it then than when the fire starts.

Mr. BOSTWICK (Gillette Rubber Company): We have a hook-up with the city fire department and we have a daily test, either in the morning or in the afternoon.

CHAIRMAN HUNGERFORD: We think it is a good thing too, and we also have a good system with regard to the water pressure.

In our water mains we maintain a pressure that is much greater than the city pressure but we have an automatic valve that connects us with the city mains, and if a fire should ever get to our power house and we should lose our pressure, then we would have the connection with the city mains to fall back upon.

J. M. KERRIGAN (U. S. Rubber Reclaiming Company, Buffalo, New York): In our plant, our fire prevention committee is under the instruction of one of the chiefs of the city department. We usually have the one that is nearest our plant and once a month he comes over to the plant. He is familiar with our lay-out in the plant and I think that is important. We try to get members of the fire department that serves our district to visit the plant. We take them around and show them our equipment so that they will be pretty familiar with it.

I would like to bring out the value of smoke masks. A lot of plants have good equipment and everything but smoke masks. I also want to bring out the fact that the greatest value is in the possession of two, not one.

CHAIRMAN HUNGERFORD: I made a personal inspection of the smoke masks in our plant and found one that was so wrinkled I couldn't get it on.

Mr. KERRIGAN: It is important that the men know how to use them. Also I think it is important that they be inspected often, as they only last so long.

CHAIRMAN HUNGERFORD: Yes, they are only good for a certain period. After that the canisters are not effective.

Mr. DOWNS (Western Electric Company): I would like to ask if CO₂ equipment is safe to use on employees whose clothing may catch on fire? We all know that if it gets on the skin and pressure is exerted, a burn will result. I should like to know what would happen if it should get down between the eye and the eyelid and when it gets down between the neck and the collar?

Mr. GREENFIELD: I might tell you of my experience in a fire prevention school in the city of Newark. A demonstration was given of the CO₂ carbon dioxide extinguisher and we were looking for a subject or somebody who would be willing to volunteer to have the extinguisher turned on him. I thought there was no one better than myself to offer and I did. I had on a new suit of clothes and I did not desire to have that suit destroyed. But he discharged that extinguisher on me, covering me entirely with the snow, until I was like a snowman. Then they discharged it over my head and over the heads of the audience of more than five hundred people. The snow settled down over their heads (some of them bald) but there seemed to be no infection and in four or five minutes there was no evidence on my clothing that the extinguisher had been discharged against it and there was not even a spot on them. It did not take the crease out of my trousers.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

C. L. HUNGERFORD, Chairman
The Firestone Tire & Rubber Company, Akron, O.

The meeting convened with General Chairman Hungerford presiding.

CHAIRMAN HUNGERFORD: I want to say that personally I have received a lot of gratification from the attendance at these Rubber Section meetings. You probably realize that there are represented here all the larger rubber companies and a number of the smaller ones.

The first speaker this afternoon is Mr. P. W. Gumaer, a consulting engineer of New York City. Mr. Gumaer is an authority on the subject of solvents and has had wide experience. He will now address you.

Ventilation for Solvents in the Rubber Industry

By P. W. GUMAER
Consulting Engineer, New York City

The principal thesis in my remarks will be a plea for better engineering as pertaining to this particular subject, and less guesswork. I will make a very broad statement, and if any of you men can cite instances to contradict it I would be very glad to have you do so. All cases of chronic industrial poisoning due to vapors are the result of poor engineering. Notice I don't include dusts in this statement, as a man can get radium or lead dust on his hands and transfer it to his mouth. Personally, I don't consider that an engineering problem, but a hygienic one. Industrial poisoning from vapors is hardly possible by mouth. You can't transfer them in any appreciable amount to your mouth. It is caused by inhalation.

The removal of toxic vapors and dusts from air breathed by workmen is a new branch of engineering. In George Washington's time all engineers were civil engineers. As engineering knowledge developed it was necessary to specialize so that mechanical and electrical engineering came to be known as separate professions. More recently, we have chemical engineers, sanitary engineers, ventilation engineers and safety engineers. Each one of these has done some work on the ventilation of toxic vapors. Even physicians have passed as authorities on the subject.

Some men in each of these professions have had the necessary training and experience to handle this problem but they are comparatively few. I know that ventilating engineers in general have had very little experience with toxic vapors. Chemical engineers as a rule are not authorities on ventilation. Sanitary engineers, except men with the U. S. Public Health Service, who have had special experience, are not concerned with industrial vapors.

The first step toward our ultimate goal, 100 per cent prevention of industrial poisoning, is to recognize that the removal of toxic vapors from the breathing zone of the workmen requires especial training and experience and is not a job to be done lightly by any one who may be handy. Too often, especially in the smaller plants, the tendency is to turn the job over to a tinsmith or contractor to install some exhaust ducts and a blower. In some cases I have seen the hazard actually increased by the installation of ventilating equipment.

I doubt if in any other field of engineering there is as much guesswork as we have today in the field under discussion. After a new steam boiler or electrical generator is installed, thorough and accurate tests are made to determine its operating characteristics. The specifications are clear and exact. If the equipment does not test up to the specifications the manufacturer has to make good. It is the exception rather than the rule for equipment, to remove toxic vapors, to be accurately

tested after installation. When a test is made it usually is meaningless, as the wrong units are employed. The velocity of air in the ducts, the size of the blower or the quantity of air removed gives us practically no information as to whether the equipment accomplishes the purpose for which it was installed. The only measure of effectiveness of ventilation of industrial vapors is the amount of vapor, in parts per million or other suitable units, remaining in the air breathed by the workmen.

The small factory is not the only party that depends to a large extent on guesswork. Many states pretend to supervise the installation of protective equipment through their departments of labor or health. In some states the orders are given by inspectors, while others require that plans showing the details of the proposed ventilating equipment be submitted for approval. In no case do I know of accurate tests being made when ventilating equipment was installed to determine the concentration of vapors breathed by the workmen.

The removal of toxic vapors is similar to the removal of dusts but the problem is not identical. The smallest particles of dust are enormous in size compared with the largest molecule. To keep particles of dust suspended in air, a high air velocity is required. This condition does not exist with vapors.

The ventilation of vapors or gases should aid the natural circulation and not oppose it. In other words up-draft ventilation should be used for lighter than air gases and down-draft for heavier than air vapors. The vapors met with in the rubber industry are usually heavier than air. If down-draft ventilation is used, high air velocities are not necessary. A two-inch water suction is usually specified for dust ventilation. I have effectively removed heavier-than-air vapors with a suction as low as one-sixteenth of water suction.

If you meet with a new chemical and don't know its density or whether it is lighter or heavier than air, there is a very simple way of finding out. If the molecular weight is higher than 29, then it is heavier than air. If less than that, it is lighter than air. That is more accurate than any other tests on the ventilating equipment.

(Blackboard drawing) I might give you a couple of examples on ventilation of heavier-than-air vapors. Suppose you have a moving belt here. You have some pieces of rubber on there coated with rubber cement or anything you want to dry, heavier-than-air solvent. You put a suction down here, a vat over there, and you don't need a high velocity at all. In fact, you have carried away all the vapors—by "all" I mean down to 25 per million or less.

We will call that zero. Using about 36,000 cubic feet of air to one gallon of solvent, you can remove all vapors so that none of them come over the edge here, and right up here you cannot detect any vapors.

Another application is one that applies to a different industry but possibly you can use it in the rubber industry. Possibly some of you men have been in an animal-leather plant where they have these hides that they dope with a lacquer which is spread on by hand. Then they set the hides up in the same room, hang them up to dry. Without any ventilation your hazard is very great.

Suppose this represents the racks where the hides are hanging up to dry. By putting a depression under here and connecting that to an exhaust and using 75,000 cubic feet of air per gallon of solvent, it is possible to measure any vapors at the breathing zone. A fence about two feet high extending around the operation or group of operations keeps the vapors from flowing out into the rest of the room. The vapors flow off the table here onto the floor, flow over here and spread out, very much as a liquid would. They flow onto the floor here and then are sucked down in there. The concentration of air removed here is about twice as much as the other is, but it is impractical to have local ventilation here. That may look like a large amount, but if you use a gallon of benzol or a gallon of any other solvent similar to benzol an hour here, it is only 600 cubic feet of air removed.

In the design of ventilating equipment, what do we need to know? We need to know the toxic limit of the material you are using; that is, how much of the vapor

can remain in the air without endangering the health of the workmen, even those who are most susceptible. Of course that is not accurately known on many materials.

You also need to know the quantity used in the process. That tells you the amount of air to be handled. A friend of mine was discussing this with me the other day and he said, "Don't you take as your first consideration the concentration at the breathing zone?" Well, you do in some cases, but not always. You have to use that with some judgment.

I made a test a while ago of an experimental machine for coating pencils with lacquer. It was set up in a large room alongside the other machines. It was more convenient to make the test on Saturday when the factory was closed down. A test of the breathing zone then would have been absolutely useless because it would have taken hours for enough of the vapor to diffuse into the atmosphere to give appreciable reading. What we did was to make tests on this machine so that we couldn't detect any vapors three inches above the pencils.

The measurement of the concentration at the breathing zone, after the machine is complete, to find out whether you have accomplished your purpose, is absolutely necessary.

As to the future of industrial poisons, the engineer and the physician are both dependent upon medical research. The engineer has to know the toxic limit of the particular chemical, that is how much the workman can breathe without endangering his health. The physician wants to know specific methods of diagnosis and if possible information on susceptibility, what kind of individuals might be more susceptible, and effective methods of treatment.

I think the responsibility for industrial poisoning rests on three parties, speaking generally of the country as a whole. First you have a producer of a particular chemical. The large producers are beginning to realize that they have a responsibility, when they put a chemical on the market for use by others. Medical research with animals will determine whether it is toxic or not, and just how toxic it is.

In the use of the chemicals, the rubber factory and others using them have a responsibility in applying the results of the research through the engineer in ventilation; the industrial physician in medical examination, early diagnosis and treatment. The state has a responsibility which is chiefly supervisory. If the state tries to enter into engineering, that is making detailed specifications, it isn't fair either to the state or to the individual industry. Suppose they come along and tell you that you have to install the equipment having certain suction, certain velocity, removing a certain amount of air at a certain place. Then tests are made and you find a dangerous concentration. Well, they will come back and want you to change it. You have a perfect right to say you installed it as they told you to and you can't afford to change it. But if the state restricts itself to supervision in merely determining whether there is a hazard after the equipment is installed, it is more satisfactory. With the new processes and new machines creeping up all the while, no one can sit down at a desk, look at a blueprint and tell whether a particular equipment is going to carry off the vapors, without some preliminary tests and final tests when the equipment is finished.

A. M. DIEZ: (Pennsylvania Rubber Co., Jeannette, Pa.): I would like to inquire about that first diagram. Does that indicate that a duct is below the belt?

MR. GUMAER: Yes.

MR. DIEZ: Would a wall fan give adequate ventilation?

MR. GUMAER: I have never found, with heavier-than-air vapors, a place where a fan placed in the wall near the ceiling is worth anything at all. It merely creates a false sense of security. I have made tests of the concentration in the fan near the ceiling and never found it more than 25 parts per million. You have to remove a tremendous amount of air and you can't get it all out. General ventilation in some cases, particularly if you have a cross draft and the doors are open right to the floor at opposite ends of the room, with the small amount of solvent that is used, may carry away the vapors, but then you have the possibility that in inclement weather the doors will be closed. As to ventilation from windows, if the windows are high it

isn't sufficient, because you don't ventilate below your window sills. Occasionally the drafts blow it up into the breathing zone.

Dr. J. N. SHIRLEY (Examining Physician, Hood Rubber Co., Watertown, Mass.): What type of instrument would you have for testing those vapors? We never gave it a thought. We run fans up near the windows to the highest point, and they are pulling from both sides.

MR. GUMAER: The instrument used is called an interferometer. With other methods it takes several hours to get one sample, and you have several days of laboratory work to know what you have in just one test. With this instrument you have your result right away. It is based upon the refractive index of a vapor.

Dr. SHIRLEY: In the picture of a coal mine I noticed they had some kind of an instrument for testing the air. The miner used some sort of an instrument, made several motions, and then walked over to a cabin in the wall, and in a very short time they had a test of the air in that particular chamber.

MR. GUMAER: There are several instruments on the market for indicating carbon monoxide and methane, and other vapors. But they are not accurate enough when you consider chronic poisoning. As a prevention against acute poisoning they may be satisfactory. If you were going to send a man down into a tank and wanted to know if there were vapors, those instruments might be of some value, but in chronic poisoning they are not sensitive enough.

Dr. SHIRLEY: I think Mr. Diez' question was along the line of where they dope the felt.

MR. DIEZ: Where they dope the inside of the tennis ball. It travels over an open conveyor.

Dr. SHIRLEY: It is my understanding that in this factory, unless it has been changed in the last six or seven years, they have solved the problem where they dope their tennis ball felt, by partitioning off that section of a room with the exhaust fan at the wall on the floor level in the closed side of the room. This has, I believe, practically entirely removed the hazard of that particular operation. That fits in entirely with Mr. Gumaer's idea, with heavier-than-air vapors.

There is one question I think Mr. Gumaer has left perhaps a mistaken impression about, in that second diagram, in the doping of hides. It isn't entirely the question of the evaporation of the vapor, as simply demonstrated there. On the doping of these hides there is manual operation of the worker, carrying that dope back and forth across the hide to cover the entire area. That creates air currents. The fumes do not entirely go down. They do eventually, but during the operation they are scattered in the air in many cases far above the level at which the man is working.

I can see where the diagram, as Mr. Gumaer has it on the board, is much better than the plants were six or seven years ago, where, if I remember correctly, in many cases the exhaust fans were on one side of the room, frequently drawing the air not only from the working space where the men are doping the hides but from the space where the doped hides are being dyed. In other words, bringing the concentration by the worker to the less concentrated part of the room. But I think it is a mistake to leave in the minds of the men that such a diagram is entirely practical because of this agitation of air currents carrying the fumes from the working surface of the hide up above the breathing level of the worker.

That is the problem which I believe has made the use of benzol in doping hides a serious problem. I believe that some concerns are trying to overcome that by spraying the dope on rather than using about a quarter of a section of a barrel-head. That is what it looks like.

MR. GUMAER: I made thorough tests at the breathing zone and I couldn't detect more than 25 or 50 parts per million of benzol. That is, the detection in that particular case was the total vapors including acetates and other solvents. You do get some stirring up. If the air were quiet and you had no drafts and no movement, you wouldn't get any benzol four inches above the hides, but under factory conditions it does stir it up somewhere around a foot.

J. Q. LEE (India Tire & Rubber Co., Akron, Ohio): What is the greatest amount that is in your mixtures at which you found a man can work in safety without getting poisoned?

MR. GUMAER: I don't want to commit myself on this because there is a thorough research on benzol under way which will answer this in the next year or so. I have found as high as 2200 parts per million at the breathing zone.

E. W. BECK (U. S. Rubber Co., Passaic, N. J.): If you had a room with a tank similar to what you suggest, where you could not put your hoods above, would you not get a pocket on your lower left-hand side, and how would you lay out your exhaust to take care of your benzol fumes?

MR. GUMAER: You would get a higher concentration in the corner there, but it doesn't build up to a height of two feet, and your concentration, I would estimate, would be around 500 parts per million.

MR. BECK: Would there be any explosion?

MR. GUMAER: No. There would be at 15,000 parts per million. Your safety factor there is very great. If you arrange your ventilation for health, you will have absolutely no explosive hazard because your explosive range is very far away.

MR. BECK: Yes, but I am speaking of it at one height and you are speaking of it at another.

MR. GUMAER: You would have a higher concentration there but it couldn't build up to an explosive limit. If you have a tank, then the best thing to do is to have a rim around it and have local ventilation. Local ventilation is always the best because you don't have to handle so much air.

CHAIRMAN HUNGERFORD: I just wonder if there are any members who use in connection with their benzol program any definite follow-up by their medical departments on people who are exposed to benzol?

B. J. BOSTWICK (Industrial Relations Department, Gillette Rubber Co., Eau Claire, Wis.): We have practically eliminated it, but we were using it a few years ago. At that time we had a physical examination, and found one case that required a little attention. We brought it back to normal blood count. That was at the suggestion of the industrial nurse representing our insurance company.

CHAIRMAN HUNGERFORD: I might say that on our benzol program people who are exposed to benzol are given a blood count test every thirty days and by that method we have been able to control it pretty well. We have eliminated the use of benzol in a lot of places because we have found out that a solvent which was not toxic could be used just about as well.

We find that some people are more susceptible than others. In our company they won't send a blond anyplace where they have benzol. It seems funny to me, but that is the rule. It just happens that every case they have had has been with a light person.

DR. SHIRLEY: I think that is true. A man in the Chemical Section yesterday morning mentioned that it was a rule in his company not to employ either blond-headed or red-headed men. I think undoubtedly he struck something which the rest of us have left out.

CHAIRMAN HUNGERFORD: This is not confined particularly to benzol. There are other things, such as carbon tetrachloride. This is not in reference to solvents, but in reference to ventilation of sulphuric acid fumes, how does that compare with the ventilation for solvent such as benzol?

MR. GUMAER: The more toxic the material the more careful you have to be. With benzol you can take a good deep breath of it. If you only take one it won't hurt you, and you can endure a good concentration for a time. The damage comes from constantly breathing it. With sulphuric acid nobody wants to get one whiff of it, so you have to be very careful with materials of that nature.

P. B. MARTENS (Industrial Commission of Ohio, Copley, Ohio): I wonder whether the members present who use benzol as a solvent for the spray gun in painting the tires have any bad effects? Have they any difficulty in removing the fumes from the room?

CHAIRMAN HUNGERFORD: We did, and couldn't do anything about it, so we eliminated benzol.

MR. MARTENS: What did you substitute?

CHAIRMAN HUNGERFORD: Gasoline.

MR. MARTENS: Does it work?

CHAIRMAN HUNGERFORD: Yes.

We will now hear from a man who has been in the Rubber Section for some time. Dr. Shirley is different from the average plant physician. Quite frequently we find it expressed by plant physicians that they are interested in safety work but it is the job of the safety engineer, or the engineering department. They say their main job is to take men who have been damaged and get them back to work on an economical basis as quickly as possible. I think the condition is changing. We find companies sending doctors out into plants to inspect plant operations. We find we are using our plant physicians to prevent accidents and industrial poisonings rather than to take care of the cases after they occur. Dr. Shirley said he was even told he might be spending too much time on safety work, but nobody had convinced him that it isn't better to prevent them than work with them after it is too late. He has been very close to the problems in the rubber industry. He has worked in connection with several men who have done a very good piece of work. I refer especially to the pamphlet on toxic materials which was prepared by Dr. Shirley in connection with Dr. Healy, formerly of the Fisk Rubber Company. If you have not made available for yourself the pamphlet on compounding materials, I certainly urge you to secure a copy from the National Safety Council. If your company wants to use material and you do not know in what classification it is as far as toxicity is concerned, it will be a great help to you.

The Industrial Physician and His Part in the Safety Program

By DR. J. NEWTON SHIRLEY

Examining Physician, Hood Rubber Co., Watertown, Mass.

Some twenty years ago, when compensation insurance became a part of the cost of manufacturing, the larger industries were quite impressed by the cost of treating minor accidents and the prolonged disabilities from what appeared to be trivial injuries. This brought to the attention of the mill executives, the fact that the treatment these cases received was not always the best. And in many cases no treatment was given until infection had set in, the employee going for treatment of the symptoms of the infection.

Adequate first aid was made available through the installation of a factory nurse or first aid worker in the first aid room. A little later, a plant physician was obtained, first on part time and later in the larger plants on a full time basis. Insurance companies approved of such a plan, as it made considerable saving in those accidents that did occur. They allowed premium deductions according to the amount and type of first aid service rendered.

Today most industrial plants with 500 or more employees have a part time or full time physician. His duties are varied and his value to the company depends upon the interest he takes in his work.

He is first responsible for the installation and maintenance of an adequate first aid room with a competent nurse or first aid worker in charge. His equipment should be such that he can administer safe and adequate first aid treatment to the injured employee. It is rarely necessary to hospitalize an injured employee in the plant dispensary; most plants are within reach of a well equipped

hospital for those injured employees who need hospitalization for a few days or more.

In connection with the hospital or first aid facilities supplied, I am very strongly of the opinion that large plants or plants composed of several somewhat separated buildings should make first aid stations available to the workers at a convenient distance from their work, instead of requiring all injured employees, regardless of how slight the injury, to report at a central dispensary or first aid room for treatment. If the distance is too great, the injured employee will not care to lose time from his work, especially piece work, and the foreman will overlook this offence when the injury is trivial. These workers are frequently the ones that later lose time from infections. Last year you heard Dr. Davis say that they had an experience of about 6 per cent infections in a tabulation of the accident cases. I believed this to be too high and solely the result of the lack of availability of treatment for the trivial injuries. This leads me to analyze our own figures on accident cases treated in the hospital for the years 1928-29 and 30. The cases of infection were 3 per cent, 2.1 per cent and 1.8 per cent respectively in a total number of cases treated, 6524, 8313 and 7163. I believe this is due to the fact that all cases of accidents are compelled to report for treatment, but first aid kits are entrusted to men instructed in first aid work, where the distance from the job to the first aid room is excessive. These men treat all minor cases and send them to the clinic later at a more convenient time. Undoubtedly many of these cases are never seen by any of the Hospital staff but the low incidence of infections is proof of the value of this system.

During the last year and a half, I have had the opportunity to supervise the first aid work in three small mills, where a trained first aid worker is the sole clinic worker, save for the one call per week I make at each mill. Infections have occurred in untreated cases but under severe reprimand in each case; trivial injuries are now being treated and infections are today definitely less frequent than they were a year ago. First aid equipment is available for the night workers and these cases are all requested to report to the first aid room the following day. When infection cases do occur and they report to the family physician for treatment, as they have the right to do in the state of Massachusetts, medical expenses climb very rapidly.

This brings us to the second requirement of the plant physician. He must make satisfactory arrangements to use competent surgeons and consultants in his work. The industrial physician need not be a trained surgeon but he should have had a reasonable amount of what is called accident or emergency ward experience, together with at least a full year of service as an interne in a general hospital doing medical and surgical work. He will find then that there is a lot to learn. A man doing full time industrial medicine would be wise in using a competent outside surgeon to do his operative work. He will find that his work in the plant clinic will take too much time to enable him to keep his hands in operative work to the best advantage. His minor surgical cases will give him plenty to think of and this type of work is best done by him. He will also have the supervision of rehabilitation of those men who are returned by the surgeon to the clinic physician for limbering up for work, following some of the more serious types of injuries.

Adequate industrial medicine has several contacts with the employee where safety can be practised and instilled into the mind of that employee. The first contact is at the time of the physical examination of the applicant for employment. This examination is primarily to see that the applicant for employment is physically able to do the work he is hired to do with safety for himself, his fellow worker and the mill. These are the sole requirements as far as the industrial physician is concerned.

To properly carry out this examination, the industrial physician must be familiar with every type of work in the plant. This requires an occasional trip

through the plant to see changes that are constantly being made in the manufacturing processes. A job which requires a rugged employee today may be a light job tomorrow with the installation of conveyors or other labor saving devices. New jobs are constantly cropping up.

These physical examinations are more or less complete ranging from the inspection, requiring only two to three minutes, to the very complete examination lasting an hour for some specialized type of work. Remember, this all costs money, and some plants feel that they are not justified in going over their applicants with too fine a comb. I was once informed by a physician at one of our larger automobile plants that one man did five hundred examinations per day. Efficiency is a great thing and when examinations take less than one minute per man, the unit cost is very low and the value of the examination is worth about what it costs. The examination should at least cover the eyes, ears, nose, throat, chest, abdomen, genitals and extremities. The last three being left out in the case of women unless there is special indication for them.

It is absolutely necessary that a worker have sufficient vision in at least one eye to get to and from his work safely. This may be with or without glasses. The amount of vision beyond this will depend upon the type of work and its requirements. When defects are noted that can be corrected with glasses, and this is done, a more efficient worker is of course obtained.

As a rule a worker should have fairly good hearing in order to do his work safely. If he is unable to hear trucks approaching or workers coming his way, he is an accident hazard. Middle ear disease is always a health hazard.

The nose and throat should be gone over for the presence of signs of contagious disease. Loss of production through sickness is just as important as loss through accident. And if a case of an acute infectious disease is allowed to go to work with other workers several cases may develop with the resulting lost time. Evidence of lead poisoning may be detected by the presence of a lead line in applicants who have worked in lead in another factory. I have a very strong recollection of such a man. This fellow was rejected for employment and referred to the proper institution for treatment. I considered him too sick to work anywhere for five to six weeks at least. His former employer undoubtedly paid for the treatment and the disability. I only made sure that he did not work for the concern I was examining for.

The chest should be carefully examined for lung disease such as tuberculosis, active or old chronic bronchitis, pleurisy or scars of former trouble. In certain lines of work, the question of exposure to silica dust is essential before passing the applicant for employment. No factory wants to assume the responsibility for this condition when the real damage was done at some earlier date.

The heart is the key note to the ability to work. No man or woman with an old rheumatic heart should do work which requires hard manual labor or lifting. I always look back at the day Dr. Richard Cabot, in lecturing to a group of students, remarked that a person with an organic lesion of the heart could work himself to death by the repeated lifting of one pound weights from the floor to the table level quicker than by doing hard labor in the erect position. At the same time many hearts are capable of doing very large amounts of work if the work is such that the worker can do it in a favorable position. We should hesitate before casting a heart case to the scrap heap. I have had the pleasure of seeing two men, labeled by heart specialists as beyond all productive employment, continue to do their work, in one case six years and in another case eight years. These are still self supporting men in the community and no harm has been done to the men, their fellow employees or the company for which they work. Remember, a specialist has a reputation to protect, we can favor the man and not run the danger of jeopardizing our consultant's standing.

The abdomen is the seat of certain acute disturbances of a surgical nature

but barring the presence of an inguinal, ventral or post operative hernia, there are few things that we could detect and consider a cause for rejection. I have always made it a rule to reject all men with hernia who are under 30 years or single, until after they have had an operation to repair such hernia. I make an attempt to find work for a man who has been rejected and then returns after having his hernia repaired. I believe that he is the right type of worker. All men over thirty are allowed to work on specified types of work if they wear a properly fitting type of truss, but an operation is always advised. The economic condition of the rejected employee is such that an operation is usually out of the question unless he can have some form of financial assistance. This is the place where the outside contact on the part of the physician is of great value. The applicant who has been rejected can usually be referred to some public or semi-charitable hospital for operation, agreeing to pay back part of the costs by installments after he is able to return to work. In some cases the local welfare board or a fraternal body will be willing to assist.

This hernia question is still a great problem for industry in most states. A few states have laws which so define industrial hernia that rarely are cases compensated, but most state laws permit claims to go through unless pre-existing hernia can be proved by actual testimony. A very interesting case is the finding in the Mills case, 258 Mass. 475, in which it was held that "possibly at some time he did something which may have caused the hernia" and was sufficient evidence upon which city of Detroit, I believe, has at least fifty of this type of oxygen breathing apparatus. Compensation might be awarded.

The back is the next important part of the body. It is of great importance in all employees where lifting is an important part of the work. The back may be the site of structural deformities of the bones of the lumbo sacral region, making the victim more susceptible to injury from motion under a load. Arthritis frequently hits the joints of the lumbar vertebrae, causing back symptoms which are naturally interpreted by the employee as the result of his work. Thus a fairly normal back as noted by inspection; palpation and motion should be required for general or heavy factory work. It was interesting to note the opinion of an orthopedic surgeon who was invited to inspect the plant for an idea of the type of work he would approve for a back sprain case. After seeing a fairly large part of the plant he said, "Why, you don't have very much heavy work here, do you?" Mechanical devices have helped out on most jobs.

The extremities are used by most employees in their entirety. The hands and arms should be examined for damaged fingers or stiff joints. These may complicate later injuries or even may be alleged to have resulted from some trauma received while working in the plant. The legs are nearly as necessary. The presence of limited function of any joint, flat feet, varicose veins or old fracture should be particularly looked for. I am the victim of a rather unfortunate case of this sort. I passed a man as O. K. for employment as a calendar helper with the history and finding of impaired function as the result of a compound fracture of the thigh in 1916. This had healed after a moderate osteomyelitis process had cleared up. Union was solid and the function of the joints good. There was about one and one-half inches shortening. He worked for two and a half years and was a good worker. Then he was taken sick with a pain in that leg and fever. He was seen by his family physician who called in an orthopedic surgeon. The leg was opened in four days and several ounces of foul pus was removed. The employee then claimed to have bumped the leg while at work on the day he was taken sick but did not report to the first aid room. Obviously the process in the leg was more than four days old but the industrial accident board ruled that the supposed blow was undoubtedly a contributing factor and the employee was awarded compensation. Investigation disclosed that this man had been awarded total permanent disability, ten years previously, for his original acci-

dent and now is on his second total permanent disability. You know this is the type of case that makes you feel rather radical and want to say, "Never hire a man who has any physical impairment or has had a major accident or injury of any kind; employ perfect men or none at all"—a rather impossible proposition.

Another example of the unusual case is that of a young man who had infantile paralysis with impairment of the function of the right hand and forearm. He was passed for employment on work he could do with his good left arm and useable right arm. He caught his left forearm in an apron, received a fracture of both bones of the forearm and collected \$783 compensation before he was forced to return to work. The industrial accident board members are similar to juries, swayed by sympathy in such a case as this where a partial handicap is evident, such as the crippled hand, even though it is not the hand involved in the accident. These cases always make you wonder if it pays to consider that a man should have an opportunity to work, even if he desires to, where an existing handicap may result in prolonged disability in case he has another accident.

The second definite contact between the employee and the plant physician is at the re-examination. There is a growing question about the economic value of the re-examination. I personally believe the results obtained justify the cost. In our own plant, we have had the opportunity to observe a marked reduction in the incidence and duration of absences from work on account of illness lasting two days or more. We believe that a part of this reduction is the result of the re-examinations that we are doing. No one can question the value of checking up on those employees handling materials which may cause changes in the body or the industrial poisons—silica, lead, chrome, benzol, etc. We all agree that the men working on these materials should be examined periodically, as well outlined in the Health Practices Pamphlets of the National Safety Council. We realize that sickness from any of these hazards costs us money; why should we not feel that re-examinations at less frequent intervals are constructive in maintaining the working ability of the employees at a higher level and for a longer period of time? When such an examination reveals some change in the physical condition of the employee, we can transfer him to some other type of work while he is still able to work or before he becomes disabled entirely and has to fall back on the community for support. Whenever the re-examination notes an early defect in physical condition, which may be helped by appropriate treatment, the employee is referred to his family physician or to some hospital clinic for treatment. If we can materially lengthen the working years of employees by properly directed treatment, the cost of re-examination may be offset by lowered labor turnover and its accompanying costs. I believe a rational re-examination program is a safety factor.

The third contact between the industrial physician and the employee is when the employee reports to the clinic for some slight accident or some complaint about his general health. This contact is probably the most open of the three. Here the employee is coming for something and he is going to cooperate to the highest extent. Of course the nurse is here the outstanding factor. She sees most of these cases first and an efficient nurse will be of great help to the physician in the clinic.

All accident cases should be required to report to the clinic for immediate treatment. If the physician in charge will only ask a few questions as to what happened, he will soon note that there is a certain percentage of the minor cases that will warrant investigation by the safety man. The injured man will say things to the doctor or nurse that he will hesitate to say to his foreman or forelady. This is regrettable but true. In all major cases, it is a good plan to have the safety man come to the clinic and, whenever possible, interview the injured man while the thought of the accident is fresh in his mind. This will give a truer picture of what happened. Of course this can only be

done when the condition of the patient will permit such an interview. The facts obtained from an early interview frequently give us ideas that it would be hard to obtain later.

The hospital records are of great importance in all accident cases, but especially so in any case which later is disputed for one reason or another. Adequate individual records of employees injured or sick should be carefully kept and sufficiently complete to be of value in controversy later. The time of the treatment is the only time such a treatment record can be properly made out.

The relations between the plant physician and the foreman should be such that a foreman is willing to come to the physician and tell him of any little thing that he feels is not right. The physician will frequently be able to have the condition investigated earlier than the foreman if there is anything bordering on a health hazard or health problem as it affects the workers. The physician should be willing to listen to all these suggestions even though he feels that they are not of material importance. Real constructive work frequently results from insignificant ideas.

The plant physician should cooperate closely with the safety committee and whenever asked should be ready to discuss some peculiar type of accident at the safety meeting. He should be ready to give talks and instruction in first aid work—first aid to the burn cases, lacerations, fractures and amputations. He can give demonstrations of artificial resuscitation, the applying of tourniquets, and the temporary splinting of fracture cases in order that they may be moved safely to the first aid room.

The plant physician should know any hazards that may be met in his plant. He should be familiar with the early symptoms and signs of absorption or poisoning from these materials. He should always keep these in mind when he is treating patients from the departments where the toxic substances are used. He should know the manner in which the material is being used and on what operations the workers might be exposed to them. He should be able to get information as to the ingredients of certain compounds used. He should have the cooperation of the technical men and when he can show that a certain material is causing trouble in the plant among the workers, they should be willing to make such changes as appear to be called for in removing the hazard. These changes may be along the line of substituting another substance or changing the method of using the original substance.

The industrial physician must be willing to do a little experimenting and quite a bit of reading in medical, technical and other publications to keep himself informed on the troubles others have experienced with various compounds in common use. Laboratory experimentation on animals is usually beyond the possibility of most physicians in industry, but remember, when you have a real problem of a health hazard nature in your plant, a problem that is sure to bother others later, there is always some one ready to make a study of the materials used. The National Safety Council has rendered assistance along this line. Insurance companies are frequently willing to finance studies that may remove causes of lost time in workers. The public health departments are always willing to cooperate when the hazard is shown to be general.

In fine, the physician in industry can just be a hanger on, doing the least possible to fulfill his obligations to industry, or he can be a "go getter", always on his toes, ready to grasp a suggestion and study it, following it through until he has it fully under control.

PAUL VAN CLEEF (Van Cleef Bros., Chicago): There is always more or less discussion as to whether one should use iodine or other preparations on infections. I wonder if the speaker has any choice.

Dr. SHIRLEY: That is a delicate question. Mercurochrome came out for general

use about five years ago. My own feeling is that mercurochrome is perfectly O. K. I haven't found anything to criticize about it. We have iodine available, there is always a bottle on the first aid table. I don't dare use it without a little alcohol because it has usually been so long since it was used that it is concentrated and you might cause an iodine burn in addition to the other injury. I think mercurochrome is just as good as iodine except for removing the stains.

CHAIRMAN HUNGERFORD: I wonder what is the experience with hernias. Do you have any rule by which you judge your hernias?

J. M. KERRIGAN (Manager, Industrial Relations Department, U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y.): In New York State the workmen's compensation law makes us up against it because it says if you employ a man in that condition you are held responsible for it. If he develops it you are held responsible. The doctor has to reject him. A few weeks ago the Compensation Board heard a case where a man was put to work with a truss on, and something happened in six months. The doctor tried to prove that the job didn't aggravate the condition, but the company had to pay the hospital bill and for the time he was out of work. In New York State you are absolutely up against it.

CHAIRMAN HUNGERFORD: In Ohio the cases are referred to the Commission. Usually if the man can't furnish proof of definite injury the case is disallowed, and we act accordingly. Our company is self-insured, and unless a man can furnish a very definite proof of an injury on hernia, we disallow his claim.

Dr. SHIRLEY: I think that brings up a very serious economic situation. I cannot state the reference, but during the last year I can definitely remember seeing an article in which it was stated that in each ten-year interval of a man's life there is an increase of hernias of about two per cent. It is a perfectly natural progression. My own feeling is that very seldom is that due to industry. It is just a natural muscular degeneration of man. It seems a mistake to me to say a man is an outcast as far as employment is concerned if he has a hernia. He has to live. If he cannot work to live, the state, city or town or somebody else has to support that man. He has to get by. He is not going to commit suicide because he has a hernia. I think it is a serious economic question. We should approach it with a definite state of mind. I appreciate that the decision of the state of Massachusetts puts us in a serious situation. But I hire them and very seldom have a comeback. The comeback is when the case is perfect when the man is hired.

E. W. BECK (U. S. Rubber Co., Passaic, N. J.): I think we should consider the remarks of Mr. C. B. Whittlesley, whom some of you heard speak before the Rubber Section. The tendency in some states is to make the compensation laws more drastic, and they keep adding to them and being more liberal with their decisions, and I think we should go back to the good work that Mr. Whittlesley did in Connecticut. They were getting some terrible lickings on hernias. We would pay over and over again, every case that came up. The committee was formed of manufacturers. I believe Mr. Cheney of the Cheney Company and Mr. Whittlesley of the Hartford Rubber Works took it upon themselves, representing the manufacturers of the state, to bring about a change in the hernia laws in Connecticut. They were successful. It was a long task. There were some of us who were encouraging their work, giving them information on other states, like New Jersey, compared with Massachusetts, and the result was that they submitted their report and brought about a change in the compensation laws. They really went to the other extreme. There has been an adjustment made, making the law a little more liberal since their law was submitted, but I want to say that if we want to do a good piece of work to the injured man who is suffering with hernia, it is up to us to do that job. I think it is up to us to find the leaders of industry who can go before the proper people and bring about a change.

Mr. KERRIGAN: In regard to what Mr. Beck said, this past winter I was appointed on the committee. They did go to the extreme. They have a waiver that

the man can sign and that puts him back into the judicial court. I talked with a plant in Bridgeport, Connecticut, in regard to the waiver, because we self-insurers were considering it in New York State and were going to put it before the legislature, but in the particular case we had in mind, when we investigated it, we found that the man signed a waiver and then had a strangulated hernia and died, and it went to the judicial court and they awarded his widow \$35,000. As Mr. Beck said, there is a solution there that has to be met. But how, I don't know.

In Buffalo in our department, particularly, when they are rejected by the department, we turn them over to the city hospital, and they are kind enough to take care of the men. Then we bring them back to the plant and if we need them we find work for them. It is heart-rendering to find so many men out of employment because of the hernia condition. It is economic, and it is also a deep problem that ought to be taken care of.

R. A. BULLOCK (Corduroy Tire Co., Grand Rapids, Mich.): As I look at the hernia question, it is not only a question of the exposure the man has in the plant, but also at home or any place else he might be. In Grand Rapids we are fortunate enough to have an arrangement whereby a man who is rejected for employment because of a hernia can be taken care of by the Community Chest, or the Welfare Union. We send him to the Welfare Union and they take care of him. If he refuses to have an operation of course he is out of employment. But if he cares to have an operation he can have it and he receives employment. I think it is a community problem as well as an industrial problem, because he is just as apt to be injured at home or in play or recreation as on the job.

CHAIRMAN HUNGERFORD: Is it possible, Dr. Shirley, for a man to develop a hernia and not know it?

Dr. SHIRLEY: Yes.

CHAIRMAN HUNGERFORD: Last week a man came in to see our doctor, complaining of having a cold, feeling weak, and the doctor found a hernia. He has no idea of where he got it, and didn't know he had it. He was very much surprised, and he couldn't blame it onto his job. But it seems to me that there is a thought there relative to re-examination of employees. If in the re-examination of employees, if you find hernias, what is the question? In Mr. Bullock's case he does not hire a man with hernia. If you would find a man on re-examination with a hernia what would you do about it?

Mr. BULLOCK: He would be given a reasonable time to have it taken care of or be laid off. We have not had re-examinations. Our employees have been examined, but we have not put in a system of making re-examinations.

CHAIRMAN HUNGERFORD: We have had a rule that any employee off from work for over a week, must have a re-examination to be returned to work. Whether it is a factory case or a non-factory case, and whether he is absent for only a week or more, whether for illness or not, he must be re-examined. That covers a lot of people in a year's time, more than you would expect.

J. R. HANSON (United States Rubber Co., Passaic, N. J.): Judging from Dr. Shirley's case, as passed down by the Massachusetts Supreme Court, he doesn't have much trouble from unjustifiable reward due to partial-permanent, but I am just wondering what he tells his employees. Supposing you had a man, Dr. Shirley, who had a broken arm. You would splint the arm, have an x-ray made and find the condition was perfect. You would expect a perfect result. Would you tell the man he had a broken arm?

Dr. SHIRLEY: Yes, you would have to. They have the privilege in Massachusetts of selecting their own physician, and if you didn't tell him and somebody else happened to get the case in a few days and told him, you might have trouble.

Mr. HANSON: I am thinking of a case of an incomplete fracture, where possibly in six or eight months you may be satisfied there is nothing wrong.

Dr. SHIRLEY: I would tell him. I believe you have to be perfectly frank. There

has been a whole lot of talk in medicine about telling the patients too much. I really feel that anybody practicing industrial medicine has to be perfectly frank and tell the individual just what there is there, in so far as an accident is concerned. When it comes to a physical disease, then maybe you can quibble a little bit, but as far as the accident is concerned you had better tell the man everything that you know. That will stimulate him to do what you ask him to do, with perfect confidence that the result is going to be satisfactory. If you don't, and for some reason or other something develops and he gets into the hands of another physician, you are pretty close to being in line for a lawsuit. He is going to say you didn't know what you were doing. So I think you have to be absolutely frank as far as an accident case in industry is concerned.

Mr. BECK: I think what Mr. Hanson has in mind is the fact that the employee takes that advice as a stimulant. In some states even if you have an arm that is back to normal in every way, form and manner, if the man knows he got a break in any way, he can go to his industrial physician with a perfect arm and get an award. That is what is happening every day.

W. L. SCHNEIDER (The B. F. Goodrich Co., Akron, Ohio): I think I have a parallel to that. I wonder how Dr. Shirley treats a man's mind in telling him all about a functional case. I think he will recognize that some of these lost-function cases do not respond for treatment for quite a period of time. Meanwhile the man has a history, but his mind is not satisfied.

Dr. SHIRLEY: My feeling is that you are going to run into difficulty on a certain percentage of those cases, but it is part of your treatment to either maintain his confidence in your treatment or put him in the hands of somebody in whom he has perfect confidence. You may have a finger or arm that is not normal, but you should do the best you can to keep it normal, and I believe that keeps the confidence of the individual. If he has no faith in you, the sooner you pass him over to another physician the better. Once in a while I find a case where I know I am running up against the wall.

Mr. SCHNEIDER: But you are not satisfying the man on his compensation. As a rule, compensation isn't paid unless it is certain the function will not be there after you have given certain treatment. I know of one particular case where a man was treated for almost a year for loss of function and it did not respond, but the examining physician thought it would respond to the proper treatment. Yet the intermediary time was such that he hadn't received his compensation and he was kept on the fence, so to speak.

Dr. SHIRLEY: That type of case is not definitely a case of compensation unless treatment has been made to bring back that function. When treatment has not been given to bring back the function up to that time, I don't believe he is legally entitled to compensation. Of course it is an insurance-medical problem.

Mr. SCHNEIDER: That is true. Then there are cases where probably the later advice would be to amputate.

Dr. SHIRLEY: Get the insurance department to tell him: "We are going to try to save that finger. If we cannot, we will see that it is taken care of and pay you later." We have done that in two or three cases.

CHAIRMAN HUNGERFORD: I think you would like to hear from Mr. Martens of the Industrial Commission of Ohio.

P. B. MARTENS (Industrial Commission of Ohio, Copley, Ohio): I realize that these are real problems in the industrial situation today. I don't know of any better method than the one given by the medical director of the Hines Lumber Company here several years ago on the rather painful but effective cure of back troubles. I think you boys are all familiar with porous plasters. In putting them on, removing them the following day, replacing them again; they say it is so effective that it is a rare occasion to have a back sprain in the organization.

But as to hernia, I think the Ohio Commission has gone about as far as any of

the other industrial commissions along that line, and we have less trouble today than we had two or three years ago. The present situation in Ohio is that they must obtain permission from the Industrial Commission to operate or be entitled to any benefits or medical treatment. In order to receive compensation they have to get the permission of the Industrial Commission that the case may be taken care of.

H. A. WALKER (The Goodyear Tire and Rubber Co., Akron, Ohio): The only thing that I have to protest against is your specific statement that as far as back cases have gone we have eliminated them. I don't think that we intended to convey that impression at any time. But we have reduced them materially by the simple expedient of doing what Dr. Shirley has suggested. When a man has complained of a back strain, we get in touch with that man immediately, our hospital calls us, and we get all the facts concerning that back strain. It is remarkable how many times a man decides finally that he isn't as badly hurt as he had complained of being. That is Mr. Gerpheide's own invention. I think he is too modest to tell about it, but it has been extremely successful.

I don't believe that any of you gentlemen would dispute the fact that a man can hurt his back in the course of his employment, and I don't want to have anyone think that Goodyear denies that. Rather we want to have all the facts in the case, and when a case is established a man gets all the consideration he is entitled to.

R. A. BULLOCK (Corduroy Tire Co., Grand Rapids, Mich.): I would like to ask Dr. Shirley in regard to watching for emphysema scars in examining the man. If a man has suffered from emphysema, is he necessarily a poor risk?

Dr. SHIRLEY: I think not, but I should be a little more cautious in putting him on the job. I have been greatly surprised at the number of men who show scars of emphysema on examination but who can do a great deal of work. But I believe that you should keep in mind that there has been definite damage to the chest cavity, and more frequently than not there is definite damage to lung tissue, and I believe that that man is not physically able to do all the work that a normal man can do. But at the same time it is surprising how much those men can do. I try to keep them off jobs that have any hazard in the way of a risk to the respiratory system.

Mr. BULLOCK: Would the fact that a man had suffered from that as an infant have any bearing on the case?

Dr. SHIRLEY: I would more or less forget that, because if he had it during infancy and has made a recovery and has grown to an adult age, practically speaking he is about as strong physically as a perfectly normal individual.

Mr. SCHNEIDER: If time permits I would like to ask Dr. Shirley if he would touch on respiratory infections. While some say it is not compensable, in certain states, it would be interesting.

Dr. SHIRLEY: I don't know that they are compensable anyway. Of course we have silicosis, which is a disease of the lungs due to the inhaling of silica dust or powder. We have cases of compensation of men having pneumonia where they have been working in warm atmospheres and have been obliged to go out and work in a much colder atmosphere. It is doubtful in my mind whether those are really justly compensable, but there are cases on record. I think you have got to judge each case of that type on its merits. Undoubtedly some cases receive compensation that never should, and cases are always open to discussion at some time.

CHAIRMAN HUNGERFORD: I want to thank both of you gentlemen for appearing before the Rubber Section. Our next subject is quite different. Our speaker will give us an entertainment, something we are all interested in—aviation. We are very fortunate in securing Mr. Colley to come with this film from the B. F. Goodrich Company. It shows in what a diversified fashion the rubber industry has entered into everything. This development, I think, is outstanding in aviation. We all are familiar with very severe accidents, plane failures, which have occurred due to the fact that ice forms on the wings of the planes and causes them to become beyond control.

While we are waiting I would like to ask for the report of the Nominating Committee for the selection of new officers.

Report of the Nominating Committee

Mr. SCHNEIDER: Mr. Beck asked me to submit the report, which is as follows: General Chairman—C. L. HUNGERFORD, The Firestone Tire and Rubber Company, Akron, Ohio.

Vice-Chairman and in charge of Program—J. R. HANSON, United States Rubber Co., Passaic, N. J.

Secretary—H. W. LOW, Miller Rubber Co., Inc., Akron, Ohio.

Chairman, Statistics Committee—ROLAND KASTELI, United States Rubber Co., Passaic, N. J.

Chairman, Poster Committee—R. A. BULLOCK, Corduroy Tire Co., Grand Rapids, Mich.

Chairman, Membership Committee—A. M. DIETZ, Pennsylvania Rubber Co., Jeanette, Pa.

Chairman, Health Committee—Dr. J. NEWTON SHIRLEY, Hood Rubber Co., Inc., Watertown, Mass.

Chairman, Engineering Committee—M. H. KILGORE, Goodyear Tire & Rubber Co., Akron, Ohio.

Chairman, Publicity Committee—M. A. QUINN, United States Rubber Co., Detroit, Mich.

Chairman, Slides and Safety Kinks Committee—B. F. GERPHEIDE, Goodyear Tire & Rubber Co., Akron, O.

News-Letter Editor—CHARLES F. SMITH, United States Rubber Reclaiming Company, Buffalo, N. Y.

Executive Committee at Large—

E. W. BECK, United States Rubber Co., Passaic, N. J.

J. T. KINNEY, Goodyear Tire & Rubber Co., Akron, Ohio.

W. L. SCHNEIDER, The B. F. Goodrich Co., Akron, Ohio.

(The report of the Nominating Committee was unanimously accepted.)

CHAIRMAN HUNGERFORD: I personally appreciate the honor of being able to head up the Executive Committee next year. The Executive Committee is at your service as members of the National Safety Council, to spread the work that the Council collects and to help you as members to solve any problems that you have. Only by entering into the work of your Section can you benefit from it.

We will now hear from Mr. R. S. Colley, Development Engineer, The B. F. Goodrich Company, Akron, Ohio.

Making Winter Aviation Safe

By R. S. COLLEY

Development Engineer, The B. F. Goodrich Co., Akron, O.

The ever increasing list of aeroplane accidents, involving the loss of life and property which have as their direct or indirect cause the formation of ice on the plane, stands as mute testimony of the seriousness of this hazard. Many mail pilots have lost their lives in the mountains in Pennsylvania on the Cleveland-to-New York route whose accidents have been directly or partially attributed to ice. Clyde Pangborn and Hugh Herndon, Jr., who recently made the flight across the Pacific, tell of how ice on their plane nearly brought their flight to an untimely end shortly after they left Japan. From their report we have good reason to believe that many other trans-oceanic fliers, from whom no word has ever been heard, also encountered ice and were forced to alight on water with planes not equipped to stay afloat for any length of time.

The problem of ice is perhaps of particular importance to the air mail and passenger transport lines who must play safe and cancel many of the scheduled trips during the seasons when ice conditions are prevalent, thereby losing considerable revenue. For this reason our first tests were made on mail planes and our efforts for the time being will be concentrated on solving the problem for them. The danger from ice formation arises partly from the increase of weight the ice adds to the plane; which in most cases is already loaded nearly to its carrying capacity, but more particularly from the deformation of aerodynamic shapes resulting in decreased lift, increased drag, excessive vibration and loss of control.

A study of the various physical and chemical properties of water with reference to atmospheric conditions is useful in interpreting the phenomena of ice formation but seems to conflict at times with records of ice formations in actual flight, due to the great variety of conditions. There are, however, three general atmospheric conditions which cause three corresponding and distinctive types of ice formation on the plane; namely, temperature inversion, mild and high super cooling.

Temperature inversion manifests itself to us on the ground as an ice storm in which ice of a glassy smooth structure adheres strongly to all exposed objects, or it may have a rough surface due to the admixture of snow or sleet. This type of ice may occur at various temperature combinations of air, water and object, but usually occurs when air and object are below the freezing point and rain falls from comparatively warm clouds at higher altitudes. It is possible for a plane to rise above this condition but often the region is quite extensive both in altitude and in area. This type of ice builds up rapidly giving a blunt nose to all leading edges.

The condition of super-cooling occurs in clouds or mist when the air temperature falls below freezing and the surface tension of the particles of water is great enough to overcome the tendency to freeze, this produces an unstable condition within the droplet and as soon as the surfaces of the plane strike them, these droplets crystallize into clear, hard ice. The mild form of super-cooling occurs from a few degrees below freezing to eight or ten degrees below freezing and the ice formed on a plane in this condition is very similar to that of the ice storm and a pilot may fly for some time in this mist and not realize he is in danger, until his plane becomes sluggish and hard to manage.

High super-cooling is encountered in fog or mist which has been cooled several degrees below freezing or down even lower than zero degrees Fahrenheit. The amount of water in the air at these lower temperatures is much less and the size of the droplet is much smaller and collects on the plane in hard, white crystals adhering strongly to the surface and building forward from all exposed surfaces in a sharp-nosed shape. This latter type of ice is slower in building and is therefore not as dangerous as the other two mentioned.

Various means have been tried from time to time to prevent ice forming but the only one to give any indication of success was to coat the surfaces with some chemical, either liquid or solid, that would mix with the moisture in the air as it hit the wing thereby lowering the freezing point sufficiently so that the mixture of water and chemical might be blown away instead of freezing on the wing. The obvious disadvantage of this method is the quantity of such chemical that would be required and its constant distribution to the various surfaces.

Attempts to provide an insoluble material such as paints, tar, varnish or greases that would prevent ice forming has been entirely without effect.

The application of heat seems a solution—but how to obtain it and how to distribute it to all the various surfaces without too great a loss is still a problem. Electrical heat involves too heavy a source of power. Utilization of the heat

from exhaust gases of the engine seems a logical source but up to the present has proved to be quite inadequate. Great care must also be taken not to cause back pressure on the engine by restricting the flow of exhaust gas.

Study of these various methods brought out the necessity for a mechanical cracking device combined with a surface having sufficiently low adhesion so that the ice could be blown away by the wind stream.

The most successful device of this nature has been brought forth by Dr. William C. Geer and Dr. Merit Scott, and later perfected in the laboratories of the B. F. Goodrich Company. It consists of a rubber overshoe attached to and covering the leading edge of the surface to be protected. Vulcanized into this thin covering are a series of tubes with suitable connections to an automatic valve by means of which these tubes are inflated and deflated periodically. The inflation breaks up the ice formation and stretches the rubber on which the ice has formed, thereby lessening the adhesion and permitting the wind stream to get under the ice and blow it away.

In order to make the necessary tests to develop this device, the Goodrich company built a large refrigerated wind tunnel, where sections of wings, struts and wires could be subjected to conditions as nearly like those encountered in actual flight as is possible to produce artificially. Here, in the test chamber of this tunnel, we were able to create synthetic storms and observe at close range the action of this device under all types of conditions from rain ice to the hard, rime ice found at zero degrees Fahrenheit.

From these tests we arrived at the most satisfactory method of making the de-icer, as it is now called, and the next step was to equip a plane. Cooperation has been enjoyed with the National Air Transport Company at Cleveland and the first plane to be fully equipped with de-icers was a Douglas bi-plane furnished by them. This, however, was still a test installation and was not fully automatic, the air supply being carried in tanks and the valves being hand operated. Several trips into severe ice conditions on days when all other planes were grounded proved the value of the device in removing the ice formation from the plane.

We next equipped the Goodrich Lockheed "Miss Silvertown" with a complete set of de-icers, automatic valve, and air compressor driven direct from the engine. The complete equipment can be put into operation as easily as you turn on the windshield wiper of your car and adds less than ninety pounds to the ship; this weight can probably be lessened in the future, but the present concern of the mail lines is the safety of its pilots and ships, and this slight decrease in pay load is not considered a serious factor.

Many test flights have been made in ice conditions with C. W. Meyers as pilot of the "Miss Silvertown."

These tests and flights in actual ice conditions have shown beyond doubt that a mechanical means of dislodging the ice formation is the most positive and dependable method yet advanced by anyone experimenting in this field.

These tests also proved that a rubber overshoe properly designed and constructed with the correct number of tubes in the proper position relative to the leading edge is basically correct and when inflated at definite intervals provides a positive means of removing ice.

The Goodrich de-icer has reached its present stage only after a great deal of experimental testing in order to make them as effective as possible without interfering in any way with the aerodynamic characteristics of the airfoil. We are now making test installations which will be proven over long periods under actual operating conditions, because we feel that a safety device of this nature upon which so much depends must be proven beyond all possibility of doubt before we are ready to put this device on the market as a finished product.

ADJOURNMENT

Thursday Afternoon Session
October 15, 1931

C. L. HUNGERFORD, Chairman
The Firestone Tire & Rubber Company, Akron, O.

The meeting convened with General Chairman Hungerford presiding.

CHAIRMAN HUNGERFORD: This is our third and last meeting of the Rubber Section for this year. We have for our last program one which is everybody's program. The first part will be devoted to a showing of safety kinks which have been collected by Mr. H. A. Walker, of The Goodyear Tire and Rubber Company. These pictures, I think, will give you ideas which you may apply to your own problems and may bring out ideas which you may be glad to tell us about.

Safety Kinks in the Rubber Industry

H. A. WALKER (Safety Division, Goodyear Tire and Rubber Co., Akron, O.): In gathering these pictures together we were successful in getting contributions from five different corporations and seven different plants. We have a total of forty-nine pictures. I believe the pictures cover about as comprehensive a program as we have shown in the safety kink section, and I ask that as the different companies' pictures are shown, the safety director of the particular company will assume the obligation of answering all questions relative to the pictures shown.

The first plant is The B. F. Goodrich Company.

W. L. SCHNEIDER (The B. F. Goodrich Co., Akron, O.): (Slide) Those are some home-made cans which we have made for cements of various viscosities in which the principal object is to prevent fires and also to eliminate the vapors coming out into the atmosphere. You will note the collar on the brush of the righthand can, and in addition to that a cover which is on a chain. The chain keeps the cover from being removed and taken away from the can. This one has a gravity lid for small dip goods. It is only about 3½ inches in diameter and two inches high. This is a gravity lid which is operated by the thumb. When you let go it automatically closes.

(Slide) This is a bank of test lamps for testing circuits whether alive or dead. It consists of three 110-volt lamps for testing. The electrode is used for testing the circuit so that you can determine whether the circuit is alive or dead. It lights the light if the circuit is alive. This is behind a heavy screen of wired glass. In the event of an overload and the breaking of the lamp, of course, the protection to the electrician will be evident.

OLIVER HOPKINS (Safety Supervisor, United States Rubber Co., Providence, R. I.): What will happen in case you touch the end of that wire to the open circuit? Isn't there apt to be a spark in case the circuit is O. K.?

MR. SCHNEIDER: It would be small, probably less than you get from a spark plug. Of course, it is insulated thoroughly from the electrode.

(Slide) This is a fuse holder which was suggested by one of our electricians some years ago. This clip is swiveled in such a way that it can be mounted on a pole and you can reach overhead fuses by means of this pole, and the spring clip engages the fuse and you can turn it around; these hooks clasp around the fuse and you can remove the fuse from the floor and replace it in a similar manner. These, of course, are different capacity fuses and are different heads that slide in a groove for the various type heads. This is only a section of the handle of the fuse. They can be made to whatever length you desire to reach from the floor to the ceiling without a ladder.

(Slide) This is a travel-meter which we designed ourselves, and consists of a Veeder counter, four digits, a hand brake, a magnet coil, equipped for 100 or 220 circuit voltage, and rubber-tired wheels of aluminum, 10 inches in circumference. This is a hard rubber handle and a frame, somewhat the shape of a flatiron. The

base is somewhat triangular, like a flatiron, with a small round caster at the base. The object, of course, is to accurately test the drift of the mill and calender rolls or similar types of machinery. By placing this on the roll with the caster at the bottom, and tying into your safety circuit, the moment your safety bar is tripped the energy is cut off in your safety circuit. A coil releases the clutch which in turn allows these wheels to turn with the roll, and it automatically measures the count on the Veeder counter in fractions of inches or in inches.

(Slide) These are safety tools for separating mill rolls in emergency, and consist of a sledge, wedges, the long bars, and also a wrench. Unfortunately we did not have a screw jack, which is also part of this equipment, in this box at that time, and it was too late to get a photograph to Mr. Walker in time for the Congress requirements. In our plant we do not believe in backing rolls in the event of a worker being caught in the bite. We stop the machinery as quickly as possible, and have trained crews who are organized and whose duty it is to quickly separate the rolls and extricate the worker. Each one has a definite duty to perform, and these are tools to be used for that emergency. The case for the tools has a glass door.

(Slide) This is a vacuum cup ladder foot which we have designed for our own use, consisting of a rubber ring and a cast base and a swivel joint. You will see the swivel joint here. It will of course provide quite an angle to your ladder to eliminate the various levels or offsets which you might have in a floor. It is not a cure-all by any means, and will not take care of every difference in level; but the angle at which a ladder can be placed with this shoe is abnormal, in fact more than any type I have seen unless it is a hook ladder which is hooked over on a shaft. Wet floors will not affect this rubber because of the vacuum principle in the shoe itself. The rubber portion is renewable, although it will wear a very long time, sometimes outwearing the others.

(Slide) This is a safety latch for a sole press. These of course stand upright. That is the upper section of the press. A slight jar might throw the upper section down onto a man's hand or head if he should be leaning over. This latch consists of the latch itself and the suspended rope, and the latch can be released by pulling the rope.

CHAIRMAN HUNGERFORD: Does that automatically engage when the upper half is engaged?

MR. SCHNEIDER: Not automatically, but it will drop as soon as the operator lets go of this handle here. It moves in a vertical direction on a guide.

(Slide) This is a tube splicing press, a hydraulic press under pressure, and it doesn't show very distinctly here but the dies are inside. This gate when open will absolutely lock the press, and the rams cannot descend or ascend so long as this gate is open. When this gate is closed the press makes its own stroke.

(Slide) This is a departmental trophy which is awarded to the various departments having an absolutely clear record for one continuous year. Here is a simple poster which we use for posting the number of consecutive days in the various departments without a lost-time accident. Incidentally, this is one of our calender divisions which has a very excellent record.

(Slide) These are our test car drivers, and the head of our test car fleet. In this case they were presented with a trophy for going through the year 1930 without a single lost-time accident. The record covered over a million car miles.

(Slide) This is our Silvertown Safety League pledge which no doubt you have heard of. This is a facsimile of the pledge itself, and this is the emblem which goes on the card, and it is nationwide. We believe not only in safety in our own plant but everywhere where we can spread the gospel of safety.

MR. WALKER: The Miller Rubber Company has the next pictures. Mr. Low.

H. W. LOW (Miller Rubber Co., Inc., Akron, Ohio): (Slide) This is a rubber belt used in Hoover sweepers. They require that every belt must be exactly the same tension. There is a test made, and they are put on this device. The girl steps on a pedal and that stretches the belt out. We had some trouble with the belts flying off the pulley. The belts would come off and fly sideways. So we put in this screen guard.

(Slide) This is a safety device suggested through our employees' suggestion system. It is a tank where the hard rubber handles are put in hot water to soften them up a little bit for forming. The operator has a table on this side, and works between this side and a little table over here. If he would forget to turn off the steam it would boil over, so the suggestion was made that we put in a sizeable section in the back. Now in case the tank should boil over all the bubbles and everything runs out the back instead of in front toward the operator. It drains on a pan on the floor.

(Slide) We have a very small punch press operation. The girls would put a disc of rubber in a little die down here. There is a little round die at the bottom. The girl puts in a disc of rubber one inch in diameter. That has to be centered in the die. She has to place this disc of rubber on a circular die. In order to center it she would stick her finger in there, until finally one girl got her finger in there and stepped on the press at the wrong time mashing a finger-nail off. We made an aluminum guard that slips over the finger. It is light aluminum, with an extension, to be used to get the rubber centered in the die. When they use it it operates very satisfactorily. The finger is away from any danger point.

Mr. WALKER: The next section is the contribution of the Corduroy Tire and Rubber Company, and Mr. Bullock will explain.

R. A. BULLOCK (Corduroy Tire and Rubber Co., Grand Rapids, Mich.): (Slide) This picture possibly interests only the smaller manufacturers that might still be cutting their rubber with the old type cutter. Instead of having the old mechanical clamp to hold the rubber in position we made up a hydraulic ram fastened to the clamp that holds the rubber in position. Since we have put that in we have not had a broken blade, and I think you all realize the danger that is prevalent from a broken blade, and also the expense involved. This hydraulic clamp will give with the rubber as the knife goes through, and it keeps the knife from bending at any particular place.

A. M. DIETZ (Pennsylvania Rubber Co., Jeanette, Pa.): May I ask if you cut all your rubber in that manner?

Mr. BULLOCK: Yes.

Mr. DIETZ: We have a device up there that I didn't think would be any value to the safety division because we didn't put it in for safety. We took an old lathe, taken out of the machine shop, and built a platform in front that was adjustable, and it had a hook on it. You can tear one of those down in half the time. If you want a drawing I will gladly send it to you. It is a very inexpensive operation.

Mr. BULLOCK: We just cut the outside four sections, the six sides of each bale, and then the heart of the bale is passed.

J. Q. LEE (India Tire and Rubber Co., Akron, Ohio): I notice you have the center guard, the knife guard out of there, more of a shield. It spreads the piece apart as it cuts off. In my case I broke several blades and had trouble with the clamping device and it clamped too tight. I took that off. I took a piece of cold-rolled steel and sharpened it on one end and put five of those on each side of that shield. When the knife gets in about half an inch it takes hold, and as it goes down these other clamps take it and spread that piece apart, as the knife goes down and makes a lead for it. You really don't need any clamp at all on it if you put that on. I haven't had a broken saw or an accident on it since I put that on.

Mr. BULLOCK: That sounds very good.

Mr. SCHNEIDER: Inasmuch as this is a subject in which a good many are interested, I wonder if it wouldn't be a good idea for Mr. Kilgore to gather information about cutting rubber. It might be worth while to the Section members.

Mr. LEE: The machine has a mechanical feed, more of a ratchet effect. It pulls the blade down as the saw was reciprocating backward and forward. On the front end of the saw where the man is standing I fastened a cable, going down through a shift in the floor, in turn fastened onto an air cylinder. They used 90 pounds of air on that and started the machine going, throwing a full valve over, starting the air cylinder to

making a stroke, and it makes about four or five shots right there. It tripled our production.

Mr. BULLOCK: (Slide) Here is a pipe guard we have installed at the corner of our building by the railroad track. It removes the hazard of a blind corner. It could be used where there is automobile traffic or train traffic.

(Slide) We have installed two city fire pumper connections at the rear of our plant by an artificial lake, and I am showing this picture more along the lines of fire protection than as a safety feature. They are about 200 feet from our warehouse, and close enough to our main building so that the city fire department can come out to this lake and hook on, in winter or summer, and have an abundance of water.

Mr. SCHNEIDER: Does any sediment get in there?

Mr. BULLOCK: They are tested about three times a week. The city has to send pumpers out to test it three or four times a week. I have never heard any comments about any trouble at all from that source. Just what the installation is in the lake, I can't answer that. Around it are cinders and reed and grass. We have a cinder foundation all the way from the roadway to the connections.

(Slide) This is an outside guard for the ladder to our coal silo. Just about a week ago I was out taking a walk around the plant and I saw our fireman crawling up on the outside. We have to find some way of eliminating that.

(Slide) On all our steps for our stairs and landings we used a rubber stair tread that we made up in our own plant. It is a molder proposition that is molded the width of the step and about a foot long. The ribs of the tread run across the step this way, eliminating any danger of anyone catching his heel in a rib that would run the other way. They found it very satisfactory and inexpensive to keep up. It is very easy to change it if one section should become worn. We have a screen grid guard protecting these windows from people walking up and down the stairway.

Mr. WALKER: Mr. Hungerford will answer the questions relative to the next pictures, from the Firestone Tire and Rubber Company.

CHAIRMAN HUNGERFORD: (Slide) This is a safety device which is used on all of our tire vulcanizers. We have had the experience when the lid was unlocked that something has gone haywire with the hydraulic, a valve or something else, and the men have not been able to stop the hydraulic. We have not had anyone injured by it but we have had considerable damage to company property. To eliminate that, this crowfoot safety device marked by the arrow, engages directly with the valve on the main hydraulic line, and opens it, stopping the travel of the hydraulic ram immediately. Naturally you have a contoured surface on heater lid. This is a flat surface so that when it comes up it engages the crowfoot safety and makes your trip action more positive. We have those on all of our tire vulcanizers.

Mr. SCHNEIDER: That could not be used on a chain hoist, could it? That would interfere with anything overhead. There are some places where they use chain blocks to hoist the lid and so forth.

CHAIRMAN HUNGERFORD: The picture gives you the impression that it is in the center, but it hits about here.

QUESTION: How do you suspend the lid?

CHAIRMAN HUNGERFORD: There are seven heaters in a row. There is an I-beam on an angle, and that has a carrier with a permanent hook, and that is suspended directly over the heater, the ram is raised and the lid is engaged on the hook and pushed back either way.

Mr. LEE: For instance, if you had one or two molds on that and it started up, how high is that crowfoot on the heaters?

CHAIRMAN HUNGERFORD: It is a distance of about eight feet.

(Slide) Here is an idea that is not original with Firestone. We got the idea from Goodyear. But we had never had a picture of it and I thought it worth while. Going up the side of the spadone machine we used to have cleats on the framework. That

meant a man had to wrap his legs around the frame, using one hand, and we have had men fall, injuring themselves. With these steps they can use both hands, and there is a platform at the top they can stand on, using both hands nicely to put the stock over the top. It makes it more safe and speeds it up considerably. Those are on both sides of the spadone.

MR. DIETZ: You don't have room for a hand rail?

CHAIRMAN HUNGERFORD: It is on the platform. This continues up and there is a hand rail to protect your man. The windup is in the front, just as your stock comes off your pull-off rolls and comes over the top. Here is your carrier wheel for your knife. Your clamping bar sticks out here.

(Slide) We used to have a high frequency of accidents in our mill room in adjusting rolls. They used to use any kind of a piece of pipe or bar, crooked, bent, or any kind. The men would put them in the cap screws; they would slip out and fall, the men getting strained backs, hitting themselves in the head, fall against other pieces of equipment. This was designed by one of our mechanics in connection with our safety department. It is a heavy bar with a knob at the top to give him a handhold. This little knob, when you put it in, fits into the other screw-hole, so it will not slip out. They used to put the bars in the screw adjusting holes, let them go all the way through and drop on their feet. This collar eliminates putting the bar through the adjusting screw-holes, giving them just the right fulcrum, because this limits the distance to which you can put the bar in. We also have a regular holder for these bars instead of placing them up against the mill housing.

(Slide) We have in our company broken several arms on the pull rolls located on the back end of the spadones. This guard is open; on this arm there is a weight, and you see the tip of it here. When that guard is up, you can take your stock and bring it around your pull rolls. This machine cannot be operated as long as this guard is up, because this rope is connected directly with the safety switch.

(Slide) When that guard is down, it is fastened with a clamp, and when that comes down this switch is closed, and you can run your stock. We have never had the slightest chance of an injury since we placed these guards on our pull rolls.

MR. WALKER: The Goodyear pictures are next, and I will explain them.

(Slide) We have had a number of cases of knife wounds due to a man holding the knife in exactly the position that this man is holding it. We find in our rubber slabs that they vary in thickness and a man may be cutting along with a pretty good tension of the knife and hit a thin spot of the rubber and go through, and he ends up by having a bad puncture wound. We have conducted a campaign of instruction to cut in this position, and thus eliminate the hazard of knife wounds.

(Slide) Here is a man taking a shell with a liner on it out of a rack, and he is doing it properly, with his hand over the end of the steam shell.

(Slide) This picture is a little hard to appreciate, but this conveyor is the white portion shown here near the top of the picture. This happens to be a section of one of our tube conveyors, and of course the trouble here was that the tube conveyor is so close to the floor—a distance of about seven feet, I should say—that a man on a jitney, as we call it, or an electric truck, going here and watching the road more than the overhead, might possibly run his head against the sharp edge. We have put an oval guard under that conveyor and when a man puts his head up against that guard, it tends to ward it down and around rather than giving him a sharp blow.

I might say, too, in that last picture that is in the part of our No. 1 plant where the conditions are not as ideal as the newer installations of Plant 2 and various others.

(Slide) This is a section of a windup on a calendar and we have put a guard here to prevent anyone from reaching in and getting caught by the revolving holder. Also you will notice that we have an abundance of safety so that the man can reach the power from any angle of his work, and they have cut off one feature here. We used to have quite a bit of trouble with the stock coming down and catching here, so we have put a piece of metal over that safety, and left of course sufficient room for the man to get it with his foot if necessary.

(Slide) This is a picture that I rather hesitated to use, and yet in talking it over with some of the rest of the men in the Rubber Section I thought we had better use it again. It is a guard on the spadone bias cutter; previous to our use of that guard we had quite a number of fingers caught by the clamping bar, but since its installation we have not had a single case of a finger being caught. It is simply a link here that operates in conjunction with the clamping bar. When the clamping bar moves away the guard comes back and allows the stock to come through.

(Slide) This picture was taken to show how we arrange the starting and stopping of our conveyors. We have two lines here. One is the start and the other is the stop. A man anywhere along that can start it or stop it.

CHAIRMAN HUNGERFORD: Do you think that is a good idea from the safety standpoint?

MR. WALKER: Possibly not; from the safety standpoint we might run into difficulty. But this is sufficiently high that the man has to reach high, and the other one, to stop the conveyors, is convenient to reach. You can see this is the end of the building and the building extends for 200 or 250 feet, and we have two men who place flat-built tires on this conveyor, and were we to just put the safety stop on he might possibly have to walk the entire distance of the building to get to the button. Of course you might say we could put in several buttons, but we have not had any trouble so far.

(Slide) This is a product of our safety committee in the tire building division. The safety committee decided that it would be a good idea to put the names of all supervisors on this board, and chalk up the accidents that they had to men under their supervision. Of course that board is an incentive to the supervisor to keep his slate clean.

CHAIRMAN HUNGERFORD: Are those inspectors or foremen?

MR. WALKER: They are supervisors. Our set-up is that we have the department foremen and then we have the shift foremen, and we have supervisors under them. You might call them inspectors. We call them supervisors. It is just a matter of name.

(Slide) This is a system that we use in our gate houses. We have four main gate houses, and we have a board at each gate house. Our safety program is divided up in the Akron plant into eight divisions. That is the way the factory set-up is, too. We have eight divisions and the division superintendent under whom these accidents are listed is mentioned on the board. When an accident occurs in a man's division we put it on the board, that is if it is a lost-time accident, and there is some difference there in the different divisions. One division has only 174 men on an average, and other divisions run up as high as 2,000 or more. Of course the greater the number of men the more numerous the accidents there. We can judge pretty well which are the larger and which are the smaller divisions. That particular month we ended up with 27 accidents for the entire month.

We have quite a number of subsidiary plants, and among them is a cotton mill, and they conduct a safety campaign among themselves. They are highly efficient in safety. I might go so far as to tell you that one of our mills has completed two years without a lost-time accident, others have completed a year. All of them have completed at least a month.

(Slide) This is a trophy won by our division. This trophy last year was won by the California plant, numbering about 1,500 employees.

(Slide) This is a picture of the awarding of our divisional trophies last year. This man, Mr. Braden, has about 2500 hundred men under his supervision, and he has pits, tubes, and a tire building department under his supervision. Mr. Razez, of Plant No. 2 division at Akron, has practically the same set-up, pits, tire building, but no tubes. Mr. Razez's division won in the severity feature of the contest.

Mr. Stevens, our general superintendent, awarded the trophies, and all the supervisors of these two divisions were present at the time of the awarding of the trophies. This is the stage of the Goodyear Auditorium. The employees of these divisions were sitting in the audience.

Mr. Hanson, United States Rubber Company, will explain the next pictures.
J. H. HANSON (U. S. Rubber Co., Passaic, N. J.): (Slide) This is a tape core cutting machine in a tape department.

(Slide) Here is the machine when out of operation. You will notice there is a dog on the top that is used for pulling a mandrel down on which a cylinder of tape cores has been placed just under the cover which is directly under that dog, and there is a series of knives to cut the cores to the proper length.

(Slide) This shows the mandrel being placed into the machine, which has just been caught under the dog, being pulled down to the malleable cutters. The machine is so well guarded that you cannot see the cutters in this picture. You will notice it is a standard two-hand operation. The man is pulling the roll forward with the left hand, having the right hand on the switch which starts up the motor, on which the knives are connected.

(Slide) This is a view of our spreader room. Just back of the dock at this side there is a wire suspended across the roll which carries a series of smaller wires which collect the static. You will notice on the post in the center of the picture there is a hydrometer, and on the right side of the picture, on the wall, there are explosion movers which take care of any explosion you might have, and it also helps to control the humidity of the room. We have never experienced a fire in that particular room, which is very hazardous on account of the solvents used in the spreader stock.

MR. DIETZ: May I ask what floor that is on?

MR. HANSON: On the second floor. You will notice the ducts above the tape stock, carrying the fumes off.

MR. SCHNEIDER: Do you condition that air?

MR. HANSON: No.

(Slide) That is coming through a spreading device. This stock is run through a friction calender and there is an extra coat giving you the same effect as a skin coat. It carries the same effect as the skin coat calender. That is regular electrician's friction tape. It is wound in liners and taken over to mandrels and cut up the proper widths.

(Slide) In the last few weeks we have had an epidemic of broken breaker caps, and this is simply a ring which is cut off the end of an eight or ten inch pipe which is merely suspended between the roll and a pin over the cap which acts as a retaining ring in case that breaker cap should break. We have had two or three cases where the cap has broken and the man has just had a narrow escape.

H. W. LOW (Miller Rubber Co., Inc., Akron, Ohio): I am awfully glad to see that picture. We had some trouble with caps breaking, and in one or two instances they flew off and struck a man. The injuries were not serious. We put a guard on the side of the mill housing here that went down, just a sheet metal guard.

MR. HANSON: We have the guard on some of the other mills where there is a different construction of cap. Some of our caps have a small dog on the side which fits into a guide slot, but this particular cap is simply a round cap and is certainly a very cheap operation to cut off an eight or ten inch gas pipe and hang it in there. It simply acts as a retaining ring.

MR. LEE: Does that slow down the operation?

MR. HANSON: I am not familiar with how far that pin must be taken out ordinarily.

MR. SCHNEIDER: The same result can be obtained, I believe, by using a sheet metal shield with a keyhole slot in it which is easily removable. It is simply a matter of putting a couple of studs in there, and it cannot become loose. I would like to ask also if there is sufficient tolerance there in the back of the screw to get a pipe in there in all cases? I know there are a number of cases where the tolerance is very limited.

MR. HANSON: That might be true.

MR. SCHNEIDER: The design of the mill itself is a handicap in some cases.

M. A. QUIRK (United States Rubber Co., Detroit, Mich.): I merely sent this photo-

graph to Mr. Walker to show that we went through July without a lost-time accident. The slogan there is the one we adopted as a safety slogan. After we completed the month of July without a lost-time accident we just used a slogan and it is being used effectively up to now. It is over this entrance and it is merely a reminder before they start the shift that they are supposed to practice safety.

(Slide) This is a little campaign I worked up last year—a departmental safety contest. This is a picture of the globe of the world and all plants and all departments in the company are represented by airplanes around the globe, and they are numbered departmentally. The departments shown in the flight are the ones that remain through the month without a lost-time accident. We went through July, and I believe up to the fourteenth or fifteenth day of August, when one of the departments had a lost-time accident so we put the plane down in the hanger for repairs. It remains there for the remainder of the month. It causes considerable interest. We keep it there for one month, and at the beginning of the month we put them in and they start out with a clean record.

MR. HANSON: Our cartoonist drew that and it is very interesting. Here is the ocean of accidents. Here is the island of broken bones and careless men. Here is Dr. Bill's place. Here is the sea of carelessness. These create considerable interest. The cartoonist did a very good job. We have had that board on a portable truck so we can move it from one part of the plant to the other in any department we wish to place it in.

MR. BECK: What is the diameter?

MR. HANSON: Twelve by six or seven feet.

MR. WALKER: That completes the photos that we have. I wish to thank the different safety directors for their cooperation.

CHAIRMAN HUNGERFORD: Thank you, Mr. Walker. That is just another example of cooperation in the Rubber Section. Mr. Walker stepped into the chairmanship of the Safety Kink and Slide Committee after the former chairman left the Rubber Section, and he has done a good job.

The rest of our program consists of a series of short talks on specific subjects. These men will cover their subjects and we will then open the respective subjects for discussion. The first subject will be discussed by Jimmie Quirk who is always ready to give us the benefit of his experience. (I want to say at this time that the program which you have listened to was arranged entirely under his direction.) On safety committees there is a lot of pro and con discussion, however, I think one of the best arguments is to listen to a man who has used them very successfully.

Organizing and Maintaining Interest in the Safety Committee

By M. A. QUIRK

Assistant Industrial Relations Manager, United States Rubber Company, Detroit

This is really a tough subject, and I hope you will appreciate that whatever I say is just my own opinion, because I have discussed it at great length with men in other sections and it just seems we don't agree. But personally, I believe that safety committees can be conducted successfully. I think the first problem that any safety man has is to interest somebody in the plant in safety committees.

I found after five years of experience that I wasn't getting anywhere unless I could reach the top of the ladder. I went to the plant manager and sold him the idea on the value of safety committees. In order to sell him the value of safety committees I took a hint from our general supervisor of the United States Rubber Company, Mr. Beck, that you had to go loaded with statistics, have both barrels loaded, which I did. Our experience in the plant, while not bad, was not as good as it could have been. I got my statistics for the last four or

five years and told the manager I wasn't interested in the plant safety committee, but I was interested in the general manager's safety committee. I wanted a representation that he would head up as chairman, consisting of the plant engineer, the production superintendent, the plant foreman, and our production manager. He said, "We will formulate that committee."

It was my job, as I thought, to carry out a program for the entire year, because I thought I had to interest the manager's safety committee as well as the employees' safety committee. I formulated a program that carried us for twelve months. It is now on its tenth month. We have met monthly and I have had my statistics at hand at all meetings; and we also started a system of budgeting our accident experience and cost. Aside from budgeting, we had our engineering department inaugurate a docketing system where we would docket items that the engineering department failed to carry out. Sometimes, as you will appreciate, they were discarded or put in the second file because of the cost. I felt that I was putting it up to the engineering department. If I put an order in, or our safety men put an order in that they didn't feel like adopting, the responsibility was on their shoulders.

I say that whether a plant be large or small, safety committees can be conducted successfully. The method and cost will all depend upon the local conditions. The plant may have 500 or 5,000 men. But the safety committeemen can be organized.

I started out with the general manager's, or the central safety committee, as we called it, and then I organized a foreman's safety committee. They met monthly, as well as the general or central safety committee. I had to have some statistics for the foremen so they could appreciate what we were trying to do, and so they could turn the same information over to the departmental safety committees. In our plant of approximately 7,000 employees we have seven permanent committees. We rotate them each month, having a different man in each department each month. We have a safety committee meeting each month, and one of the foremen's men acts as secretary. A copy of the minutes is sent to me and to the general manager. We keep a tickler file on the minutes, and if we don't get the minutes we send a letter out from the general manager asking for it.

We have our general safety committee meeting, which is scheduled for the entire twelve months of the year. At these meetings I find, as you will find, I think, and have already found, that the men in the plant get sick and tired of hearing me, as safety director, talking on safety, or the general manager talking on safety. I have tried to get different outside speakers for each month. We have some good talent in the city of Detroit. By getting outsiders I find that the men get more interested than in listening to me or perhaps our factory manager.

In addition to that we have conducted what we call the conference type method of safety meetings, which perhaps some of you are familiar with. We tried it first with our production foremen in problems in production, and I saw we could use the same method in safety. I have found that successful. In addition to that, some of the men in the general safety committee have—I won't say developed, because I don't like to use that word—but shown keen interest in the conference type method of safety.

I am not using this authoritatively, but it is my plan that we have got to change these meetings monthly, give them new people to listen to, and new plans. In addition to that, we have an inspection system in the plant that is conducted by our safety committees. We have one man in each department who makes a survey of his respective department one-half hour each day. His report is turned in to the foreman who in turn sends it to me. I must tell you that I am pretty busy writing up orders. I felt that this may be an argument later on, that safety committeemen are interested in safety, if you show them results, if

you appreciate their results. At our plant we found a few years ago that it wasn't a wise thing to pay for the time they spend at such meetings, but now we find it is paying us big dividends. We pay every man for every minute he spends in our safety committees. While he is making inspection of his department, he is not paid. It is done after his shift. After each shift one of these men will make an inspection of the department and turn in the report to the incoming foreman.

I think a great many men will argue as to whether we should pay safety committeemen for the time spent at the meetings. We didn't for a number of years, but I think now we feel that it is money well spent.

A subject of this kind could occupy a great deal of time, and I think we can get more out of discussion than by having just my personal opinion. Some may have a better line-up than we have in our plant.

This year our safety committees have been successful. We have operated several months this year with no lost-time accidents for a month, and have gone through other months with one or two, where heretofore we had quite a number each month. So it is a proven fact in our plant that safety committees do pay, and in order to interest them we have got to give them some food for thought.

CHAIRMAN HUNGERFORD: That was very quick and snappy, and covered the subject, I think, very well. Let's have some questions. I am sure you will want to know in further detail as to how they handle safety committees at United States Rubber Company's plant in Detroit, and maybe some of you have other methods that you use that you think are successful.

MR. NORMAN: At what time do you hold these monthly safety meetings?

MR. QUINN: We have the large meeting at three-thirty, at the end of the first shift. We have the men on the second shift come in a half hour earlier. We combine the shifts once a month, because one shift is off at three-thirty and the other is on at three-thirty.

R. A. BULLOCK (Corduroy Tire Co., Grand Rapids, Mich.): How long do meetings last? Is there any specific time?

MR. QUINN: As long as the men are interested we keep them there.

OLIVER HOPKINS (Safety Supervisor, U. S. Rubber Co., Providence, R. I.): What system do you use in posting safety bulletins? I haven't heard a thing about safety bulletins being posted.

MR. QUINN: We have, I believe, 50 safety bulletin boards in our plant. We just assign the literature, with the foreman's name on it, and he has been previously instructed to post these posters in the department.

MR. HOPKINS: That is practically the way we do at Providence, but when we send out a bulletin I found it has worked out better if we only allow it to remain on the bulletin board three days. Years ago you would find seven or eight bulletins, but we have found it more effective to leave one bulletin on a safety board three days. It has worked out splendidly.

CHAIRMAN HUNGERFORD: We have five plants at Akron and 100 bulletin boards, and at each plant one man is responsible for posting the bulletins. Every Monday, regardless of whether he has anything to post or not, he goes to the board and cleans it. We found, too, that notices of different nature would remain long after the date on which the event occurred.

MR. SCHNEIDER: That could be taken care of similar to the way we do, using a rubber stamp at the bottom margin of the poster, in which the date of removal is indicated on every poster that goes out. We control the period of time ourselves, and the posters are not sent to the mailing room. We send them directly to the foreman whose duty it is to post them. He must know what they contain and describe them to the men.

MR. BULLOCK: We allow our foremen to select their own posters. That has helped to create interest in the posters. They select them from the *National Safety News*.

FRANKLIN ZELLSCHOFFER (Industrial Engineer, Kochring Co., Milwaukee, Wis.): The speaker seemed to think that people didn't agree with him on some of his methods. It might be of interest to him to know that we are on our third year now in using the system of rotating the members on our safety committees from month to month, and we have found it a great addition for creating interest. Our men are paid for the time they spend in the safety meetings, at their regular wage rate.

MR. QUIRK: When the men are safety committee members they are a permanent member always. A small button is given to them, which they wear on their coats or caps. We believe it is a mistake to keep the same safety committee for the entire year.

There is a man in the room representing a company that discounted inspection service. I would like to know how some of you feel about it. They think too many recommendations come in that cannot be taken care of and it discourages the men who submit the recommendations. I read an article on that a short time ago. I think some others here have probably had the same experience.

CHAIRMAN HUNGERFORD: Do you think it is a very good idea to tell these men just why their recommendations are not adopted?

MR. QUIRK: We give them an answer to every recommendation submitted, whether it is adopted or not.

J. R. HANSON (United States Rubber Co., Passaic, N. J.): I inferred from what Mr. Schneider said that the foremen are definitely assigned to the responsibility of maintaining the bulletin boards. Is that right?

MR. SCHNEIDER: That is correct so far as safety work is concerned.

MR. HANSON: I have been fighting with my boss on that very subject. He wants the foremen to have the entire responsibility of the bulletin boards. Don't you find there is a tendency for them to clutter up the board?

MR. SCHNEIDER: We have a distinct separate board for our safety posters. You would be surprised how much interest is manifested.

CHAIRMAN HUNGERFORD: The only thing we permit on our boards besides safety bulletins is letters on departmental subjects or company policy. We do not permit the foreman to post any piecework rates or any rates of any sort on his bulletin boards. We have a separate board.

JOHN KIRKPATRICK (Safety Committee, Armour & Co., Chicago): I would like to ask you gentlemen if you have these boards on the outside of the plant as well as inside the departments?

CHAIRMAN HUNGERFORD: We do not have any boards on the outside of the plant.

MR. KIRKPATRICK: We have them on the outside. We have them changed. We have visitors going through this plant every day. You are driving safety to the worker, but we are trying to drive it to the party at home, the wife, the mother and the children. They go through the plant, look at these posters and stop and read them. I think that is a good way for you fellows to bring safety to the homes as well as the company workers. We have boards placed along in different parts of the plant, and they are changed, as you say, by one man, but he has to change them, rain or shine. He is detailed to that job. I think you will find that is a good idea.

OLIVER HOPKINS (Safety Supervisor, U. S. Rubber Co., Providence, R. I.): We use the outside bulletin board, and in the case of these boards the same system as with the other bulletin board, leaving the bulletins up only three days. We have created a lot of interest in our automobile division.

CHAIRMAN HUNGERFORD: I wonder, Mr. Walker, if you would say a few words about your new arrangement with committees at Goodyear.

H. A. WALKER (Safety Division, the Goodyear Tire and Rubber Co., Akron, Ohio): We are very much indebted to Mr. Quirk for his presentation of safety committee work last spring at Columbus, and we followed practically the same procedure that he has used. We do pay our men for serving on the safety committees, that is except the supervision, with one exception. We do not pay our assembly men. Our

safety inspection committees are composed of a pieceworker, an assembly man and a man from the supervision. Perhaps our assembly man will bear explanation.

Our plant is divided into precincts and divisions, and the precincts are represented by representatives and the divisions by senators, and the whole thing is worked up on the federal plan; we have our senate and representatives, and they meet together and also in committees. An assembly man of course is supposed to have the welfare of the employee at heart at all times. He is allowed a certain number of hours a month to devote to that work, anything that might have to do with the good of an employee, running down a grievance of an employee or a condition in the plant. So the management felt in his case that was a part of his quota rather than a part of the safety work.

As far as the effectiveness of the safety committee is concerned, I don't want to quote a lot of figures of what we have got so far, and it hasn't run long enough to be sure about it, but our committee began to function effectively about the middle of July. August came out as a very fine month for us, and September has followed suit. If we can come back to the convention next year and say that has continued through the whole year as it has for the past short period, we will feel that the safety committee has done what it is designed to do.

CHAIRMAN HUNGERFORD: The subject before us now is "Safeguard Health of Compound Room Employees." That is a broad subject but the man who is going to talk to you has had a world of experience in safety work. I am very glad to present Mr. P. B. Martens.

Safeguarding the Health of Compound Room Employees

By P. B. MARTENS

Industrial Commission of Ohio, Columbus, O.

I am in a rather difficult position here. I can't refer to what we do at our plant, or what we do at the other plant, because if I describe a lot of things specifically, I might be in the same fix I would be in if I were up against a judge. Anything I would say might be held against me.

Mr. Quirk handed me my subject. Naturally, when I would ask the employees in the plant what were the hazards in the compound room, they very readily agreed they didn't have any. However, we all know that we have our little hazards in the compound room, and I don't know of anything that is of greater importance than good housekeeping. There isn't anything in the compound room that would injure the health of employees except the ingredients that are handled there, and there is just a doubt in my mind as to whether the man working in the compound room is given sufficient education as to the products he handles.

I know it to be a fact in a large number of places that a man will be given a respirator and told to use the respirator, but he is not told why. A certain man not long ago told me that he put a new man in the compound room, the foreman handed him a respirator, and the very next thing that happened was that he was looking for the exit. He said he didn't want to die, and if there was anything in there that necessitated his using a respirator, he wanted to get out.

I am a firm believer in educating the employee and telling him what the hazards are, and also telling him what he must do to protect himself. We have lots of things that are dangerous, and a man may say the litharge is about the most hazardous thing that we have. I know a great number of the plants are taking proper care of their employees along that line. I don't know a better method than is followed by some of the large companies where they furnish the worker a complete change of clothing when he enters upon his duties at the beginning of his shift. The men are rotated. If there are 30 or 40 employees in that department, the man will be exposed to the

lead hazard only as frequently as the number of men employed in that department. If it is ten days, every ten days he is exposed to the lead hazard. A man in good physical condition rotated in that manner will be able to throw off any lead that may be consumed; if he takes proper care he will be able to come back in there without improper effects.

I realize that we may tell men they must do this, they must take care of certain sanitation, but unless supervision sees that those rules are enforced, then it is just too bad. I frequently get into a department where there are health hazards, and instead of wearing the respirator you will find it hanging upon a post somewhere. You call a foreman's attention to it and his usual remark is, "Well, he should be wearing that." But he doesn't take the right step to correct the violation of that safety rule.

Your laboratory, where the formulas are compiled, should take the first step in the safeguarding of health of employees. As a usual rule, when a formula comes into the compound room it is not given a name. The person handling the pigments and compounds doesn't know in a great number of cases what he is handling. He is just handling a "number." That is number so-and-so and this is number so-and-so. I think if the foreman and the laboratory would work closely together along that line they would be able to educate their employees to be cautious and handle dangerous chemicals or formulas in a more safe and sane manner.

As to the manner of dumping your drums into the hopper, the greatest amount of dust, I think, is being raised at the time of weighing your pigments. I have seen cases where the hopper is up on the floor above and the bins are below. They will be dumping the pigments into the hopper without closing the bins downstairs, and the very first thing that will happen will be a cloud of dust coming out of these bins. Some of your employees are very careless and spill your pigments all over the floor, and in a very few minutes they will be walking around and stirring up a cloud of dust.

Those are the health hazards. The medical staff in the large plants do follow these things very closely, but in the small plants where a medical staff is not available, I think some means of examination should be installed. I realize fully that when a man enters the service of the company he is given a thorough medical examination as to physical condition. May I cite a case? This is not in any way connected with a compound room. A man employed as a crane man for years, entered the service of the company in perfect physical condition. His medical record established that fact. One day he walked out on a crane beam in violation of the company's rules and without throwing out the main switch; and as he stooped over to place the trolley arm onto the feed wire he evidently became dizzy and fell down on the feed wire and was electrocuted.

After the company had paid compensation to the widow, the widow came to the service department of the company and asked the manager to assist her in disposing of an automobile that they had. The inquiry produced the fact that the machine was nearly four years old, and when they asked her for the mileage on that car it was less than a thousand miles. She finally told the manager of the service division that they had bought the car and only driven it a few months, but the husband ran into the ditch one Sunday afternoon—he became dizzy and fell on the wheel. Her statement was, "Since that time we have been afraid to go out driving."

The widow admitted then that the husband had been afflicted with heart trouble for more than three years. Now, had that company taken the precaution of re-examination frequently, say every six months, I think that man would have been removed from the work of handling a crane, endangering a number of workmen. I believe that re-examination of employees, irrespective of the positions which they occupy, should be made very frequently, but not with the object of removing physical defectives from the service. In my experience we have always found that removing physical defectives from hazardous conditions or conditions unsuitable to them, and putting them on work that they are well able to do, has prolonged the life of the men and has removed the hazard of their injuring fellow employees.

Another hazard in connection with the compound room was ably demonstrated here with the picture of cutting rubber this afternoon. That is a physical hazard and not a health hazard. I don't know why they assigned this health hazard subject to me. Dr. Shirley covered it very thoroughly yesterday, and Dr. Shirley covered the advantages of physical condition, and re-examination. I happened to attend the Chemical session this morning, and Dr. Bricker read a very excellent paper on industrial hazards, and for a long while I thought I was sitting in the Rubber Section. It is discussion such as we have had here in our sessions, and I think that we can well refer to her paper when our proceedings are sent out to us, because we are vitally interested in solvents in the rubber industry.

There is nothing that I care to stress more than cleanliness in the compound rooms, the enforcement of the use of safety appliances installed, and frequent inspection of respirators. There are only a few things that are a detriment to the health of employees in the compound room, and we must stress cleanliness. Every compound room should have at least one shower facility for each fifteen or twenty employees. I know that some of our compound rooms in the rubber industry do not have shower facilities, and the man will go home and carry on day after day without having the opportunity of receiving the sanitation that he really should have.

CHAIRMAN HUNGERFORD: Thank you, Mr. Martens. Mr. Schneider, do you still use the soap treatment on employees in the compound room?

W. L. SCHNEIDER (Safety Director, The B. F. Goodrich Co., Akron, Ohio): Yes, we do, with lampblack or pigments that do not come off readily. That is the only purpose of that type of soap. We call it vanishing-cream soap. It is a composition of starch and soap preparation which is used either before or after taking a bath. It is more effective by using it prior to the shift, and it keeps the penetration of the lampblack and some of the other pigments at a minimum; it is readily removed.

MR. MARTENS: May I ask Mr. Schneider if they still continue the supervision of the sanitation of the employees, seeing that they go through the process of a good shower before they change back into their street clothing?

MR. SCHNEIDER: When we started out we had what we called compulsory supervision, but we don't have to do it today. We have made our shower baths so attractive that you will rarely find any man going home without taking a bath.

J. Q. LEE (India Tire & Rubber Co., Akron, Ohio): I might suggest that if you want to create interest, let the company furnish soap and towels, and they will all be taking a bath. We furnish soap and towels for all employees.

B. J. BOSTWICK (Industrial Relations Department, Gillette Rubber Co., Eau Claire, Wis.): In our compound room we stress cleanliness, Mr. Martens' main theme, and we allow thirty minutes paid time at the end of the shift for men to clean themselves up before going home. It is very effective.

MR. SCHNEIDER: We pay the men the time for taking the shower. I might also mention we absolutely prohibit the use of tobacco chewing. I think everyone recognizes the importance of such control.

CHAIRMAN HUNGERFORD: To the contrary, we permit chewing tobacco. We prohibit it in no place. However, we show them the way to take a chew, so as not to get it affected by the materials in use in the plant.

R. A. BULLOCK (Corduroy Tire Co., Grand Rapids, Mich.): How about ventilator hoods over the scales where the compound workers weigh up the different materials? I would like to know if that is advisable.

MR. MARTENS: Yes.

J. M. KERRIGAN (Manager, Industrial Relations Department, U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y.): One thing you have to watch is the density of compound. It varies with the different types of compounds. We have a problem which we try to work out. It is hard sometimes, but it is effective.

CHAIRMAN HUNGERFORD: We were using a compound which was very light, and it also had a very bitter taste which was objectionable. We placed a scale on a hood and the man pulls a lever and empties the required amount, watching the scales. That

is completely ventilated. Also where we have objectionable compounds, especially in connection with master batches, the material is placed in certain quantity bags, with certain numbers of pounds, whatever is necessary for a batch, and when the compound ticket calls for that material it goes to the mill man, and it eliminates the handling of the compound and eliminates exposure which you would have otherwise. We use it especially with lamplack.

MR. BULLOCK: Do you mean you buy the compounds weighed up in those bags?

CHAIRMAN HUNGERFORD: Yes.

MR. BULLOCK: If it were necessary to weigh them yourself, would you have a ventilator over the scales?

CHAIRMAN HUNGERFORD: Yes. We have several that we cannot buy that way, so we put it up in bags.

The next subject is one that we can spend a lot of time on. Mr. Schneider will now talk to us.

Inspection of Rubber Machinery and Equipment

By W. L. SCHNEIDER

Safety Director, The B. F. Goodrich Co., Akron, O.

The principal reason for a definite and periodic inspection of machinery and equipment is to detect faults not ordinarily observed and to insure safe operation of such machinery and equipment within reasonable limits.

Stopping limits of prime movers and their appurtenances are closely associated with the condition in which a machine is maintained.

To guard against machine hour loss and to insure quality production, it is essential in some cases to inspect machinery and equipment while in motion, to determine by sound and feel whether or not it is in good condition. In such cases, from the viewpoint of safety, the method of inspection and control exercised is most important and requires careful and logical planning.

In such cases, the inspector must be carefully trained to avoid coming in contact with moving parts, and adhere strictly to all rules and regulations covering machinery and equipment of such special nature upon which he is required to work.

Wherever possible, new equipment, if carefully designed, provides for greater and safer accessibility and often obviates the necessity for working on machinery in motion.

Where machinery is not in motion, naturally little hazard is encountered and therefore shut-down periods are decidedly advantageous in planning inspections and repairs.

In shut-down periods or when machines are at rest, however, due precaution should be used in locking out main or auxiliary switches if independent, or by the substitution of warning cards hung on switch handles otherwise. These cards should generally contain the name of the mechanic or inspector and his payroll number.

Wherever possible, centralized control of machinery, tools and equipment is decidedly advantageous for the reason that a unified control eliminates divided responsibility.

The question of the part the safety division plays in this subject is and always will be debatable, however, from the viewpoint of experience the method must, as in many other cases, lend itself largely to the facilities provided for in each case.

It is the writer's personal opinion that more effective safety inspection can be accomplished by delegating such responsibility to the field engineer and production groups, the safety department always receiving reports of such inspection

tions and sitting in as may be necessary in the discussion and conference of the subjects at hand.

At Goodrich our safety meetings are partially taken up in an inspection of machinery and equipment in which the department to be inspected is not assigned until conference time and the safety director and all general foremen of the division themselves make the inspection, and the findings are a part of the minutes of the safety meeting. The follow-up is then made by the foremen involved and checked by the safety director.

Time will not permit of the detail in such procedure as this would involve four divisions employing over 10,000 employees, in which workers in operation produce 32,000 different rubber articles, representing 1,000 different rubber products; so it is evident that the extent of the safety problem of inspection is readily apparent. Add to that, pertinent facts about physical property and the background is complete—65 separate buildings varying from one to ten stories in height, providing a working area of over six million square feet, 60 elevators, 7 substations of which 3 are main stations controlling incoming 23,000 volt power for 3,200 motors with capacity up to 1,000 H. P.; 32,000 machines; 12,000 shears and 15,000 knives. All motors, 150 H. P. and above, are operated at 2,200 volts. I will endeavor, however, to briefly discuss some of the important machinery and equipment in detail as follows:

I think you are interested in high pressure gases, such as oxy-acetylene cylinders, etc. We have inaugurated a system in which every piece of apparatus in connection with high pressure gases, gauges, etc., is inspected once each month. We have a trained man in our mechanical division who does nothing but that, and maintains a complete record of every gauge that is in use in our plant and our neighboring subsidiaries. That is tested mainly for leaks, parts that might be corroded, such as valve discs and things of that nature, and if they are found defective they are replaced and again tested to be sure they will function when needed.

After that the gauge is tagged with a sticker which indicates the date upon which it was inspected and the production department, as well as the mechanical division, are informed of the date on which that should be returned for a reinspection.

You might be surprised to know that we have found a great deal of defective equipment, and we found that it has made us not only from a safety standpoint but from a dollar and cents standpoint able to carry on this inspection as we have done. Probably it might not be necessary in some instances where you have a small amount of equipment, and the inspection of such might readily be delegated to the man that uses it, provided he is sufficiently acquainted with it.

One other item that I think might not be applied to the rubber industry alone but to any industry, is a ladder control. We maintain a ladder control. I can't recall at the present time how many ladders there are, but I think it is around 400. These ladders are mainly kept at one point under the control of a qualified man who has a complete record of every ladder. The ladder is also tagged with a metal label to identify it. All information indicating the type of ladder, what it is used for, the name of the man who is to use it, is kept on the tag board, and no ladder is given out without a tag, and the ladder must be returned by the man to whom it is given on the same day upon which it is given out. By this method we find that a ladder is given an inspection every time it is taken out of the control room. There are exceptions to this rule, so I will mention the fact that there are some assigned ladders. It would be detrimental to good practice to take away every ladder from the outlying departments where they are needed very often, and in these cases they are assigned. In most cases they are chained up, and only those having to use them have the keys. These are, however, recorded the same as any others, and are brought into the control rooms for a complete inspection, or inspected in the field once a week.

I am proud to say that our ladder accidents have been very small. In fact, they have been infinitesimal. I am not going to say that is the reason, but I believe

it is. It goes without saying that the quality of the ladder should be good, and we don't pussyfoot around, as was mentioned at one of the former meetings, with the ladders. If there is anything wrong with them they go immediately to the repair shop, or if they are in bad condition they are scrapped. When I say scrapped I mean nobody gets them or any part of them.

Regarding chain blocks, I think that is highly important. We have a man in our mechanical department with an assistant who does nothing else but take care of chain blocks. He has a card record and every one is numbered as to its condition, and he makes a periodic inspection of chain blocks and the chains thereto. If a chain block is found defective it is taken out of service, and if it is necessary to have one immediately, another one is supplied that is safe. The chains are measured very frequently in the method you are probably familiar with, an elongation test of having a mold which is an exact facsimile of the chain as it should be without stretch. If there is any stretch or elongation to it it will show up in the mold.

In addition, every part of the chain block is gone over to see that there is no defect, carefully oiled, and seldom is there a chain block that has a defective part taken and put into another block. I think you will find that is done, but it is detrimental and may cause a serious accident.

There are a number of other safeties in connection with vulcanizing that I will mention casually, that is "tell-tales." I am not familiar with all types of equipment, but we have what is termed a tell-tale which affords the relief of the pressure within the vessel below one pound per square inch. I believe I can best give you an impression of that by telling you that we have had, prior to the installation of such equipment, cases where a door has been blown open. In fact, serious injuries have resulted from the premature opening of doors, where the pressure did not show on the gauge at one pound. A pressure gauge for high pressure generally does not indicate pressure below one pound, and to the average vulcanizer worker it is not appreciated that the pressure per square inch can run into thousands of pounds at below one pound pressure. Consequently that is a hazard which every man should recognize in his own plant, and we have provided for that purpose a tell-tale on the front of the door in which every bit of pressure can be relieved from that door and you can see from the atmosphere whether there is any pressure behind it. It simply is a pipe connection with a valve open to the atmosphere and going down. It may consist of an elbow, going down, and you turn it down and your gauge registers zero. We prohibit a man from opening a door until it reaches atmospheric pressure.

In addition to that, we have interlocks, which require inspection to be certain that there are no worn links or anything of that sort. The purpose, of course, is to prevent premature opening of the door, and these are usually operated in connection with a device known as a tell-tale. I believe there are still some bolted doors operated. I think that is possibly the older type of equipment, and I don't believe you will find many of those today. But the lugs should be carefully examined for defects, and the rings, in fact the entire vessel, both internally and externally, should be examined. Our vulcanizer inspection is conducted by a man who is delegated to that job entirely, and contacts with the inspection department of our insurance carriers, and the inspections are made on every vessel within our plant in one year, both internally and externally, and other times that may be found necessary with special types of equipment.

For this we have a very elaborate set of forms, upon which every known inspection is recorded, and these of course are kept for us to determine the life of the vessel from the standpoint of use as well as safety.

Conveyors, both horizontal and vertical, require considerable inspection for the reason that a good many of them consist of chains or links, and it is quite possible that lack of lubrication, or wear, may disjoint one; and in the case of a vertical conveyor I have heard of cases where an entire chain, going four or five stories, has come back and caused very serious damage and in some cases injury. In this case latches are provided, and it should be the duty of the inspector to see that these latches are inspected each day to be certain that they will function; and in the case of any

emergency stopping or rope switches, the functioning of those should be inspected by the production department at the beginning of each shift to determine whether they will function in the proper manner.

The hooks connected thereto are apt to bend. I have seen some cases where malleable iron has been bent in a hook to the extent that it has caused considerable damage to other parts of the conveyor. Of course it may cause a serious injury in that case.

The wind-ups might apply to a good many types of machines, primarily to calenders and bias cutters, and as we saw on the screen today, I think we all recognize the importance of safeguarding those, to be certain that whatever type safety we have is correct; I believe the majority of members here use some type of emergency stop. If an emergency stop is used that should be tested at the beginning of each shift to be absolutely certain that it will function within that shift, so far as possible. With regard to any other moving parts, these of course would be inspected in the same manner, particularly your holder bars, and so forth. I have known cases where they have been badly bent and it has caused misalignment, and so forth, and I think it might be well to cover those.

I think the most essential part of mills and calenders is the stopping limits and the safety devices as applied to stopping limits. Whatever type stop is used, whether it be plugging control or dynamic breaking or clutches or what-not, the stopping limits are highly important because of the fact that if a worker is caught between the bite of the rolls, the stopping limit, if effective, will lessen the seriousness of the injury. The stopping limits recommended by the various states, I believe, are rather limited. There is an American engineering standard, and I believe it is a very good standard to follow. It is reasonable, and if the equipment is maintained and designed to come within the limits of that standard, I think we should be reasonably protected.

The switches and breakers, often become corroded or soapstone or other pigments get in between the breakers and contacts, and I have known cases where, when the safety was tripped, they failed to function for that reason. We have designed for our own use a number of roller contacts which so far have worked very efficiently and eliminated that particular trouble. With clutches, where brakebands are used or solenoid switches, the switches must be inspected so that they will not only lift the weights but function quickly and accurately with the bands for alignment, so that when the safety is tripped they will take hold and operate your clutch so that your line or piece of equipment is readily brought to rest. In addition to that the tests that are made will determine largely whether further inspection is necessary in the roll drive.

As to the compound room, I think that has been covered from a health standpoint. There is one item I would like to mention, however, and that is that very often clutes are used for sulphur, and it has been found that where baffles are provided to break up the sulphur molecules it has eliminated static electricity to some extent. We have found that corrosion has taken place and often eaten off the baffles, they have dropped down and consequently we were exposing the compounders to some hazard until those were replaced. An inspection of that should be made to determine the fact that the baffles are in good condition, and where they should be provided at the various off-sets.

Regarding elevators, I would like to mention simply that while elevators are used in other industries, it is highly important that a definite and periodic inspection be made of every piece of safety equipment in connection with an elevator. I have seen cases where guide-shoes were worn, governor ropes were worn, cables were defective, and people had no idea that such a condition existed. A good many of them depend largely upon their insurance carriers to determine the defects. I think it is well, if possible, to delegate some one individual or more to make a periodic and careful inspection of every piece of equipment, including the gates of an elevator, because of the serious hazard involved, primarily to life. I think everyone recognizes the fact that elevators carry a great deal of human freight, and are usually in charge of an

operator who is but human. Therefore the inspection of the equipment itself is very important, and I don't believe you can go too far in the inspection of an elevator.

CHAIRMAN HUNGERFORD: We do know that the only way we can eliminate certain types of injuries is by inspection. It is a matter of simply equipment failure, and they can only be eliminated by careful inspection.

J. M. KERRIGAN (Manager, Industrial Relations Department, U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y.): Mr. Schneider spoke of elevators. I would like to warn the members of this section and other sections that in regard to elevators you should have an inside drop door. We learned that after last Friday. We had a man going up in the elevator, an experienced man, with a load of rubber. Unfortunately, he stood back of the load. The handle dropped, forced the truck back against the wall at the other side, and he lost his leg. I don't know of many freight elevators that have that inside door on the carrier proper. We are going to start on all freight elevators, whether one side or two sides, to put this guard in front, not more than a half inch at the most, of mesh wire, and have it drop on the inside of the lift proper, making it positive that it will be in position the same as the door, protecting it well before the elevator can lift. Some of you men may want to look into your own elevators regarding that thought. Whether you have one side or two sides open, you have that potential hazard that the man may be back of the load and he may have his body crushed.

CHAIRMAN HUNGERFORD: I think you all know Mr. Beck, of the United States Rubber Company, Passaic, New Jersey, one of our outstanding men in accident prevention work, especially in the rubber industry. I am mighty glad to introduce Mr. Beck.

A Talk on the Basic Causes of Accidents

By ERNEST W. BECK

Supervisor of Safety, United States Rubber Company, Passaic, N. J.

In order to determine the basic cause of an accident, one should study and investigate the conditions and operations which cause or help to cause the accident. When you determine the basic cause of the accident then you are in a position to develop ways and means of eliminating the cause.

When reading statistics on accidents you will notice they designate the types of accidents as *causes*. This is a very common practice and does not get us very far. The type of an accident is not always the *cause* because you cannot cure a type. Unless you go back of the type and find the real cause, you have no remedy. For example, a man may fall on the floor and break his leg. The accident might be classified as "fall on floor." The real cause might be due to failure to enforce rules, lack of maintenance, improper equipment, or lack of instruction. Perhaps in this case it was some supervisory cause which if corrected would most readily have prevented the accident. It is only a matter of selecting the particular cause that will most readily prevent an accident. Only by doing this shall we prevent accidents.

Statistics mean very little when you speak of percentages of falls, percentages of machinery accidents. They mean much more when you speak of an accident caused by inexperience, lack of mechanical safe guards, lack of instructions, or something which is a direct cause of the accident. In fact, statistics at times are misleading. Until we analyze them they are meaningless.

Take as an illustration a machinist mounting a casting in a chuck. Suppose the chain hoist should fail and the casting drop on the chuck or machine, damaging the equipment seriously. This would be an accident, even if the mechanic were not injured. The first thing that management would do in this case, would be to find out why the accident happened. Management would not say that the accident was caused by a falling object and let it go at that, but would immediately inspect the overhead track, the chains, hooks, pulleys etc., in order to determine the exact basic cause of the accident.

I believe we should have this same analysis in determining the cause of our accidents. Recently I was reading over some accident statistics, analyzing the cause of accidents in a certain industry. They were classified according to the most important causes which were as follows:

1. Handling material.
2. Falls.
3. Machinery.
4. Falling objects.
5. Striking objects.
6. Hernias.
7. Other forms of strain.
8. Scalding.
9. Elevators.
10. Infection, etc.

The point I want to bring out is, after analyzing these statistics, I found I had accomplished practically nothing, for these classifications in themselves were really not causes of accidents. I believe I am safe in saying that none of the accidents mentioned in the statistical report were really caused by the classifications mentioned. Take for instance the classification of machinery. I cannot see how you can blame a particular machine for causing an accident any more than you can blame an automobile for being the cause of an accident.

A large number of accidents were classified as due to falls. What I would be most interested in knowing is just what caused the fall. Was it due to defective equipment, not obeying instructions, or taking a chance? When you have an accident classified as due to a fall and find out that it was really due to a defective step-ladder, I see no reason why you should blame the accident on the step-ladder. It is surprising after a thorough investigation through a large plant how many defective step-ladders you find and accidents caused by this equipment classified in the wrong manner. If the above accident was classified under "lack of proper equipment" the safety engineer would be in a position to make a definite recommendation.

I would like to quote from a talk given by Mr. Heinrich on this subject as follows:

"That above all, as in the case of bodily ailment, it is vital that we find and treat the cause of the trouble. In this case the cause of the accident. This to a regrettable extent we are not doing today. We confuse the injury with the accident in our search for cause. We confuse cause and types and are therefore misled in our corrective action."

A slip or fall may be the cause of an injury but not the cause of the accident. The accident itself is the slip and the fall. What we want to determine is the cause of the slip or fall, not necessarily the cause of the injury. The accident is not the injury but the accident is the slip or fall. Now, the point is, what caused the slip or fall. Unless we know actual causes, we cannot bring about effective remedies. Progress can best be made through actual knowledge of accident causes.

Keep your causes brief. Make the report concise so that the foreman will have but to underline or check the basic cause of the accident.

Suggest Revision in Classifying Accidents

I suggest that you make a determined effort to bring about a revision in the present practice of classifying accidents by causes and that an effort be made to obtain the complete story of accidents from which the real cause may be more readily determined. Draw up a list of what you believe to be the basic causes of accidents in your industry. When an accident happens, find the cause of that accident in accordance with your classification. If this is done in a conscientious manner and given the proper publicity, I believe it will assist materially in reducing your number of accidents.

Strictly speaking, there is no such thing as an accident because the things that we

call accidents are merely the working out of the law of cause and effect. A great majority of our accidents are due to the human element. I believe it would be a good thing if we could devise a new symbol for this word "accident" which might involve the responsibility of the individual because so many people regard an accident as merely an act of Providence or something that they cannot prevent.

The only way to bring about a reduction in accidents is through the knowledge of basic accident causes. In solving any problem, the first thing you do is to find out what is wrong and then you proceed to correct it. I am sorry to say that this is not always done in accident prevention work. So often the injured man is blamed when as a matter of fact the responsibility could very easily be placed on the shoulders of some other party. The reason for this is obvious. We dislike to hold a court of inquiry; dislike to blame someone on the supervisory staff or even the management, but if the safety engineer is going to make any progress he must have all the cards on the table and not close his case until he has solved his problem.

In getting at the causes of accidents, in some cases there will be persons responsible who will try to shed responsibility, but the safety engineer has the advantage at all times in accident prevention work of bringing forward the argument that we do not want the same thing to happen again and for this reason we want to know just what we should do in order to correct the condition.

I do not think we should stop classifying our accidents by types, for it is valuable to know what accidents are classified as burns, falls, explosions, infections, etc., just as it is valuable to know the cost of accidents together with the time lost. I feel that it is important to know the cause of the accident itself as distinguished from the cause of the injury.

It is a fact that physical hazards are becoming less a real factor in safety each year. However, when we do have accidents caused by physical defects, they are usually very serious and run into considerable expense and time lost.

When you have the correct analysis of the basic causes of accidents you will probably be convinced that more than 90 per cent of your industrial accidents are preventable. The analysis of your basic causes will probably show a large number of cases due to lack of proper supervision. This should mean that more time and effort should be devoted to this phase of safety work which is so important.

After analyzing your basic causes of accidents, the next thing to do is to set out and eliminate the cause. When you do this you will find that it is not only possible to prevent a great many of your accidents but you will also make for economy, efficiency, greater production and greater profits. We have tried analyzing our lost-time accidents according to basic causes. If we were to do the same with our no-lost-time accidents, I have every reason to believe that we would find the same causes predominating in this group. Concentration upon the reduction of minor accidents frequently automatically takes care of the major or severe accidents as well.

Your number of accidents is controlled by proper supervision. I believe the majority of accident troubles in industry can be cured by the foremen. They should be held responsible for the proper machine guarding and the improvement of what is known as mechanical or plant physical condition. In other words, those accidents that fall into the classification of supervisory and physical, are both controlled by either the employee or the employer. A careful employee can perform his work safely under hazardous operating conditions. Management can operate safely since it has charge of the employing of careful and experienced help. Management also has charge of the training, instruction and supervision of its employees as well as the proper guarding of its machines and the adoption of safe methods and practices.

Accident Proneness

A great many people believe that accidents are usually due to outside physical causes, but you gentlemen know that there are mental causes of accidents also.

Lack of forethought, for example, in doing things without consideration of the possibility of mishaps. Another mental cause is inattention or wool gathering. Persons with slow mental and physical reactions on jobs that require alertness and quick coordination. On the other hand there is the nervous, quick acting employee. He at times is also a hazard to himself and others. Irritation also is a frequent cause of mishap. Noise is irritating to some but not to others. Worry is unquestionably a contributing cause. All of these factors tend to develop accident prone employees. Individuals differ in accident susceptibility. It has been proven that the liability of workers to sustain accidents is not equal and that some are inherently more liable to sustain them than others. A frequency curve would show that the bulk of the accidents in any group is sustained by a relatively small number of individuals in the group.

We have in our company a personal injury report that we use in connection with our analysis of the basic causes of accidents. In addition to the history of the accident, which includes all circumstances occurring prior to and immediately following the accident, we ask each foreman to underline the predominant cause of the accident, what has been done to prevent a recurrence, together with any recommendations. The foreman signs the report. After glancing over this report you can see at once that the foreman is making the analysis. If no instructions were given, he is required to state so. If the machinery was unguarded or ineffectively guarded, he also makes a memorandum accordingly. Take for example, an accident that happened where tools were defective. The foreman would be required to underline defective tools. This report is passed on to the safety engineer and gives him just the information that he wants in order to correct the situation. It may not be the fault of the foreman that the tools were defective, but it gives the safety engineer an opportunity of presenting the proper facts before the powers that be, in order to correct the hazard.

The reporting of an accident in this manner means a little more work on the part of foremen but I believe the time is well spent, and when the work is properly done and followed up, the tendency is to reduce the number of accidents, thereby reducing the amount of accident report work.

Following is an interesting table taken from a report submitted to the National Safety Council. A group of 600 cases of lost-time injuries was studied. It shows the steps that probably would have prevented the mishaps, together with the percentage of cases:

Discipline	17.68 per cent
Instruction on safety methods of working	15.12 " "
Warnings to be more careful	12.38 " "
Enforcement of safety rules	11.69 " "
Improved inspection methods	8.42 " "
Changed or new tools or equipment	7.05 " "
Additional personal safe equipment	6.00 " "
Additional safeguards	4.64 " "
Change in methods of doing work	4.47 " "
Change in plant layout	3.94 " "
Safety education	3.09 " "
Physical examinations	2.23 " "
More suitable work for employee	1.55 " "
General discussion at safety meetings	1.03 " "
Closer supervision of details of work	.35 " "
Enactment of new safety rules	.18 " "
Clean-up of plant	.18 " "

100 per cent

Recently I made a survey of the basic causes of all the lost-time accidents in two of our largest factories, and I was surprised to find that at each plant the majority of causes were the same. The greatest number of accidents was due to disobedience of instructions. Next came poor judgment, then unsafe practices and fourth, haste. You will note that in each of these four cases the causes were due to the human factor. You might say, "I notice that you state that the largest number of accidents were due to disobedience of instructions. Don't you think the foreman is trying to pass the buck on to the worker?" In a few cases, I will agree with you. However, we have the basic cause, which is disobedience of instructions. It may mean that the foreman was disobedient in not giving his instructions as well as the worker being disobedient in not following instructions. In other words I believe we have the pulse of our situation, namely that the foreman may not be putting across his instructions. He may be a poor teacher. When these facts are presented at a foreman's meeting I believe you have an excellent opportunity to register on your foremen the importance of giving proper instructions and seeing that instructions are properly followed. This is an important responsibility of every foreman.

I would like to impress upon those who are in charge of accident prevention, that you assume the full responsibility of your job, that you dig below the surface causes of the accident, and not be satisfied with evidence that may indicate the accident was unavoidable.

I have had the unpleasant task of investigating many serious accidents and I am sorry to say that some accidents would never have happened if safe working conditions and proper equipment had been provided and used. Accident prevention, to accomplish the desired results, must have the whole-hearted support of the entire organization and the management must be willing to back up its good intentions financially without quibbling over minor expenditures. Safety is not a one-man job. The success of the work can best be measured by the number of people who are cooperating and if the safety director is wise, he will stay in the background as much as possible and stimulate the interest of those who are on the firing lines, and in a position to put the thing across.

He should by all means give credit for results achieved to his helpers as the good work will be reflected through the efforts and results of his associates. He should have no thought of ever finishing his job, as his task is one of eternal vigilance.

CHAIRMAN HUNGERFORD: As far as basic causes are concerned, we have been using that method for years and we find it gives wonderful results. It gives you something definite.

W. L. SCHNEIDER (The B. F. Goodrich Co., Akron, O.): I am heartily in accord with the idea Mr. Beck has brought forward today. I don't think half of us delve enough into the causes. I think the recording of them, however, costs a lot of money, particularly in a large industry. I might ask this: Would the foreman hang himself by answering your form, to the extent of saying that faulty supervision or lack of instruction was the cause of accidents in his department?

Mr. Beck: In the paper I have stated that the more analyzing you do on the subject of basic causes, the fewer accidents you are going to have. It is a little more work for the foreman to make out this report, but I think you are going to have fewer accidents, therefore less work. It is true the foreman may not want to put down improper instructions as the cause of an accident, but if he finds out that is true, why shouldn't he put it down? You have to make him do it. When he finds out he has to, he is not going to have the accidents to record. The more you take the club down to the person who is responsible, the quicker you are going to accomplish results. I said I didn't believe in drastic discipline, but I do believe in putting the fault where it belongs. When I talk to the foremen I tell them that their responsibility is in their department. I say, hold him to it. Make him take the responsibility. When you put it

to him in that way he is going to assume the responsibility of his department. When you say the safety engineer is responsible for the accidents, you are not going to get to first base, but if you make the foreman responsible and make him put down the cause, you are going to get down to basic facts.

We don't like to hold a court of inquiry, but that is what this amounts to if it is done right. But it is done by the foreman. If you get enough of these reports from a particular foreman that they begin to show him up, you don't want him around.

CHAIRMAN HUNGERFORD: I think, Mr. Schneider, that is one way we were able to point to our foremen their responsibility. They didn't realize that those things should be definitely under their control until they had to make these reports.

Mr. SCHNEIDER: I meant this: A foreman is human just as a worker, and he isn't going to hang himself if he can get away from it. He is going to give you some other cause if he can, particularly when you are placing the responsibility on him, which you say should be done. We rather feel that we should let our foremen tell how an accident happened and the basic cause in their own language, rather than fill out a form. With a form, as you know, it is common practice to check this off, and check that off. I think there is value to both systems.

Mr. Beck: You go back to him and say, "Do you think you checked that right?" You don't have to tell him.

Mr. QUINN: When a man comes to the doctor's office, you get the story from the doctor, as I see it, and I have always found the man in most cases will give you the basic causes. I don't believe the foreman wants his men to know he is double-crossing them or the safety department.

Mr. SCHNEIDER: We find in many cases the worker goes into the dispensary and tells them the accident occurred differently from the way the foreman describes it. We find it through the investigation and the foreman's report. They tell it in their own language.

A. M. DIETZ (Pennsylvania Rubber Co., Jeannette, Pa.): May I ask how some of these basic causes are arrived at? I want to cite an instance. Every time we have a mill down we have a record of that; it is my duty in the morning to go along and take a record of that mill, and if it is down for some cause other than a natural cause we record it.

About four weeks ago I was called from home to come down, we had a man caught in the mill. I immediately went into the office and looked up the record and found this same man had on two different occasions this year pulled that safety switch to take foreign matter from this mill. This particular time, instead of doing that, he jumped in after a knife he had dropped in doing his work. The foreman sent the report back blank; he said he would rather the safety committee would fill it out.

Some say the accident was caused by inattention. A committee went to investigate the home conditions and found that shortly before that he had had a girl operated on in the hospital and they said it was a mental condition.

Mr. Beck: I mentioned in my report about mental conditions and fatigue. You have to consider those factors. How many times did that particular man stop that mill himself?

Mr. DIETZ: Twice.

Mr. Beck: How long had he been at the plant?

Mr. DIETZ: Eleven years.

Mr. Beck: He should have stopped it many times. If a man stops mills every week or two, when you shut a line down, he knows what to do and won't dive in after knives he drops. In our plant we have men stop the lines, and a report goes to Mr. Hanson and he knows who stops those mills every time. He knows how many men are in the department and if he cares to he can check them off and know whether the man has stopped his mill with safety twenty or thirty times a year. The man who has done that is not going to jump in.

Mr. DIERZ: One of the first regulations of our company in the morning is that those mills are started and stopped by the man himself to see that they are safely working. There are five mills, and every one is stopped. It takes fifteen or twenty minutes.

Mr. QUIRK: I would like to add something: (This might answer Mr. Schneider's question too.) Take, for instance, the mill room. We will say it has six lost-time accidents over the first quarter. The reason for them is desired, and we want to review them with the management. At our central safety committee meeting we review them. I investigate them with the foreman and safety man in the department. If the foreman submits five reports a year, and on that particular report he will just say improper instructions, it is up to the general manager of that plant to see if that man is issuing proper instructions in the future. If it is disobedience of rules it is poor discipline; I think the only way to arrive at that is to review them periodically. I think you will get more meat out of them after reviewing them and going over them with the people responsible for the production. The foremen have got to be shown, and it is certainly working out in our plant well.

Mr. SCHNEIDER: Still I question whether a foreman will hang himself by stating that he failed to give an employee proper instructions.

Mr. QUIRK: In this one department in our plant I really believe we have one of the most efficient foremen in our company today. He is pushing production all the time. Fifty per cent of our accidents were charged to the mill room. These were turned over to the general manager. They were serious accidents. Since we started to review them and put the blame on the foreman, that department hasn't had a lost-time accident in five months. He is showing you he can do something, and he is elevating himself in the eyes of the management, because he is now doing a good job.

CHAIRMAN HUNGERFORD: In answer to your question, Mr. Bostwick, the foreman makes out this report for every injury, no matter how trivial. Original is sent direct to the safety department and a copy to the department manager. The manager may have charge of several departments. I was getting a number of reports from our calendar room, not lost-time accidents but cases where men cut their hands on a knife. The reason checked was inattention. I didn't care so much for that cause as given by the foreman, and in investigating I found 85 per cent of our injuries were knife cuts in the calendar room. In following it up myself I found the reason was because they were using a round-handled knife. The hands would perspire and the knife would slip. The result was that I got our purchasing department to contact the people from whom we buy most of our knives, and we are using a knife now that is flat on one side, also a triangular knife. We are replacing the old knives gradually with these new ones, and it is practically eliminating that type of injury. They use a long knife for cutting out samples on the cord.

Mr. BECK: We get a complete analysis in our New York office of all accidents, classified according to causes, listed by departments and by plants, then finding out where they are happening, and how many. We have been surprised to find out that, say, 3,000 accidents are happening from scissors, sharp pricks or points. You dig into that, you find it is not the individual's fault always; so we said that was our fault. The scissors were dropping from tables, falling, cutting, sticking into people. We issued orders that points on all scissors must be ground off unless there was a good reason for their being there. The points were ground off at very little expense, and our accidents due to shears have practically been eliminated.

CHAIRMAN HUNGERFORD: Another thing in answer to Mr. Schneider. I found out quite a number of cases occurred where the foreman would not hang himself. But in making an investigation of those accidents, particularly a lost-time accident, getting down to brass tacks with the foreman, I have shown him very definitely that he didn't answer correctly. I explained just why, the basic cause, and the result was that I found that with very few exceptions they will assign the basic cause because

they know if they don't they never know when they are going to be checked by me or someone else who is familiar with basic causes. If that occurs we usually put it up in such a manner that they realize that it is pretty serious to do that.

Mr. BOSTWICK: We had three copies of that report made up, each one in a different color. One report goes to the general manager on the lost-time accident. It brings the foreman's attention where it belongs, and we get results. It has been effective, and lost-time accidents are not so numerous so the general manager will take the time to go over them, and it has brought us the results.

Mr. DIERZ: May I add one thing to this. When we have a lost-time accident and a man leaves the factory and later reports back to the nurse. I am notified that the man has reported back to work. At the following committee meeting we ask the man to appear before the committee, with his foreman. When they come in there, we let them sit for general department, and they stay there during the period of the whole meeting. Before they know why they are there they are rather uneasy. Then we get the description, both from the employee and the foreman, and the controversy is ironed out in that meeting and the responsibility placed.

There is another thing, regarding tag hooks. Up until the last of last month we have had 76 people visit our hospital who were scratched or cut with tag hooks. I can't eliminate tag hook scratches and cuts.

Mr. BECK: You can. Believe me, we had them. You remember the old serial tags? Didn't you have just any number of cuts with them? We have licked them. You have got to stay with the job.

Mr. BECK: I remember what Mr. Quirk did on serial numbers. You know the quantities of tags you have, all the way from 100,000 to 150,000 tags a day, with the men handling them several times a day. These men were cutting themselves over and over again. We found out how many accidents were due to serial numbers, found out the cost, and told the management the amount. We put in aluminum tags with round corners. It was just a case of a business.

Mr. DIERZ: The hook I have is a little two-pointed hook that you put a tag on and the end sticks up.

Mr. QUIRK: You use an ordinary paper hook. We use string.

CHAIRMAN HUNGERFORD: There is another hook on the market. It is a triangular affair, and is heavier than this paper clip. We found that these were not heavy enough, and the points are made so they come together like this. This is very easy to put onto the liner with your tags and eliminate that trouble.

H. W. LOW (Miller Rubber Co., Inc., Akron, Ohio): We have eliminated a lot of accidents in using a little diamond shaped holder. We asked the manufacturer to send them to us with the points blunt. That was satisfactory, and since we affiliated with Goodrich, they have a different type of hook on which the point is protected after it is blocked on. We used to have a stock book with it fastened on the leaves. We put a little staple in the end of the hook and just drove the ordinary wire staple into the wood.

Mr. BECK: You gentlemen remember the binding wire bands that we had, half-inch iron wire. They were hazardous to ship out of your plant. It behooves us to study that hazard and cut our wire band short or cut it round. You know there is a tool on the market that will cut them round so you will have no point. Of course we have eliminated some of our hazard by using wire instead of the iron band.

Mr. SCHNEIDER: There are some cases that might be classed as an injury where an employee goes home and discovers that he had an injury four or five hours prior to the termination of his shift. It is a pretty difficult job to find the basic cause of that accident. In some cases he cannot tell himself.

CHAIRMAN HUNGERFORD: Please remember that your opportunity to exchange experience does not end with these meetings. As members of the Rubber Section of the National Safety Council you have the privilege through our various chair-

men, engineering, posters, slides, to at any time present your problems and get answers practically the same as you have here, even greater. For instance, suppose you have a certain type of accident on certain equipment and you are up against it, just as Mr. Dietz stated with regard to his hooks. That question will be broadcast through the News-Letter of the Rubber Section, or be sent direct to members by our Engineering Committee or secretary, and invariably you can get some very good answers to your problems. Please do not forget that it is your privilege and it does not cost anything except to sit down and write a letter. I am sure it will repay you and be worth while.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Steam Railroad Section

Officers 1930-31

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 F. M. METCALFE, Northern Pacific Railway, St. Paul, Minn.

Tuesday Morning Session October 13, 1931

GEORGE H. WARFEL, Chairman
Union Pacific System, Omaha, Neb.

The first session of the Steam Railroad Section convened with General Chairman George H. Warfel presiding.

CHAIRMAN WARFEL: Gentlemen, the annual convention of the Steam Railroad

Section of the National Safety Congress will please come to order. Let us ask for divine guidance.

REV. D. T. DENMAN (Pastor, Universalist Church of Oak Park, Ill.): We would but lift our thoughts to Thee, Thou who art the creator and giver of all things. We would recognize that we live in Thy world that Thou hast created and we are glad to have the faith that Thou hast not created it and left it to itself but that Thou art abiding in it, that Thou art still creating and working in the world of men, in the world of human sympathies and human needs. And we pray that Thy blessing may come upon us, upon the Government under which we live, upon those who are bearing the responsibility of the directing of affairs of our nation, upon all those groups of men who are interested in coming into harmony with the great divine thought of humanity.

We pray Thee that there may come into all our hearts and all our minds a desire to be co-workers with Thee, O God, in the working out of the great problems that shall enrich the lives of men and lead to their safety and healthfulness and happiness in the future. We pray Thee to find knowledge and to know how to direct our efforts and to give us all that treasure within, treasure of vision, treasure of human sympathy to help our brothers.

May Thy guidance be present in the hearts of all those present, these delegates, to know how to plan during this session, that they may step forward in achieving the things which in their hearts they have undertaken to do. May Thy blessing direct us and keep us in all these things, through Him who said, I am the way and the truth and the life, we ask it. Amen.

CHAIRMAN WARFEL: I am sure that you are all eager to hear from the secretary of the Steam Railroad Section of the Council, Mr. J. L. Walsh of the M-K-T.

J. L. WALSH (Missouri-Kansas-Texas Railroad Company, Dallas, Texas): Mr. Chairman and Gentlemen: There were four meetings of the Executive Committee of the Steam Railroad Section of the National Safety Council, all of them held in Chicago, on January 31, May 19, September 1, and October 12, respectively. Routine business was conducted and that is about all the Secretary has to report, except that in having finished his term of office as News Editor, he desires to express to you his grateful thanks for your contributions in helping him get it out.

F. HARTENSTEIN (Lehigh Valley Railroad): While we are on that subject, has there been anything done to continue a News Letter in the Safety Section of the American Railway Association? Considering the action of the Committee yesterday, I think that is very important and should be continued.

CHAIRMAN WARFEL: There has been no definite step taken as yet, pending the outcome of the negotiations now in process.

I shall ask the vice-chairman of the Section, Mr. W. A. Booth, Canadian National Railways, to take the chair.

(Vice Chairman Booth took the chair.)

VICE CHAIRMAN BOOTH: Gentlemen, the next order on the program is a Resumé of the Year's Activities, by our General Chairman, Mr. George Warfel.

Chairman's Annual Address

By G. H. WARFEL
Union Pacific System, Omaha, Neb.

Custom decrees that at the opening session of the Annual meeting the chairman should address the membership on the status of our organization. The program indicates that this talk should be devoted to a resumé of the year's activities. At the risk of setting a bad example to others who appear on the program, I intend to digress considerably from the limitations of that subject.

A great many of you are as familiar with the history of the Steam Railroad Section and of the National Safety Council as the speaker—many of you more so. We all know that credit is given to Ralph C. Richards, general claim agent of the

Chicago & North Western Railway for taking the first active steps to inaugurate a safety campaign on steam railroads in 1910, twenty-one years ago. At about the same time a similar movement was started in the steel industry, and a year or so later occurred the first national conference of men interested in promoting a general campaign for the prevention of industrial accidents and casualties. That conference was sponsored by men fired with an almost holy zeal to stop unnecessary accidents which had become so numerous in a rapidly developing industrial era. It resulted in the formation of the organization we know as the National Safety Council.

We who have come into safety work in recent years can scarcely realize the physical conditions and the spiritual inertia faced by those early apostles of a new gospel. While they occasionally found a manager or supervisor willing to cooperate, they found a larger number who were wholly indifferent, or even resentful of the suggestion that they should be obligated to protect a worker from the hazards of an occupation he had chosen for himself. Naturally they were still more reluctant to spend money for mechanical safeguards to overcome even the most obvious hazards. It took patient years to get safety engineering incorporated into mechanical processes.

There was much less opposition, however, against preaching safety to employees. In fact, this phase of safety was quite generally acceptable, and most safety men devoted their entire efforts toward selling safety to workers as they would preach a religion—as something that was optional with the individual, which he could accept or reject as he saw fit. Their most earnest exhortations were designed to persuade the man that safety was really a good thing for him, and he should believe in it.

For a long time, this evangelistic method was accepted as the orthodox procedure. The most successful safety supervisor was the man whose sincere pleadings and emotional appeal could move men to renounce their sins of carelessness. This work had a strong appeal to men of sincere purpose with ability as public speakers. Their work has been, and still is, wonderfully effective. Almost without exception, they have been splendid, capable men. At their invitation supervisors, officers, and executives would occasionally attend mass meetings of employees, and hearing these urgent appeals, were moved to a deeper sense of duty, and more and more of them began to realize their moral obligation toward their employees. Gradually safety became recognized as a problem of management as well as of men. The annual safety conferences became larger and larger each year. The National Safety Council acquired sufficient income to establish a small staff of competent and experienced safety advisors. One of its earliest steps was to begin compiling accident statistics for industries, to afford definite information of the fearful waste of carelessness and indifference. Their figures impressed managements, and thinking people generally, and as the extent of the problem became more evident, statistics became more complete and explicit. Within the past ten years, the National Safety Council has been able to function as the most authoritative agency in this country for the collection and dissemination of industrial and public accident information, and for promoting safely and conservatively, a nationwide campaign for safety in all occupations, public activities, and recreations.

After some ten years of pleading the cause of safety by inspirational and evangelistic appeal, some of the more thoughtful workers realized that the results were still not as satisfactory as they should be. A new plan was evolved for stimulating greater interest, known as the "safety contest" method. It developed from the original experiment of putting on special campaigns for a No Accident Week, a No Accident Month, etc. The competitive scheme proved very effective in lowering casualty rates, for accident prevention became a highly interesting game, and enthusiasm and team work achieved some splendid results.

The competitive feature was introduced into railroad safety work definitely in 1923. In that year just two of the twenty-five large railroads had an employee casualty rate lower than twenty casualties per million man-hours. (A million man-hours is almost exactly the number of hours accumulated by 408 men working eight

hours a day every one of the 301 working days in a year.) The average for those twenty-five larger roads was over 31 men out of that 408 hurt during the year, including fatalities.

In 1930, every one of those twenty-five largest roads had a casualty rate below 201. The poorest was 14. The average for all of them was just over 7 per million man-hours—a 75 per cent reduction in eight years! The reduction for all class 1 railroads, large and small, was 70 per cent.

But some "doubting Thomases" say,—"That is because some men who would have laid off with their hurts in former times now continue at work to keep their injury from counting!" To a small extent that is probably true. But 500 dead men did not come back to life in 1930 to make the fatality rate 37 per cent less than 1923! They were not killed!

"But," asks that same Thomas, "why is the reduction in injuries nearly twice as great as the reduction in deaths?" And the answer is, "Because it is twice as easy, by planning and forethought, to avoid the lesser hazards of the ordinary industrial occupations followed by most of the employees, than to avoid the major hazard of death that relentlessly haunts the moving cars and engines."

The remarkable decrease in casualties to railroad men since 1923, so much greater than anything accomplished prior to that time, has been largely due to the arousing of interest and enthusiasm through the railroad employee contest conducted by the National Safety Council. It is impossible to overestimate the value of that service to the railroad men of this country. Through publication of comparative figures, ranking each road solely on its casualty rate, presidents, managers and subordinates have been spurred to more determined efforts to stop accidents—all accidents, and out of their constructive interest has emerged the realization that the control of accidents is chiefly a matter of efficient supervision.

And just there is found one of the most important functions of the present day safety officer—to instruct, direct and check the supervisors on his road in the handling of their safety educational work with their own men. Supervisors have to be taught to regard the unsafe practice or the rule infraction with the same concern as a doctor regards the first little sore that indicates cancer,—something to be treated, seriously, positively, and at once.

Like cancer, the initial symptoms of carelessness are too often ignored—frequently concealed—in the hope that they will disappear or at least not get any worse. Many supervisors do not even see the symptoms when they are openly displayed. The safety officer has to point them out to him, indicate the treatment, then, more important, see that it is applied, and check up frequently to know whether the supervisor is now detecting his own cases.

The philosophy of railroad safety has undergone a definite change in the very recent past. Thoughtful officers have come to the realization that carefulness should not be considered merely as a social virtue of the individual, like thrift, or charity, or morality. It should be presented as an essential industrial obligation, like accuracy in manufacturing, punctuality in coming to work, or honest handling of company funds. There is no more excuse for tolerating carelessness of personal safety than for tolerating dishonesty, poor workmanship, or failure to come to work on time. Railroad safety work now embraces a wider field of effort, not only supplying rules for safe procedure, but seeing that those rules are enforced by rigid discipline. The three "E's" promulgated by the National Safety Council, "Engineering, Education, and Enforcement," have been accented in turn, and in the railroad field today, the emphasis undoubtedly is on the final "E"—Enforcement!

During the first 10 years of its existence the National Safety Council expanded steadily, and the men engaged in safety work became more numerous in each industry. The Council was divided into separate sections, each devoted to study and discussion of the particular problems of their own industries. The Steam Railroad Section is one of the oldest and largest of these. For a number of years it was the only body engaged in the study of railroad safety.

During wartime Federal Control, each railroad was directed to organize accident prevention work and place it under a man charged with responsibility for its conduct. While most of the largest railroads were already carrying on such work, the order issued by Carl R. Gray as Director of Operations, made it obligatory upon all the other roads. A Safety Section of the American Railway Association was organized.

Inevitably the safety men of the larger roads, already active in the Council, became also most active in the leadership of the Safety Section, A. R. A. Again inevitably, men of various railroads who found the annual meetings of one Section interesting and profitable, were drawn to attend also the annual meetings of the other. For the past seven years railroad safety officers, as well as interested employees, supervisors, and officials, have had the unusual privilege of two annual conventions with two sets of conferences, discussions and committee reports devoted to much the same purposes.

The economic situation during the past two years has affected the railroads very seriously. Every activity involving an expenditure of money has been closely scrutinized. The very pertinent question has been raised as to why the two bodies directly concerned with Steam Railroad Safety should not merge their activities and confine themselves to one annual convention, thus unifying and centralizing their efforts. In the last few weeks the executive bodies of both sections have considered ways and means to accomplish this, and a plan has been tentatively agreed upon.

In the light of what has just been related, you may better understand why your general chairman has not more actively promoted particular interest and activity in the Steam Railroad Section, as a separate entity. It seemed quite obvious to me that spurring special committees of this section into efforts to produce reports and studies already being produced by committees in the other section, would merely promote petty politics, each section bent upon exalting its own activities. Had the two sections been composed of entirely different members, this would possibly promote a healthy condition, as rivalry and competition usually produce more efficient results; but when a large majority of the active men in both organizations are the same persons, it is much more likely to produce friction.

It has seemed to me a wiser policy to endeavor to promote constructive consolidation than to promote destructive rivalry. The effect of this course upon my personal popularity in either organization is a matter of no consequence to anyone but myself. I believe it is futile to expect that men can do work loyally in two similar organizations without manifesting bias, prejudice, or partiality toward one or the other. I have also felt that it was imperative to consolidate these two sections to eliminate the unnecessary expenditure of money by the railroads, involved in carrying on the activities of two organizations.

It seemed obvious that the railroad safety section should remain an integral part of the National Safety Council. The Council is preeminently the most important organization devoted to the promotion of safety as an essential principle in American Life. By far the greater volume of what has been accomplished in this country in preventing accidents has come through its influence, or at its instigation. It is recognized as an impartial, non-profit, altruistic organization, seeking only to serve the best interests of the whole industrial field and the general public. It is the fountain-head of national safety consciousness. It offers a background for our convention, the machinery for our efforts, and an avenue for reaching the general public, which cannot be secured through any other channel. Our transportation business comes in direct contact with every industry, every civic organization, every public agency embraced in the Council's membership, and we could not consider any course of action which would dissociate our organization from the one agency which contacts all the others. The work of the Council in promoting safety education in schools and colleges, is a service which alone returns to each individual railroad

many times the cost of membership. That work needs to be actively promoted and extended.

What a wonderful advantage it is to have young men coming into railroad occupations already safety-minded, already sold on the principle that enforcement of wise rules and regulations affords him the best protection against accidents. How important it is to us that the youth at the steering wheel shall watch for our crossing signs and signals, and have a wholesome concern for his safety at the railroad crossing; that all drivers of cars shall realize that obedience to the traffic rules is essential to keep us out of the hospitals. How important it is to us that the people who congregate at our stations and ride upon our trains shall learn to take the little precautions to avoid injury, and refrain from those hasty actions while moving about the tracks, boarding or leaving trains, which so frequently end in quick disaster. Is it not good for us that the men who deliver and receive merchandise at our freight houses, at our car doors, at our docks and wharves, shall have a thoughtful regard for the safety of our men who work alongside of them? Is it not worth while that shippers load their materials and machinery so securely on our cars as to withstand the shocks of traffic, and to provide safe and easy handling by our employees? The Council has been and is the major influence in bringing the public, and our friends in other industries, to a sense of their responsibility toward us, as well as our responsibility toward them. Certainly that is another service worth many times the yearly cost of \$75 to \$100 for a railroad's membership.

In these trying times let us continue unfaltering support of the Council. It is doing effective work;—let us help make that work more effective. It seeks to serve the railroads in broader measure;—let us see that it does. If we can help in its public education campaign, let us do so loyally. Every community, every industry, every person along our lines, who makes any contact whatsoever with the National Safety Council, helps to make railroading safer in that vicinity. Whatever our future name or form of organization may be, let us each resolve that we will loyally support the Council, help direct and guide it, to the end that by our united efforts we will eventually make America *physically* safe for Americans.

Now I want to conclude these remarks with some suggestions for your serious thought. There has not been a time in the past twenty years when safety supervisors could render more valuable service to their roads. There is not a road with a safety department but pays out each year many times more than its cost in settlement for accidents. It is dead loss—out of pocket expense. Much of it,—most of it—can and should be saved for better use.

Every man who attends this convention—safety officer, supervisor or workman—can find here practical information, definite and proven ideas, inspiration and determination that will enable him to help constructively to stop railroad accidents. Come to sessions punctually, listen thoughtfully. Above all, get up and take part in discussions,—not to advertise, not to relate tedious details of some personal occurrence, but to get or give information that will be of real benefit to you or to others.

To those of us who are experienced members of this section let us shake off any feeling that we are self sufficient—that we know all about our work. Our right to our titles depends upon our ability to progress. Let us so shape the procedure of this meeting, and the work on our own roads through the next year, as to prove even more decisively that organized safety work is the best investment any railroad ever made.

ROBERT SCOTT (Atlantic Coast Lines): Mr. Chairman, I wish to make a motion that the General Chairman's most enlightening and encouraging message be received with a rising vote of thanks.

(The audience arose and applauded.)

VICE CHAIRMAN BOOTH: It is my pleasure to return the meeting to your hands, Mr. Chairman.

(Chairman Warfel resumed the chair.)

CHAIRMAN WARFEL: It is my privilege at this time to ask to step up to this platform a man who certainly knows American railroad safety work if any man does, Thomas Holmes Carrow.

An Analysis of the Accident Record of the Railroads as Reported to The Interstate Commerce Commission

By THOMAS H. CARROW
Superintendent of Safety, The Pennsylvania Railroad

Total Persons Injured on the Railroads

Year	First 6 Months	
	Killed	Injured
1930	2602	26,386
1931	2441	18,279
Reduction	6%	31%

There was a 6 per cent reduction in the total of all persons killed and 31 per cent reduction in the total of all persons injured on the American railroads in the first six months of this year compared with the same period last year. The reason the percentage of reduction as to killed is so much less than the reduction as to injured is due to the fact that trespassers, highway grade crossing accidents and certain other classes of persons over whom the railroads have no control are included in the statistics and the figures are presented in their entirety merely as a complete exhibit of the casualty situation on the railroads taken as a whole.

Persons Injured in Highway Grade Crossing Accidents

Year	First 6 Months	
	Killed	Injured
1930	962	2685
1931	921	2403
Reduction	4%	11%

The education of the automobile driving public to exercise care in approaching and driving over highway crossings has helped to keep the number of crossing accidents down to the present figure while the efficient use of the locomotive whistle to warn travelers of the approach of train has also been a very important contributing factor.

It is important to notice that crossing accidents make up more than one third of all fatal injuries and about 13 per cent of all non-fatal injuries that occur on the railroads. This proportion makes the highway crossing accident situation extremely serious and one that not only merits full attention, but will continue to be emphasized as the years go by. There are few problems upon the railroad today which are giving and will continue to give the managements more concern than highway crossing accidents. The principal remedy that can be provided by the railroads is an effective locomotive warning whistle signal and to a careful, thoughtful driver this should be all the warning necessary.

Trespassers Injured

Year	First 6 Months	
	Killed	Injured
1930	1051	1396
1931	1106	1490
Reduction	+5%	+7%

Nearly half, or to be exact, 45 per cent, of all persons fatally injured on the railroads are trespassers, this being the only class of persons that show an increase

in both killed and injured during the present year. This increase is directly due to the fact that thousands of un-employed men are traveling about the country on freight trains or using the railroad tracks as highways.

Trespassing accidents are a class over which the railroads have but little control, except insofar as they are able to police their properties and keep the trespassers off the trains and off the tracks.

Passengers Injured

First 6 Months		
Year	Killed	Injured
1930	21	1562
1931	16	1365
Reduction	24%	13%

Note: There was but one passenger train accident in the six months that resulted in a fatal injury.

Figures covering injuries to passengers are very misleading to the public as they include not only accidents for which the railroads may be responsible, but those for which the passengers themselves are responsible as well.

Out of 16 passengers killed in the first six months of 1931, only three lost their lives in train accidents, that is derailments or collisions, whereas six met death while getting on and off cars and six were struck and killed by trains other than the one on which they had been riding or intended to ride.

A similar proportion of the non-fatal injuries were attributable to the carelessness of the passengers themselves.

With all steel car equipment, vestibule coaches and pullman cars and train service employees trained to perform their duty efficiently and safely, the chances of passengers being killed or even slightly injured are infinitely less than in any other form of transportation, even less than walking on the streets and highways.

So far as train accidents are concerned, there is never a year that there are not scores of railroads in the United States which operate throughout the whole twelve months without a single passenger being killed in train accidents. Even such liability of injury to passengers as may now exist is being constantly diminished by improved equipment, signalling systems and more particularly by more efficient training and supervision of operating employees to insure perfect safety in passenger train operation. Speed, comfort and the safety of railroad passengers are all on the increase.

Employees on Duty Injured

First 6 Months			Per Million Manhours	
Year	Killed	Injured	Killed	Injured
1930	494	19,512	.26	10.25
1931	302	11,974	.20	7.79
Reduction	39%	39%	23%	24%

Employee fatal injuries from all causes dropped from 494 in the first six months of 1930 to 302 in the same period this year, reduction 192. Non-fatal injuries dropped from 19,512 to 11,974, reduction 7,538. On a manhour basis the reduction in killed is 23 per cent and in injured 24 per cent.

Making allowance for decrease in business, it is fair to assume that 75 to 100 of the fatal injuries to employees that were saved, can be attributed to safety activities of the railroads. Comparing the performance of the roads having the best records and the roads having the worst records, and more particularly comparing the fatal injury rate of certain units with other units of the same railroads, it is reasonable to expect a further substantial reduction in fatal injuries to employees. Most fatal injuries are attributable to a few causes, nearly all of them being within

the control of employees, and if the employees are taught to ward against these causes, the number will, of course, show a marked drop. This simply means that supervisory forces must be held to account for checking to detect dangerous practices which result in fatal injuries and employees must be held to account when detected indulging in such practices.

Employees on Duty Injured While Coupling and Uncoupling Cars or Locomotives and Hose

First 6 Months		
Year	Killed	Injured
1930	17	466
1931	10	285
Reduction	41%	39%

Under no head has greater progress been made than with respect to coupling accidents. The future of accident prevention under this cause will revolve largely around the question of avoidance of going between moving cars to couple or uncouple. In other words, it is not a matter of more knowledge, but a more efficient use of the knowledge that has already been acquired by employees as to how to avoid coupling accidents.

Employees on Duty Injured While Operating Locomotives

First 6 Months		
Year	Killed	Injured
1930	8	1044
1931	3	743
Reduction	63%	29%

Accidents while operating locomotives occur in connection with firing engines, shaking grates, operating water plugs and other mechanical operations and involve the question of slipping, tripping and falling. They are nearly all of a preventable nature. It is especially important to avoid sticking the head or other part of the body beyond the line of the locomotive and to avoid falling off.

Employees on Duty Injured While Operating Hand Brakes

First 6 Months		
Year	Killed	Injured
1930	12	602
1931	10	393
Reduction	17%	35%

Considering the fact that a large percentage of the times a car is shifted the hand brake is operated, which means literally billions of hand brake operations in a year, the number of accidents from this cause is not large, but it will show a reduction from year to year as they are largely within the control of the men who are injured from this cause.

Employees on Duty Injured While Operating Switches

First 6 Months		
Year	Killed	Injured
1930	1	225
1931	—	125
Reduction	100%	44%

It is impressive to notice that no person was killed under this head in the six months period, notwithstanding the fact that this operation is being constantly performed by hundreds of thousands of men every day, almost in the face of moving trains.

Employees on Duty Injured Due to Coming in Contact with Fixed Structures

First 6 Months		
Year	Killed	Injured
1930	16	154
1931	11	113
Reduction	31%	27%

Most accidents due to "coming in contact with fixed structures" involves structures which it is economically impossible to remove. The remedy, therefore, for such accidents is to keep the body within the line of the car. The rule says, "Look in the direction locomotive or car is moving to avoid coming in contact with structures alongside of or over track or cars on adjacent tracks."

Employees on Duty Injured while Getting on or off Cars and Locomotives

First 6 Months		
Year	Killed	Injured
1930	30	1478
1931	16	982
Reduction	47%	34%

The reduction in injuries from this cause is quite substantial and considering the countless number of times employees get on and off cars, the number is comparatively small. At the same time, the fact should be emphasized that these accidents are nearly always preventable by forethought, or, anticipation of hazardous conditions.

In the calendar year 1931, 101 employees were killed and 8096 injured while getting on and off cars, which shows great progress in safety under this head.

Employees on Duty Struck or Run Over Not at Public Crossing

First 6 Months		
Year	Killed	Injured
1930	126	145
1931	74	86
Reduction	41%	41%

No figure in the whole record of accidents to employees is more encouraging than the reduction of 41 per cent in the present year on top of a 44 per cent reduction in the previous year in killed and injured due to being struck by train because it is a definite illustration of how the most serious danger around the railroad has been partially mastered. "Struck and killed" is the most prolific cause of fatal injuries and the one for which there is least excuse. Notwithstanding the progress made under this head, there is scarcely a railroad in the country that has fully succeeded in impressing employees to the extent they should be impressed with this danger.

Employees on Duty Injured in Non-Train Accidents

First 6 Months		
Year	Killed	Injured
1930	123	12,268
1931	81	7,103
Reduction	34%	42%

In 1923, 463 fatal injuries and 115,248 non-fatal injuries were reported under this head. If we double the record for the first six months of 1931 and subtract this from the 1923 record, we will have a saving of 301 lives and 101,042 injuries for the year 1931, which is equivalent to a drop of 65 per cent in killed and 88 per cent in injured. As these injuries mostly involve track men, shop men and station men, the record reflects great credit upon these departments.

Train Accidents from All Causes to All Classes of Persons

First 6 Months			
Year	Number	Killed	Injured
1930	6637	140	902
1931	4291	97	561
Reduction	35%	31%	38%

Train accidents reported to the Interstate Commerce Commission include only those that cost more than \$150. In addition to those reported there is a large percentage of train accidents, probably 70 per cent, which do not result in this much cost, but which have all the ear marks of the more serious accidents. It is obvious that if the minor accidents are prevented it will also tend to prevent the serious ones. But it is of even greater importance to detect the violations of rules or dangerous practices that are the causes of train accidents and take corrective action before the accidents actually occur and most railroads are doing this.

Collisions—Total Persons of All Classes

First 6 Months			
Year	Number	Killed	Injured
1930	1568	26	395
1931	958	12	214
Reduction	39%	54%	46%

There is reason to be gratified over a reduction of 39 per cent in the number of collisions and 54 per cent in the killed and 46 per cent in the number injured under this head. It shows that rules are being enforced.

Derailments—Total Persons of All Classes

First 6 Months			
Year	Number	Killed	Injured
1930	3881	69	414
1931	2489	47	281
Reduction	36%	32%	32%

Locomotive Boiler Accidents—Total Persons

First 6 Months			
Year	Number	Killed	Injured
1930	16	7	8
1931	9	2	3
Reduction	44%	71%	63%

While locomotive boiler accidents are very infrequent, they are nevertheless extremely serious and this fact is appreciated by all the railroads and is one which is given constant attention, the decrease in the number and resultant casualties under this head being highly gratifying.

Other Locomotive Accidents—Total Persons

First 6 Months			
Year	Number	Killed	Injured
1930	371	—	8
1931	356	—	4
Reduction	4%	—	50%

Miscellaneous Train Accidents—Total Persons

First 6 Months			
Year	Number	Killed	Injured
1930	801	38	77
1931	479	36	59
Reduction	40%	5%	23%

Train Accidents at Highway Grade Crossings—Total Persons

Year	First 6 Months		
	Number	Killed	Injured
1930	76	65	75
1931	73	42	40
Reduction	4%	35%	47%

A train accident at a public highway grade crossing is a derailment or other accident to a train due to trains, locomotives or cars striking or being struck by trolley cars, automobiles or other vehicles or objects other than hand cars or other railway tools or material, in which the damage to railway property, including the expense of clearing wreck, amounts to more than \$150.

CHAIRMAN WARREN: I am very sure that every one of us, and particularly those of us who have repeatedly attended these meetings, feels a debt of gratitude to Thomas Holmes Carrow for the thought he gives to the preparation of statistics so that he may present them in a way that will carry conviction and direction on what we should do with the figures he presents, what we should learn and how we should apply them. His talk is always, as it was this morning, an outstanding feature of our program.

The man who is to speak to you next is a division engineer of the New York Central Railroad, whose territory lies about Chicago, a man who has achieved an outstanding reputation on his own railroad because of his ability to reduce accidents in his own Department.

I shall ask Mr. F. J. Jerome, of the New York Central Railroad to address us.

The Maintenance of Way Department's Responsibility In Accident Prevention

By F. J. JEROME

Division Engineer, New York Central Railroad, Chicago

In the earlier days of accident prevention on railroads, the Maintenance of Way Department had very grave responsibilities in connection with avoiding and remedying unsafe conditions about the right of way and structures. However, it is now generally conceded, I believe, that the unsafe conditions formerly existing have been practically eliminated and that new conditions arising are given sufficient safety thought in advance to do away almost completely with the further creation of unsafe situations.

It is my thought, therefore, that while the Maintenance of Way Department will still have to pay a reasonable amount of attention to conditions affecting it and other departments, its principal responsibility now in accident prevention is seeing to it that the percentage of accidents occurring in that department, compared with total railroad accidents, is reduced to a minimum.

The maintenance of way forces, particularly those engaged in working on the track, are admittedly in a hazardous occupation and have been producing their share of personal injuries reportable to the Interstate Commerce Commission. With this in view it will be my endeavor in this paper to bring before you my belief, from a division engineer's standpoint, as to the best and quickest way to reduce the maintenance of way percentage, and also, as the eminent structural engineer and designer Chic Sale, has said, "I'll tell you why."

With very few exceptions, all accidents in the Maintenance of Way Department are avoidable, and I confidently look forward to the time, not so far distant, when we will not be comparing our records on the basis of how many Interstate Commerce Commission cases per year but on the basis of how many years we have gone without an Interstate Commerce Commission case.

Avoiding accidents before they happen is what we must accomplish, and there is just one way to do this—develop 100 per cent by personal contact, friendliness and understanding the common ordinary horse sense that is in every one of us.

The laborer in the Maintenance of Way Department by far outnumbers all other employees, and it is the laborer that is having the accidents. All of our efforts must be primarily with a view to his 100 per cent development. The heaviest burden in this undertaking falls on the foreman who is in close contact at all times with his men; but the foreman cannot and should not be expected to assume this burden unless he has the wholehearted support of his superiors.

On the New York Central for the past several years our management has sponsored annual Maintenance of Way Foremen's Safety Meetings held each winter at suitable times and places, depending upon the general condition of the work and upon the weather. These meetings are presided over by the division engineer and are attended by all foremen and their assistants or first men. Divisions are divided up into convenient districts, possibly three or four, and two meetings are held in each district at some central point, having foremen from every other gang and assistants from alternate gangs attend each meeting, thus protecting the gang supervision and causing no interruption in their work. The management gives those attending the meetings full time allowance and pays for their meals while away from headquarters.

The meetings are opened by a few general remarks by the chairman, followed by an extensive talk by the supervising safety agent, in which he goes over carefully and in detail the principles of safety work as applied to the Maintenance of Way Department; then follows an open discussion by the men themselves which takes up the bulk of the time allotted, and which in my mind is the most valuable and important part of the meeting. Each foreman and assistant present is called upon to get up on his feet and say just what he has been doing in the interest of safety; if he has had any accidents in his gang during the past year; what was the cause and what action was taken to avoid a recurrence; and what success he feels he has had in getting under the skin of his men and developing that horse sense.

When these annual meetings were started five years ago, only very few of the foremen were able to get on their feet and express themselves, but they have overcome this embarrassment, have seen the benefit derived from a mutual and frank discussion of their problems, and there is hardly a man among them that cannot now get up and give a good convincing talk on safety.

The engineer maintenance of way attends as many of the meetings on each division as is possible, and not only by word of mouth but by his mere presence emphasizes to the foremen his interest in their work and the extreme importance of personal contact, friendliness and understanding in relation to safety.

Also in attendance at the meetings are the supervisors, their assistants and chief clerks, all members of the engineering corps, and when possible, the division superintendent who acts as chairman of the Division Safety Committee on our railroad, consisting of representative from all departments, together with his trainmasters and officers from other departments who can conveniently be present.

I believe once a year is frequent enough for these general meetings. The follow-up after the foremen get back to their men is what really brings results.

Under instructions issued several years ago, each Monday morning the foreman gives his men about a ten minute talk on safety. This was compulsory and consisted usually of the reading and discussion of several of the more important safety rules each week. This practice was of great value during the early stages of the campaign, as it promoted the habit of thinking safety at least once a week, and the men at any rate absorbed some of the principal safety rules at definite intervals. This, however, was not sufficient to complete that horse sense development.

I have urged on our foremen that they study each of their men carefully. All men are different and require different methods of approach in getting over to them and putting into them the safety idea. Our foremen are putting a great deal of thought into this and most of them are every day studying and talking with their

men, both individually and collectively, with a view to safe performance in every part of their work. This action on the part of the foremen must be continuous if we are to have no-accident gangs, no-accident subdivisions and no-accident divisions in the Maintenance of Way Department.

No man wants to go through bodily suffering nor does he want to cause suffering to anyone else, and safety should be the easiest thing in the world to sell, as it costs the individual nothing and is something that everybody wants. There are a few men, however, that are habitually careless, and there is no place for these men in the Maintenance of Way Department.

I am not a believer in graduated discipline in accident prevention work. If a man makes an error in judgment or violates a safety rule or makes an out-and-out mistake, or two of them, in connection with safety practices, I do not think he should necessarily be condemned or be given a ten or twenty or thirty day sentence, if he is essentially a safe man. He should be made to profit by his experience and his errors should become an object lesson to others. What he needs is personal contact, friendliness and understanding, not a blot on his record card. However, if he is habitually careless he should be dismissed from the service without delay. Please understand that I believe in this method of discipline only in connection with safety work and it does not apply in connection with the violation of maintenance or operating rules.

In order that the foreman, the supervisor and myself may be able to judge fairly whether a man is safe or habitually careless, we must know our men. The foreman, of course, should know them intimately, and it is the aim of the six supervisors on my territory and of myself to know personally every one of our men. We have made considerable progress and I earnestly believe that when this personal contact is completely established and a full understanding arrived at, we will have no more avoidable injuries.

The place for the supervisor and the division engineer is out on the job just as much as his office work will permit, and he should arrange his office work so that it will permit him to be out the majority of the time. Close contact with the work and the men promotes not only safe work but efficient work.

I receive an immediate report on all accidents that occur on my division and require the supervisor or his assistant to make an investigation on the ground, at least by the following day, taking statements from the injured man, his foreman, and any witnesses, to determine the cause, responsibility, and how to avoid a recurrence; and these statements are sent to me with the supervisor's comments and recommendations as to any further action that should be taken. If an injured man loses time, telephone advice to that effect is received at my office immediately, and I personally keep in touch with this case, going to the extent sometimes, if necessary, of talking with the injured man myself, or the doctor who attended him, with a view to getting the man back to work, unless it would be absolutely injurious to his health, within the three day limit, and thus avoiding a case reportable to the Interstate Commerce Commission. By taking prompt action and getting all the facts quickly and, most important, by knowing our man personally, we have been able to save a number of cases that would have been reportable if no particular attention had been paid to them.

For the last several years on the New York Central Lines safety contests, based on the ratio of reportable Interstate Commerce Commission injury cases per million man-hours worked, have been conducted between the various system lines as a whole and between the same departments in the various lines. Data are also assembled and distributed on the standing of the various departments by operating divisions. On my territory we have been going further. At the end of each month the supervisor sends out a statement to his men showing the safety record of each foreman, accompanied by a letter in which any accidents that have occurred during the past month are fully discussed. Also, I send out a letter and statement to the supervisors showing the safety record on each of their territories for the months so far passed that year and for the same period the previous year. This statement is in turn passed

along to the foreman. We are thus, in effect, conducting a contest between gangs and between supervisors, and each foreman and each supervisor is also competing with his own record for the same period the previous year.

We have not yet adopted any system of awards in connection with the contest between gangs and between supervisors' territories, although this is being given consideration. A great many of the foremen feel, however, that the satisfaction it gives them to stand up in the annual foremen's meeting before the other foremen and their superiors and state that they have had no accidents for the past year or for the past several years, as the case may be, is sufficient reward for what has been accomplished.

The division engineer should have detailed knowledge of all accidents that have happened on his territory. If he cannot remember the details, then he is having too many of them, and the answer is—more personal contact and understanding. The division engineer should very definitely feel his responsibility for any avoidable accident occurring on his division.

When out on the road and with his men, the division engineer should not make a nuisance out of himself by continually preaching safety. A carefully chosen word here and there is sufficient, but it must reach under the hide.

The strict disciplinarian and the advocate of the long list of safety rules undoubtedly has, or at least has had, his place in safety work, but I sincerely believe that the quickest, best, and most lasting results will be accomplished by the use and application of the horse sense development method.

In closing, I am quoting below the number of accidents reportable to the Interstate Commerce Commission on my division during the last four years and the ratio per million man-hours, not for the purpose of giving this division any particular credit, but offered in evidence as supporting data for the method we have applied and believe in.

Year	Number	Ratio
1928	30	8.31
1929	28	7.47
1930	11	3.78
1st 8 mos. 1931	1	0.71

CHAIRMAN WARREN: I am sure we appreciate, Mr. Jerome, your thoughtful presentation of the situation in the maintenance of way department. I trust that every man in the audience grasped the fact that there was almost direct conflict between Mr. Jerome's thoughts on discipline as applied to his particular department and the thoughts expressed by the preceding speaker. It is good for us to have our thought stimulated. It is good for us to have debate. Departments are not all alike, employees are not all alike, supervisors are not all alike, railroads are not all alike, we are not all alike, and the more we can get of individual opinion in our gatherings here, the better it will be for us.

I am very glad to introduce our next speaker, Mr. R. S. Kniffen, of the Great Northern Railroad.

Transportation and Maintenance of Way Departments' Joint Responsibilities

By MR. R. S. KNIFFEN

Trainmaster, Great Northern Railway Company, Minot, N. D.

The fact that the transportation department handles the operation of trains over tracks that are constructed and maintained by the maintenance of way department in itself creates a joint responsibility. While the same is true of other departments to some extent, the transportation and maintenance of way departments are the most striking examples in the field of railroading because of the many facilities used in common.

In reading over the reports furnished us by the Bureau of Safety, Interstate Commerce Commission, of accidents which that department has investigated, as well as reviewing the causes of accidents as shown in the Interstate Commerce Commission annual bulletin, I find there are numerous conditions which resulted in accidents where both the transportation and maintenance of way departments were, in a measure, responsible. The time at my disposal would permit me to discuss but a small percentage of these causes. Therefore, it occurs to me that it would be of more interest to speak on some of the causes which, to my mind, seem most important and which from actual experience I know have caused accidents.

Nearly every maintenance of way crew must, of necessity, frequently create a condition in doing its regular routine work which would constitute a real hazard if done without the prescribed protection. The rules provide a method of doing this work safely, but the need of both departments fully understanding and complying with them is self-evident.

One of the greatest hazards on our railroads today is where track and bridge men, in making repairs, find it necessary to make the track unsafe for passing trains. Proper protection of obstructed track, or track not safe for normal speed, and the observance on the part of transportation employees of the rules governing this protection are of vital importance and one in which both departments share in the responsibility.

I recall a case where there was a serious accident on a bridge. A bridge crew was renewing bridge ties on an 1800 foot trestle. The train movement over this line was very light. The rules permitted the foreman to protect his work with flags and torpedoes, set the proper distance in each direction from the obstruction, and did not require the use of flagmen so long as the set signals were in plain view of the foreman, so that he would know that they were not removed or molested. After the work was properly protected the crew removed about two rail lengths of track, then loaded up the push car with old bridge ties and took them to the end of the trestle to unload, as well as to get new ties to put in their place, leaving no one at the obstruction. Just as the crew was ready to start back with new ties, the foreman noticed a train approaching from the opposite direction.

Now the engineer's duty in approaching an obstruction that is protected, as it was in this case, is to proceed at restricted speed after passing the caution signal and to stop before passing the red flag. The engineer observed the caution signals, but did not stop at the red flag and continued at restricted speed, and, regardless of stop signals given by the foreman, who was several hundred feet beyond the obstruction, continued out onto the bridge. The rails spread, permitting the engine to drop through the trestle, resulting in the death of both the engineer and fireman. There was joint responsibility in this case surely. The foreman should have seen that someone remained at the point of obstruction. This added precaution would no doubt have prevented the accident. The engineer should have complied with the rule which did not permit him to pass the red flag until he had received a proceed signal from the foreman.

Collisions between trains and motor cars were a much more common cause of accidents in years gone by than at the present time. Nevertheless, the problem of safely operating the motor cars is still one of much concern. These motor cars have to be operated over the track daily and in many cases where the visibility is limited, due to either the topography or climatic conditions, making necessary a full compliance of the rules governing their operation at all times. I remember an accident some years ago where a light engine struck a motor car moving in the same direction at about the center of a five mile tangent. Although it was cold and some snow blowing, it was daylight and the visibility such that the motor car could have been seen for a distance of three-fourths of a mile. While it is true that the light engine had the right of way, had the employees on the light engine been more watchful or given a little more thought and consideration to the other fellow's safety, or sounded an extra blast or two of the whistle, I am sure this particular accident would have been

averted and saved the lives of the section foreman and his son, both of whom were killed.

Engineers know that between the hours of 7 a. m. and 9 a. m. and between 3 p. m. and 5 p. m. the track crews can be expected to be moving over their section, either going to work or inspecting the track in the morning and returning home from work in the late afternoon, and special care should be exercised at these times to see that every possible warning is given by the sounding of the whistle so that trackmen may remove their cars and get clear of the track.

The past season I have read accounts of some quite serious accidents due to soft or washed out track brought about by heavy rains during the night when trackmen were off duty. In accidents of this nature, it is usually the transportation department employees or passengers who are injured and such accidents, in my opinion, are avoidable. All section crews are instructed to patrol their tracks in case of heavy rain storms and it would seem with all of our present modes of communication that it would be impossible to have a storm of such proportions to damage the track without some of our employees in the immediate vicinity being aware of it and able to communicate this information to those whose duties would require them to protect the track and trains.

Engineers and trainmen can be of great assistance in reporting to the proper officers any unusual condition, such as bad spots, blocked drainage or other similar defects that might, if left unnoticed, cause trouble. I have in mind a defective rail which was found by a section crew shortly after a freight train had passed over this track. There was a piece fourteen inches long broken out of the ball of the rail. The rail was certainly in this condition before the caboose passed over it, but if any of the employees in the caboose noticed any unusual noise or jolt they did not report it.

Maintenance of way men can add to the safety of operation by observing the condition of equipment in trains as they are passing, see that no brake beams are dragging, journal boxes hot, or other defects, by seeing that all obstructions are removed around switches and along the track where trainmen are required to work, that all switches and other facilities under their care work properly and safely, protect all doubtful conditions with messages or orders as the circumstances require. It would seem that such matters would always be attended to—yet many accidents occur due to failure on the part of employees to take proper action.

In some cases where there is joint responsibility there is a failure to get the proper cooperation due to departmental jealousy. Where this condition exists it must of necessity be corrected. The officers and employees involved must be made to realize that the lack of cooperation on their part is actually responsible for accidents. It is the wrong attitude when an employee in one department, observing an unsafe condition or practice in another department, fails to report it because this very condition may eventually involve him and his department.

Cooperation, the spirit of fair play, and consideration for the other fellow, should be the attitude of all employees. As railroad officers, we are guardians of a trust jointly to the corporations we serve. Upon us rests the direct responsibility of the promulgation of rules and instructions pertinent to the safe-guarding of both the employees and the traveling public.

Loyalty cannot be purchased or fixed, but is the spontaneous outgrowth of contact where the officers meet the rank and file of employees with a fair and friendly interest. It is then only that men can be taught to respect the rights of others, to reason methodically, act with inherent self restraint and control, and to hold the rules inviolate.

CHAIRMAN WARFEL: It has certainly been interesting to hear a man experienced in both the maintenance of way and the transportation departments discuss individual and concrete accidents. Few men have the capacity to devote themselves to abstract thought and evolve as much concrete and practical principle for accident prevention

as they can from a study of individual accidents. I am sure we have all appreciated the reference Mr. Kniffen made to particular cases.

We will not have the report of the Nominating Committee at this time. The meeting this afternoon is to convene promptly at two o'clock when we will discuss the railroad highway crossing accident problem from all angles. Immediately following that we will have some committee reports. It is imperative that every man representing his railroad, who has a membership in this organization, shall be at the afternoon session.

ADJOURNMENT

Tuesday Afternoon Session October 13, 1931

GEORGE H. WARFEL, Chairman
Union Pacific System, Omaha, Neb.

The second session of the Steam Railroad Section convened with General Chairman Warfel presiding.

CHAIRMAN WARFEL: As you know, the session this afternoon is devoted principally to a discussion of the railroad highway grade crossing accidents. You will hear some rather startling information as to what has been accomplished in that field. You will undoubtedly hear during the afternoon some very instructive comments on what may still be done.

The chairman of the Grade Crossing Committee of the Steam Railroad Section has prepared a fine report on the status of grade crossing accident work in the country at present. I am going to ask Mr. E. G. Evans to present the report of his committee.

Report of Committee on Prevention of Railroad Highway Crossing Accidents

By E. G. EVANS

Chairman; Superintendent of Safety, Louisville & Nashville Railroad,
Louisville, Ky.

The Committee on the Prevention of Railroad Highway Crossing Accidents is happy to report that the reduction in grade crossing accidents and deaths and injuries occurring therein which was started in 1929 with a 3.2 per cent reduction in fatalities was continued and improved in 1930 when there was made a 19 per cent reduction in the total number of grade crossing accidents; an 18.7 per cent reduction in fatal injuries occurring therein, and an 18.9 per cent reduction in other than fatal injuries occurring therein.

It is happy to report further that during the first four months of 1931, there was made a still further reduction in grade crossing accidents of 10 per cent and a further reduction of 8.4 per cent in total casualties occurring therein. We have reason to believe that this reduction will continue. We feel that every person of this Section and of similar sections of other associations who has given this question his thought and effort may congratulate himself upon these accomplishments.

That this record of reductions is an authentic one independent of any general decrease in traffic movement or traffic accidents is shown by the fact that during 1930 there was an increase of .08 per cent in automobile registration, an increase of 6 per cent in gasoline consumption, and an increase of 5 per cent in all automobile fatalities. The fact that during 1930 there was a decrease of 10.8 per cent in locomotive miles is more than offset by the decrease of 17 per cent in the ratio of grade crossing fatalities to total traffic fatalities when the composite decrease of 19 per cent in highway crossing cases is being considered. From figures available it looks as though this decrease in ratio which has been generally downward since 1920 will continue to be reduced this year.

Functioning as a body this committee has attempted little of major importance during its term of office, but the individual efforts of its members—Messrs. Scott, Walsh, Flanigan and Philips—the efforts of you men and the supporting activities of our parent organization, the National Safety Council, have wielded a substantial influence toward bringing about this reduction.

With none of these activities do I feel a need to go into detail. You know the work you are individually performing. You are all familiar with the Council's multitudinous activities—its poster service to industries and local Safety Councils; its publications, the *National Safety News*, *Public Safety*, *The Safe Worker*; its clip sheet service to newspapers and magazines numbering into the thousands; its influence with the leading broadcasting agencies—with all these you are familiar; you appreciate the immense power for good with which such activities are laden. The activities of your committee members are not so obvious and yet their influence is great.

More than ever sensitive to the nation's needs by virtue of the added interest resulting from their membership on the committee, they have had their ears to the ground during the past year and have given to the various angles involved in the subject their best thought, both as the problem relates to their own roads and in their contacts with men of other roads whose problems are the same.

Your committee has been encouraged in observing the reductions occurring in grade crossing accidents in 1930 and 1931. It wants you to feel encouraged, but at the same time we want to impress upon you that there are certain questions to which your continued best thought and attention must be given if this good record is to continue and is to spread into the ranks of other automobile fatalities than those occurring in highway crossing accidents—and spread into these ranks it must, for, until the traffic situation in all of its angles is improved, there will be no dependably permanent improvement in any of its branches.

There are two angles to this question of the Prevention of Highway Grade Crossing Accidents—one concerns this Council's Committee, of which I am chairman—the other concerns the similar committee of the American Railway Association, of which committee I am a member. That there may not be a duplication of effort and a loss of efficiency thereby, it is well for us to consider the angles which concern each peculiarly and then observe closely the point at which the angles join.

The questions that concern mostly the Prevention Committee of the A.R.A. are those concerning the railroad's duties, such as the reduction of physical hazards by making a level, smooth and sufficiently wide highway surface over the track; the elimination of approach to track grades of more than 4 or 5 per cent; the avoidance of standing railroad cars or other temporary obstacles to the view; the removal of banks, trees, billboards, etc., where they obstruct the view; the sounding of proper whistle and bell signals by approaching trains and the installation of warning signs and protective devices. Let me urge upon each and every one of you prompt and complete discharge of these duties of your roads to the fullest extent.

Of these questions concerning the railroad's duties there is really only one on which there is any division of opinion—that of protective devices for crossings. Experience has led me to prefer the "barrier" type of protection offered by the automatic crossing gate. On the subject of wig-wags, flashing lights, etc. I feel as does Mr. Ridd, chairman of the Signal Section, A.R.A. who, before a recent meeting of the Section said:

"Regardless of what people think, we know that there are thousands of people who do not know what these flashing lights mean, and they do not know what the wig-wag means, and we are trying to tell them. We know that the signals at present are not adequate, I mean the ordinary flashing light or the wig-wag, because people are disregarding them all of the time."

Our experiences on my own road have led me to favor the "barrier" form of protection—21 per cent of our crossing accidents occur at crossings protected by devices such as wig-wags, flashers, light and bells; 15 per cent of them at crossings protected by watchmen; less than 1 per cent of them are at crossings protected by gates, of which we have no inconsiderable number.

In their recommendations for the protection of railroad grade crossings the National Conference on Street and Highway Safety says that at certain crossings

there should be "automatic train approach signals—either wig-wag or flashing lights—at others manually controlled gates and watchmen where frequent switch moves are made." I have expressed my opinion of the wig-wag and flashers—I regard the "watchman" form of protection of little value due to the speed at which traffic moves and the utter disregard of drivers for a man on the crossing. On our road we have had a large number of such watchmen killed and injured. Thus, by a process of elimination of other forms of protection my thoughts and remarks come back to the automatic gate.

That you men—that all railroad men, appreciate their company's duties in these respects is undeniably proven by the fact that for the past several years the railroads have spent more than \$60,000,000 per year on grade crossing elimination; they have spent huge sums for signals, gates, etc.; they expend large amounts annually in payment of crossing watchmen—for what purpose?—to protect the public against its own folly. In spite of their enormous expenditures for crossing elimination the total number of grade crossings in the country is increasing. All of them cannot be eliminated—the cost prohibits. The cost also prohibits, for the time at least, the installation of expensive warning devices, signs, signals and gates or the general use of watchmen and even if this was done the crossing problem would not be solved for a large percentage of crossing accidents are at crossings so protected. On my road, for instance, 40 per cent of the crossing accidents are at crossings so protected. In 27 per cent of our cases automobiles ran into the sides of our trains after they had occupied the crossing. I can see no reason why the situation should differ greatly with us and with others.

What then, have we to hope for—in what manner shall we go about solving this problem if these improvements in physical conditions and the installation of protective features do not turn the trick? The problem resolves itself into one of education—it has become evident that it is more a problem of human conduct than physical conditions and it is at this point that the angle, which concerns the Prevention Committee of this Council, enters the situation.

Elimination, protection and improvement of crossings is not enough—the public must learn, must be taught to drive sanely and safely, not only at railroad crossings, but at all points and all times. Until the entire problem of traffic control is solved the problem offered us by highway crossing accidents will not be solved, for it is not a problem that stands alone. Crossing accidents constitute only 8 per cent of total traffic accidents.

Therefore, the solution does not lie in the hands of any one railroad, or in the hands of an association of railroads concerned with only the technical railroad angle of the case and more or less limited in their works to their immediate circle. The solution lies in the hands of every man, woman and child who drives a motor vehicle, for it is the passenger automobile—driven by all members of the family—that offers the greatest problem. It is the passenger automobile which is involved in more than 76 per cent of our grade crossing accidents—then come motor trucks with 13.6 per cent. It is the average driver, the owner driver, with whom we must contact.

The mediums through which these drivers can best be reached are—this National Safety Council of which we are a part—and such governmental agencies as the recent National Conference on Street and Highway Safety. As chairman of this Prevention Committee let me urge upon you members of this Section continued and increased support of the activities of our Council which is performing a great and invaluable service for the railroads, one which they cannot perform for themselves, and an equal service for the public at large of which you and your family and friends are a part. Let me urge upon you support of educational activities such as those in which the Council is engaged, and of all legislative action looking toward uniform rules and regulations of traffic; registration acts; operator and chauffeur license acts and all similar measures which have for their purpose the education of that portion of the public who are susceptible to education and willing to learn; the

forcing into line of those who are indifferent to education and to the rights of others and the refusal of the ownership privilege to and the barring from our streets and highways of those who are mentally incapable of being taught or who are otherwise unfit to be at the wheel of a machine whose power of destruction is terrific when its force is misdirected.

That educational and regulatory measures have an effect on the traffic situation is seen in the grade crossing records of the states, some of which have in effect such measures, others of which have given the question little thought or attention. Twenty-five states found it possible, in 1929, to reduce grade crossing accidents from 2 per cent to 100 per cent under the previous year. Three states made no reduction, but no increase, and twenty-one states showed an increase—some of them substantial ones. Conditions in these states, which in all three groups are scattered over the country so that each group may be considered as representative, do not as groups vary enough physically to account for such a difference. Their ability or inability to improve their record resolves itself, therefore, into a question of education and enforcement of regulations—into a development of a crossing consciousness on the part of the driving public. Until regulatory acts become a part of our system of laws and are enforced impartially, without fear or favor, until the provisions of these acts become a part of the consciousness of each automobile driver, then the traffic problem will not be solved—the highway crossing problem will not be solved and the efforts of committees, such as this for which I am reporting, will come comparatively to naught.

The Record for Another Six Months

The written report submitted covers statistics for four months of this year. Since it was written we have received reports for six months which show a continued improvement.

For the first six months period 1931 there were 2,114 accidents at highway grade crossings. Fatalities in these accidents were 921. Injuries were 2,403.

This is the smallest number of accidents, fatalities and injuries, compared with the same period, in the past eight years and shows conclusively that progress is being made in this important phase of accident prevention.

The reduction in the first six months of 1931, compared to the same period last year, represents 221 fewer accidents, 41 fewer fatalities; and 232 fewer injuries.

I want to express some of my personal views in connection with the grade crossing accident problem. In the first place, I am firmly convinced that the revised crossing whistle signal of TWO LONG, ONE SHORT AND ONE LONG, the last blast to end as the engine enters the crossing, the entire signal consuming approximately ten seconds, is the most effective signal in use today. Our experience since March, 1930, has proved this to be true—many accidents have been averted by the whistle warning close to the crossing.

Now, to discuss some of the different forms of crossing protection in general use that do not fully meet the present day conditions. It is my opinion that protection furnished by watchmen provided with hand disk stop signs is fast becoming obsolete, especially on high speed highways, wide city streets and where there is a density of traffic. These men cannot go into the street to stop traffic as their lives would be endangered and the only position they can safely occupy is near the curb. The hand signal at this location is not readily observed by the auto driver who is moving at high speed and has his eyes in front of him. Except in some special locations I do not think this form of protection is worth much.

While it is true that manually controlled gates are still considered probably the most dependable form of protection now in general use, they do not now and never will afford a full measure of protection. The majority of them are what is

known as pump gates and the starting time for lowering the arms depends entirely upon the judgment of a man, who in most cases is some old decrepit employee who cannot be expected to use the best of judgment, many times lowering the gates on top of or just in front of automobiles and causing damage to both the car and gates. As a rule these gates are equipped with a poor light on the arms and an obsolete bell that cannot be heard a sufficient distance from the crossing to be of any benefit. At many locations where manually operated gates are in use they are in service part time only, one or two shifts, leaving the balance of the 24 hour period unprotected. This creates a bad condition, as it is our experience that heavy judgments have been rendered in cases where accidents have occurred during the time when the gates were not in operation. It is, of course, understood that part time protection is a matter of economy and that the railroads cannot afford watchmen to control the gates for the full 24 hours. At such points the automatic crossing gate furnishes 24 hour dependable protection and requires no watchman at all.

I have not changed my opinion about flashing light signals. There is nothing positive that the general run of motorists respect them to any extent, and coupled with the fact that many of these signals are actuated by trains and cuts of cars not actually occupying the crossing, thus creating a false indication, and further that there is no penalty when the motorists run by them—and too their location to the extreme side of the road or street, frequently obscured or partly so by trees, posts and other signs—all this has made me seriously doubt the wisdom of a continued general installation of this type of protection in the future. The protection afforded by flashers on double track is shown by experience to be entirely inadequate. On our road in May this year an auto occupied by three men was stopped at a crossing protected by flashers to let a northbound freight pass. Immediately as the caboose cleared the crossing they started over the tracks and were struck by a southbound passenger train, all of them being killed. All this time the flashers were working properly. Another case, which resulted in derailment of one of our fast passenger trains, turning over engine and four passenger cars, causing property damage to exceed \$20,000.00, killing engineer and fireman and truck driver, occurred at a crossing that was protected by the wig-wag type of protection. The signal was operating at the time, but the driver evidently paid no attention to it. This form of protection is not even as good as the flashers.

To show that regardless of what type of warning device is used the railroads are still held liable in the courts, the widow of the truck driver sued our company and was awarded a \$5,000 judgment. Many similar cases could be cited to show that warning signals are not the best form of protection.

Considerable has been said from time to time about the value of advance side markings indicating the approach to railroad crossings. There is probably some value in such markings, but they are not nearly so effective as pavement marking. The usual run of automobile drivers do not look along side of the street or road, but they do look at the road in front of them and where distinctive markings are upon the pavement they are readily observed.

In conclusion, for the past 16 months we have been very closely watching the performance of a type of automatic gate protection installed on our line in the city of Louisville, Ky. The gate is controlled by track circuit, operated automatically, provided with a superior type of red lights, a well sounding gong and controlled by mechanism which prevents damage to automobiles in case they are lowered on them and so constructed that automobiles caught between the lowered gates can drive through them without damage to the gates or car. The installation is economical and if installed at points where watchmen are employed, the saving in wages pays the entire cost within a few months.

This device has been inspected by a large number of railroad representatives who have been impressed with its dependable up-to-date form of crossing

protection. In fully meeting the present day conditions, which require a different form of crossing protection, I predict that within a very short time railroads generally will be making use of some form of automatic gate crossing protection.

CHAIRMAN WARFEL: I want to thank Mr. Evans for a very constructive talk. I hope that from what he has said you will be prepared to enter more fully into the discussion that will follow the presentations of the three phases of crossing accidents which will follow in the next few minutes.

The first topic under this heading is "The Engineer's Responsibility." Our secretary, an experienced safety superintendent, Mr. J.-L. Walsh will discuss that phase of the problem.

The Engineer's Responsibility

By J. L. WALSH

Superintendent of Safety, Missouri-Kansas-Texas Railroad Co., Dallas, Texas

Most of you are familiar with my attitude on the grade crossing proposition. Mr. Evans has stressed the importance of the new method of sounding the whistle for grade crossings. I fully concur in everything he said, that this is the most effective way of stopping an automobile that is approaching the track.

Ten years ago we changed our highway grade crossing signal from two longs and two shorts to two longs, one short and one long, the last blast of the whistle to continue until the engine had crossed over the crossing. There has been only one year in the period since we adopted that rule, in which we have had more accidents than we had in the former years.

The fireman has a part in preventing crossing accidents just as much as the engineer. When we started on this work in 1921, two-thirds of the cars that we came in contact with approached the crossing from the fireman's side of the engine. So we installed a whistle on the left side of the engine for the use of the fireman, and by special instructions, held him equally responsible with the engineer for striking cars. After that rule had been in effect a couple of years, the ratio of accidents occurring on the fireman's side was reduced to almost equal those occurring on the engineer's side. It demonstrated that the fireman was in a position to, and did, by the use of the whistle, stop cars that were approaching the crossing that otherwise would not be stopped.

On the modern locomotive the engineer can't see cars coming from the fireman's side of the engine and it is very necessary that the fireman act in his stead. We found that it is not possible for the fireman to notify the engineer when a car is approaching. His trying to do so invariably resulted in the engineer's misunderstanding what the fireman said and before his message could be repeated another crossing accident had occurred.

It was with a good many tests and a great deal of talk and trouble that we got our enginemen trained to the point where they are now doing an effective job of whistling at these crossings, but by contact with the men, with the enginemen and the firemen, we have learned of so many cases where automobiles were stopped at the last moment by the use of the whistle, so there is no question in our mind as to the effectiveness of a good job of whistling, with the whistle sounded close to the crossing, in stopping these reckless drivers before they get on the track. I suppose in the course of the year we have had 25 or 30 cases of the automobile making a short turn and turning over before they get to the crossing. That is proof conclusive that they don't look and the only means we have of stopping them is the locomotive whistle. If that is sounded close to them, it will stop them if anything on earth will.

I am convinced further, by a study of the highway grade crossing accidents, that a clear view of the crossing comes next in importance to the sounding of the whistle. I was a witness to two near automobile accidents due entirely to the view of the driver being obstructed. In each case, there were a number of men, one of them a

crossing watchman and the others were trainmen, out in the street trying to stop the automobile because of the approaching train near the crossing, and they were unable to do so because the view of the approaching train was obstructed by obstacles on near by tracks. Regardless of all the stop signs that were given him, the driver didn't believe there was anything coming when he couldn't see it himself.

There are a large number of crossings in our country where the view is obstructed by buildings, trees, and other things. I expect if you go over your railroad and check it pretty carefully, you will find a lot of car houses and tool houses and section houses in the corner of the angle between the road and the highway, entirely cutting off the view of the driver of an automobile. Those things, in my opinion, should receive attention. We should have them removed and thus open up the way for the man to see, and I think they need to see even more than they can hear. If you take the view of an approaching train from a man in an automobile, he is in a dangerous position.

It should be said that fixing the fire in a locomotive or coal burning engine can be deferred a few seconds while the fireman observed the crossings he was approaching. We all know where the important crossings are, and the firing can be deferred long enough to give the fireman the time to observe whether or not an automobile is approaching, and that should be insisted upon. If we are going to get on top of the highway grade crossing accidents that are costing not only lives, but loss of money, we will have to educate the men that ride the engines in the importance of sounding the whistle in accordance with the rules, and we will have to keep it up until we get the public scared off the crossings, rather than doing it by any number of signs that we may put up on the highways, which we know from experience are not effective.

CHAIRMAN WARFEL: We have had a very interesting discourse on another aspect of the crossing situation. I must confess that I anticipate a number of you are waiting rather impatiently until the subject is thrown open for general discussion. In order to facilitate the handling, however, I think we should proceed with topic (b) under the Prevention of Railroad Crossing Accidents which is assigned to Mr. Carl T. Bailey, of the Oregon Short Lines Railroad.

The Maintenance of Way Department's Responsibility

By C. T. BAILEY

Chief Safety Agent, Oregon Short Line Railroad, Salt Lake City, Utah

The responsibility of the maintenance of way department is clearly defined, I believe, and is one of the greatest responsibilities of any of our departments. In the first place, the physical conditions of the crossing should be in first-class shape, depending, of course, upon the amount of travel a crossing has to carry. That varies with the conditions, as I stated.

Visibility, in my opinion, is one of the most essential things. In congested areas it is practically impossible to move buildings and obstructions that have been there for years and years, and as a consequence of that, it is necessary to have something to take its place—something to advise the approaching automobile driver that he is coming to a railroad crossing. I have been firmly sold on the installation of advance warning signs on our highways at the right of the approaching driver, and I believe that that has had a tendency to educate the drivers of automobiles to the extent of using care in approaching crossings.

I am also wholly in accord with what Mr. Evans has said about the mechanical device crossing protection. I believe that the visible type signal, the mechanical signal, in front of an automobile driver is the most effective signal we can have. The barrier, as Mr. Evans stated, is a visible signal, of course, but if an automobile driver can't see a wig-wag signal wagging in front of him, he can't see a box car on the track, and where the crossing indicates that it is necessary to afford protection, I think that some visible type signal protection should be afforded.

I believe that a yearly survey should be made by designated officers of the Maintenance of Way Department, and that inspection should be made in company with a safety man. We have pursued that policy for a number of years, and many times the safety man has discovered a particular condition that was overlooked by the maintenance officer, but that was then readily corrected.

The position of crossing watchman in the past has usually been filled by some fellow who has been injured or incapacitated. As a result of that, there has crept into the ranks of crossing watchmen men not physically qualified under present heavy traffic conditions to afford the protection we expect from them. I agree with Mr. Evans that the traffic watchman in heavily traveled, highly congested highways is in a precarious position when standing in the middle of the crossing unless it is possible to erect some kind of a safety zone for him to stand in. I don't know whether it would be effective, but it has always appealed to me that on our wide crossings, where there is room for an installation of a wig-wag signal on a concrete abutment in the middle of the street, there should be room to erect a safety zone for the crossing watchman, and the effect would be practically the same as with the wig-wag signal.

I am convinced that the wig-wag signal is very effective. The flasher light, I believe, is more generally accepted on lines in the East than in the West. We have gone to the use of a new standard wig-wag signal, which is a low signal at the right of the driver on each side of the track, and that is a very effective signal.

I have in mind an accident that occurred out on the Pacific Coast recently, and while it may not have direct reference to the maintenance of crossings, the accident occurred due to a condition the Maintenance of Way Department would be interested in. This accident occurred on a double-track line over which trains are operated by automatic block signals and train orders. A fast passenger train came up on this paved crossing, a very highly traveled crossing, and approaching from the engineer's side was a heavy truck. This crossing was protected by a wig-wag signal. The truck driver failed to observe the signal waving in his face and he also failed to hear the locomotive engineer whistle, as a result of which there occurred a collision. The engine of the train struck the automobile about where the driver was seated. The train was approaching the switch stand to cross over from one track to the other. The engine dragged the truck along, the truck contacted the switch stand and displaced the switch point. After the locomotive crossed over safely to the main track, the switch points switched under the tank of the engine, resulting in a serious derailment of the entire train.

No doubt we have conditions of that kind in many places and maybe the maintenance officers have not considered the hazard incident to that kind of installation. I believe a switch point locking device might have prevented an accident of that kind had it been installed in this particular instance.

There is much that can be said about responsibility in grade crossing accidents, with particular reference to the responsibility of the railroad, and usually the railroad has to pay the bill. I heard one of our executive officers say one time that no matter what the operating investigation developed as to the adherence to the rules, even if everybody had performed one hundred per cent, yet we paid the bill.

In conclusion, the proper maintenance of grade crossings is of very great importance. To afford the best and easiest and most effective means of protection with the greatest absence of hazards, we should clear away shrubbery and any obstruction that can be cleared away at a grade crossing. We should have, where the traffic count indicates it is necessary, the installation of mechanical device signals and crossing watchmen or gates, whichever the occasion demands, and there should be yearly inspection on the part of the maintenance people to determine that the crossing is in good condition and is kept in good condition.

CHAIRMAN WARFEL: If the rest of you are as much impressed as I am by the way every one of these men is thinking seriously on crossing accidents, and by the changing viewpoint that we hear presented, this meeting is going to be one productive of excellent results.

I know the next speaker is both a driver and a railroad man. I have no premonitions as to what his attitude will be as to the responsibility of the driver, but you will find out very shortly. Mr. C. E. Hill of the New York Central Lines.

The Motor Driver's Responsibility

By CHARLES E. HILL

General Safety Agent, New York Central Lines, New York City

Accidents at railroad highway crossings create more comment and attain a greater amount of publicity than any other type of accident in which railroad operation is involved. The reason is obvious. A collision between a fast moving passenger train and an automobile at a grade crossing creates news, and therefore, the event is conspicuously recorded by the press of our country. This fact, however, has not been without its compensation, for publicity properly applied is a valuable adjunct in any well regulated safety campaign. It is only fair to say in this connection that the newspapers, generally speaking in recent years, have been quite fair in giving the facts, and this is helpful in our educational efforts to prevent such needless tragedies. To carry on accident prevention work with any degree of success it matters not whether it is in the shops, yards or at grade crossings, we must pursue a definite policy, recognizing the work must be conducted along business lines.

The railroads have made quite substantial decreases in the number of accidental deaths and injuries to their employees, due in a large measure to a well planned campaign. Accidents have been analyzed as to causes, departments, class of service, and locations, thus providing an opportunity to apply intelligent remedies.

To succeed in our efforts to prevent crossing accidents it is obvious that a similar procedure be followed, recognizing, however, that there is a joint responsibility as between the railroads and the public.

It is incumbent upon the railroads to give necessary attention to the maintenance of crossings and also comply with the rules and instructions governing the sounding of the whistle and bell upon approaching such crossings. These features have been adequately covered by other speakers. The carrying out of these requirements upon the part of the railroads will not within themselves prevent crossing accidents. They are only an aid to a general plan.

We now approach the public's responsibility. Our subject deals with the motor driver, as automobiles were involved in 91.5 percent of the crossing accidents in 1930, and their proportion of such accidents is increasing each year. With 30 million motorists traversing our 240,000 crossings, the opportunity for accidents is apparent. During the past seven years the number of automobiles in the United States increased 86 percent which, together with the increased mileage of improved highways, increased the volume of traffic over such crossings at least 100 percent in 1930, as compared with 1923. In spite of the fact that there were twice as many opportunities for crossing accidents last year, as compared with 1923, the railroads made a decrease of 6.6 percent in accidents and 12½ percent in casualties. On the basis of the number of casualties per ten thousand automobiles we show a decrease of 45.2 percent. However, if we stop with the mere statement that crossing accidents are decreasing, we not only mislead the public but we fool ourselves, for an analysis of reports made to the Interstate Commerce Commission reveals some rather startling, as well as interesting information.

Our analysis shows that while we have made substantial decreases in accidents and casualties due to the train striking the automobile yet we are handicapped with a far greater increase in the percentage of accidents and casualties due to the automobile running into the side of trains, the proportion of such accidents having increased from 14 percent in 1923 to 27 percent in 1930. This clearly emphasizes some of the difficulties encountered by the railroads in their constant campaigns to prevent

**Grade Crossing Accidents and Casualties
Class I Railroads in United States**

Reports to the Interstate Commerce Commission, showing comparisons as between 1923 and 1930.

	Accidents	Killed	Injured
1923	5060	2268	6314
1930	4725	2020	5517
Dec.	6.6%	10.9%	12.6%

The above figures (exclusive of those accidents due to pedestrians crossing over or under cars, etc.) are further segregated as follows:

	Struck by train			Ran into train		
	Accidents	Killed	Injured	Accidents	Killed	Injured
1923	4312	2040	5076	748	187	1115
1930	3469	1737	3667	1311	257	1798
Dec.	19.5%	14.8%	27.8%	Inc. 75.2%	37.4%	61.2%

crossing accidents. In this connection it is interesting to know that motor vehicle fatalities in the streets and highways increased in almost identically the same proportion as those due to colliding with the side of trains. Is this not significant? Does this not almost definitely establish the fact that the major portion of the progress we have made thus far in reducing crossing accidents has been through increased efficiency upon the part of the railroads in the protection of crossings and in the operation of trains over such crossings.

While we show a decrease of 12½ percent in crossing casualties in 1930 over 1923, yet when we analyze the matter further we find there was a decrease of 20 percent at *unprotected crossings* (those having no protection other than standard warning sign) and an increase of 8½ percent at *crossings having protection*. Delving into the matter further we find the following information.

Protected Crossings

Casualties involving various kinds of vehicles show following increases or decreases in 1930 as compared with 1923.

Motor trucks (decrease in casualties)	9.1%
Motor buses (decrease in casualties)	26%
Animal drawn vehicles (decrease in casualties)	74.5%
Passenger automobiles (increase in casualties)	35.8%

Unprotected Crossings

Motor trucks (Decrease in casualties)	12.4%
Passenger automobiles (Decrease in casualties)	12.7%
Motor buses (Decrease in casualties)	25.6%
Animal drawn vehicles (Decrease in casualties)	84.5%

As information, at the close of 1923 there were 243,785 crossings at grade, of which number 31,019 or 12.7 percent were protected and at the close of 1930 there was a total of 240,673 crossings, of which number 30,287 or 12.6 percent were protected. Inasmuch as both years had about the same proportion of protected crossings, the comparisons heretofore shown are of greater significance.

These figures show definite progress in the prevention of accidents at *unprotected crossings*; also definite progress at crossings having protection excepting where *passenger automobiles* are involved. The decrease in casualties involving motor

buses and motor trucks is influenced by laws in many of the States requiring a safety stop at grade crossings and also through special supervision of the drivers. The large decreases made where animal drawn vehicles are involved are due largely to curtailment of this mode of travel as well as the use of "horse sense".

In view of the fact that in 1930 there were nearly 18 million horses and mules in this country, representing a decrease of only 25 percent over 1923, the decrease involving animal drawn vehicles is somewhat outstanding.

Our real problem therefore is with *passenger automobiles* and since the increase at protected crossings is substantial it is obvious that too little consideration is given by the average motor driver to the watchman, gates, flashlights or other measures installed at such crossings for their protection. A motor driver who would not think of running a red light or disobeying the stop signals of a traffic officer in our cities, too frequently disregards with impunity such warning measures at grade crossings. Such disregard of motor drivers caused 561 deaths and 1,632 injuries last year. The reason for this contrast in the effectiveness of warning measures is obvious, one is policed, the other is not.

What is the remedy?

While the remedy lies largely in education, yet this is only an aid to a general plan. Education is merely a method of informing the public as to the number of accidents, their causes and the remedy. With this limited application of effort automobile accidents of all kinds have been constantly increasing. We have found in our efforts to prevent employee accidents that we need rules regulating the conduct of the individual and that such rules, to be effective, must be enforced. It is imperative that a similar procedure be followed if we are to curb the recklessness inherent in certain motor drivers. There are three things requisite to bring this about.

1. That we have laws in the respective states, requiring a proper standard of qualifications, making it impossible for motor cars to be operated by those who are unable to meet the required mental and physical tests, or those who have a record of reckless driving.

2. Cooperation upon the part of state and municipal authorities, through the establishment of regulations, that will compel obedience to the warning measures placed by the railroads at grade crossings.

3. That the users of the highway not only obey the signals at grade crossings but regardless as to whether the crossing is protected or not, assure themselves that the way is clear before attempting to cross the tracks.

The automobile is a necessity in the conduct of the business of this country. It is an instrument that is perfectly safe when in the hands of a competent and careful driver. However, it is a menace to life and limb when the operator is either incompetent or has no regard for the rights of others.

The fundamentals of accident prevention are the same whether in the street or industrial plant. The problem of automobile accidents, whether at grade crossings or elsewhere, will not be solved until we properly regulate the licensing of drivers; which means not a perfunctory method, but one that will weed out those who are incompetent or reckless. It is imperative that we have enforcement of rules and regulations and insist upon safety on the highways with the same measure of earnestness and sincerity as now followed by the railroads in the operation of trains.

Ninety-five percent of the motor drivers are competent and careful. It is to them we appeal to aid in the establishment and enforcement of such rules and regulations as are necessary to eliminate from our highways the one and one half million drivers who are reckless or incompetent.

The history of motor vehicle accidents shows the necessity for what may be termed drastic measures if the needless tragedies resulting in loss of life and limb are to be prevented. Who should be more concerned than the 29 million motorists who are competent and careful and who use the highways, not only for business and pleasure but with due regard for the rights of their fellow men. If we are to

make further progress in the prevention of accidents at grade crossings, we must of necessity have the wholehearted support of the motor drivers. Our success will be measured by the degree of cooperation received. Therefore, our hope for the future lies in our faith in the justice of our cause—that all agencies involved will unite in one common purpose—the saving of human life.

CHAIRMAN WARFEL: Mr. Hill, you certainly are entitled to the thanks of this Section for an excellent presentation of what is evidently the most important phase of the prevention of accidents at grade crossings.

I am going to exercise the prerogative of a chairman in making a little readjustment of this program. I should like to hear the reports of two committees, following which we will have a brief recess and then resume our session.

I think it is quite desirable to receive the reports of these committees at this time, lest any who might be absolutely required to leave should leave in advance of the rendering of these reports. They are of vital interest. I will now ask for the report of the Committee on Present and Future Activities of this Section, by Mr. John E. Long, Chairman of the Committee.

Report of the Committee on Present and Future Activities

By JOHN E. LONG

Superintendent of Safety, Delaware and Hudson Railroad, Albany, N. Y.

About a year ago when you were kind enough to elect me as chairman of this committee, I wondered what I would be able to present to you today as matters worthy of your consideration. There were several things that I thought might be worth while to bring here, in thinking the matter over during the year, but about a month ago something happened which made me think it would be just as well if I left my file back in New York State.

My understanding is that about a month ago the president of the American Railway Association asked that some effort be made to consolidate some of the activities of the two Sections, the Safety Section, American Railway Association, and the Steam Railroad Section, National Safety Council. With several others, I came to Chicago about a month ago and discussed briefly the possibility of this consolidation. Yesterday the Committee of Direction, Safety Section, American Railway Association, and the officers of that Section, and the officers and members of the Executive Committee of the Steam Railroad Section, National Safety Council, met in this hotel and the result of that discussion, which lasted nearly all day, was a working memorandum which I am going to submit to you today for your consideration.

In the preamble of the Safety Section of the American Railway Association, it states its deep appreciation of the intelligent educational, cooperative, and progressive labors and efforts of the National Safety Council, and states further that they recognize the appropriateness of combining its activities and definitely affiliating itself with the National Safety Council. The reason for that is that in their opinion economies can be effected in the operation of the various committees, the various activities, and the consolidation of the annual meeting.

In setting forth the principles of this consolidation, the first principle was that the Safety Section of the American Railway Association should retain its name, rights, privileges, obligations, and organization as a Section of the American Railway Association. The second provision in this memorandum is that the Safety Section, American Railway Association, will also be the Steam Railroad Section of the National Safety Council, and that the annual meeting will be held as a part of the annual Congress of the National Safety Council.

The third provision is that the financial support of the National Safety Council will be derived in the future, as it has in the past, from its individual railroad members. There is another provision that the National Safety Council may refer in this re-

organized section or group, if you please, as The Safety Section, A. R. A.—Steam Railroad Section, N. S. C.

The fourth provision is that the Safety Section of the American Railway Association shall be represented upon the Executive Committee of the National Safety Council by a member of its Committee of Direction.

The fifth provision is that railroad employees may attend sessions of the annual meeting of the Safety Section, American Railway Association—Steam Railroad Section, National Safety Council, without the payment of the usual annual Congress registration fee. However, they will not be entitled to participate in the other functions and activities of the annual Congress without the payment of such fee.

The next paragraph pledges the loyalty and continued cooperation of the Safety Section, American Railway Association to the National Safety Council, and the closing article provides that this consolidation shall become effective on the approval or after the approval of the American Railway Association and the National Safety Council. In other words, this is a tentative working agreement and before it is finally put into operation, it will have to receive the approval of the American Railway Association and the National Safety Council.

In asking for your approval of this report of the chairman of the Committee on Present and Future Activities—and I assure you this is a very important future activity—I am asking that you also approve the action of the officers and members of the Executive Committee of the Steam Railroad Section, National Safety Council, and the action of the officers and members of the Committee of Direction of the Safety Section, American Railway Association, which they have taken up to this time. There are a great many other details yet to be arranged for and I hope you will also approve of the suggestion that the bodies I have mentioned continue their effort to bring this consolidation of activities and of the Sections.

Mr. Chairman, I move the adoption of this report.

CHAIRMAN WARFEL: Do I hear a second?

ROBERT SCOTT (Atlantic Coast Line): Mr. Chairman and Gentlemen: It has been my pleasure during the past year and a half to labor as chairman of a Committee on Relations with the Steam Railroad Section of the National Safety Council. I have been in close touch with Mr. Long who is chairman of this Committee on Future Activities of the Steam Railroad Section of the National Safety Council, in the capacity of chairman of a Committee on Relations with that body, representing the Safety Section of the American Railway Association. I have given this matter the deepest sort of study. I met here in Chicago on the second of September and again yesterday, and I am thoroughly familiar with the entire movement, and I am convinced that the resolution offered by Mr. Long is in the best interest of safety work on the American railroads today. And I have simply risen to second the adoption of the resolution which has been so thoroughly covered by Mr. Long.

CHAIRMAN WARFEL: It has been regularly moved and seconded that the report of the Committee on Present and Future Activities of the Steam Railroad Section of the National Safety Council be accepted and approved by this body.

I want it very definitely known what this vote records. The Committees of both Sections have met together twice. They have drawn up this plan for consolidation which in effect accomplishes this: the Safety Section of the A. R. A. now existing and which has been holding its meeting in the spring, as we also know, shall become the Steam Railroad Section of the National Safety Council, functioning as such, but retaining absolutely all its identity, all its sectional obligations, activities, and organizations as a section of the American Railway Association; that hereafter we will have but one annual meeting of the railway safety men of the country, which will be this fall meeting, and consequently there will be no meeting in the spring. Under the present economic conditions, such a thing certainly could not be anticipated.

When you vote, if you vote as I expect that you will, approval of the resolution that has been offered, or the motion that has been made, you signify your willingness as members of the Steam Railroad Section of the National Safety Council to merge with

the Safety Section of the American Railway Association, and the Safety Section of the American Railway Association merges with us and we become one body known by the hyphenated name, Safety Section, A. R. A.—Steam Railroad Section, National Safety Council, so far as reference to or activities of the Council are concerned. The literature of the A. R. A. will continue to be that of the Safety Section of the A. R. A. as far as it is concerned.

I think it should be made clear that the men who should vote on this motion are the men who represent the member railroads of the Steam Railroad Section of the National Council. Those who are attending as visitors, the supervisors and employees of railroads who come here, should not vote on this motion, but only the chief safety officers or men in similar capacity who represent their railroad at this meeting.

Before we take this vote, I want to ask if there is any discussion on this motion.

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): If you wish to have this accepted as an official document, the motion should be to adopt the articles as drawn up by these two committees rather than to accept Mr. Long's report.

CHAIRMAN WARFEL: My thought in putting the question as I did was this: it may be necessary for the Executive Committee of the Steam Railroad Section to make some alterations in this at the request of the Executive Committee of the National Safety Council. If that is done, we certainly would have to refer any such suggested change to the Committee of Direction of the Safety Section, A. R. A., and they in turn to the Executive Committee of the A. R. A. For that reason, I am not asking that you men who vote on this motion shall vote on every T and every I in this presentation, but that you shall vote your approval of what has been done to date and of the continuation of this work of the two committees, subject, of course, to the complete review of the American Railway Association and of the Council, that we may not have to again put it to a ballot of all the membership if the least change in wording or the least change in any way, shape or form, of the agreement which has been composed by joint action of the two committees of the two groups, is suggested.

H. A. ROWE (Delaware, Lackawanna & Western Railroad): Inasmuch as this is a very important matter for both organizations, it seems to me that we should record the vote of the railroads individually so that should any future question arise, we shall know exactly who voted, how, and how many railroads were represented at the voting. It seems to me that might be a politic thing for us to do, and I offer that as a suggestion.

F. HARTENSTEIN (Lehigh Valley Railroad): I may be a little foggy on this proposition, but as I understand it, this Section and the Safety Section of the American Railway Association propose to present this resolution directly to the American Railway Association for approval.

CHAIRMAN WARFEL: I should inform you, if I get your point, that the first tentative outline of consolidation was presented to President Ashton for his inspection, as he suggested the merger, and President Ashton instructed us to go ahead so far as the American Railway Association was concerned, and try to reach an agreement on the getting together and forming of one section; that communication was had with the officers of the National Safety Council and we received similar authority from them to proceed to formulate a basis to merge the two Sections. What Mr. Long has given here is the basis of the consolidation.

MR. HARTENSTEIN: What about submitting the proposition to the executives of the respective lines. Are we going to eliminate them in this consideration?

CHAIRMAN WARFEL: The executives of the lines, so far as the presidents and managers of the railroads are concerned, usually function through the Committee of Direction of the American Railway Association for that Association. Now, as to the Steam Railroad Section, the railroad members of the Steam Railroad Section are authorized to be represented by their safety officers, and it is the vote of the safety officers of the Section that I am asking for.

MR. HARTENSTEIN: I understand that very clearly, but there is that difference in the functioning of the two Sections. Now then, gentlemen, I feel that we are going

at this thing backward. I know I have received a letter from our vice president stating to me that we would continue our membership in this Section until the first of the year, at which time we would withdraw.

CHAIRMAN WARFEL: That is the Steam Railroad Section of the Council?

MR. HARTENSTEIN: Yes, the Steam Railroad Section of the National Safety Council. I bring that to your attention to show you there is an interest in the minds of the executives as to the existence of these two Sections. I think we should move very carefully with this thing, and I think it should be presented to the presidents of the different railroads we represent here today.

MR. CARROW: Mr. Chairman, I am very sorry I brought this up, because I don't apprehend anything serious as to how it would happen either way. My only thought was that after two or three or four days' deliberations, the result of our deliberations was embodied into a specific document, and as I understand it, Mr. John Long presented that document as his motion. Now, anything extraneous or supplementary to that document would be contrary to the purpose of the two committees in having it presented today.

It has always been the practice of the Steam Railroad Section ever since it was organized, to vote directly on the floor and I don't think there can possibly be any commitment on the part of any representative here as to this particular proposition. I wouldn't have mentioned it at all if I hadn't been anxious to confine the motion to the document, that is to say, the articles presented by the two committees and concurred in yesterday, and it seems to me that is all the motion should call for.

MR. SCOTT: Mr. Chairman, I call for the question, please.

CHAIRMAN WARFEL: Is there any further discussion? Are you ready for the question, gentlemen?

The question is on the accepting and approving of the motion made by Mr. Long, which carries with it the approving of the action in consolidating these two Sections exactly on the basis Mr. Long has set forth to us, with the assurance that no extraneous matter will be incorporated, but that it might be necessary to change a word or two, which, if we voted to accept the document, might necessitate another meeting of the two Executive Committees, and you may be sure that the interests of both Sections will be fully protected.

I might make one other explanation to Mr. Hartenstein before I call for this vote: that the individual memberships of the individual railroads in the Steam Railroad Section are depended upon by the National Safety Council as their means of support. The American Railway Association is not pledging any financial support to the Council as a body, and it is hoped that the railroads will continue their individual memberships, but at their own option, but that nevertheless the railroads which are a part of the Safety Section of the American Railway Association will have their full participation in all of our meetings.

MR. HARTENSTEIN: Is this presented with the distinct understanding that the railroads will be to no expense in connection with their affiliation with the National Safety Council?

CHAIRMAN WARFEL: That is the understanding, that there will be no additional expense, aside from membership, and any railroad that is a member of the American Railway Association will still have its participation in the Safety Section and in the annual convention and program, as a part of the American Railway Association.

All those in favor of this motion will please stand.

(Thirty-one arose.)

CHAIRMAN WARFEL: All those opposed to the acceptance of this motion will please stand. (No one arose.)

The motion is carried.

MR. CARROW: I wouldn't do this except that I am fearful that unintentionally it might be omitted. I want you gentlemen, and especially Mr. Hartenstein, to know that if anything was emphasized in the meetings of these committees, it was this: that we would maintain without qualification, so far as we could individually through

our influence, the membership that we now hold in the National Safety Council. It was the unanimous opinion of both committees, and there were about twenty of us representing the large and the small railroads of the country, that the National Council is necessary to our purposes in perpetuating and carrying on the safety work of this country, and I certainly do hope that nobody will construe this procedure to effect a consolidation of these two bodies as minimizing our interest to any degree whatever in the National Safety Council. Mr. Chairman, I apologize for doing that, but I was afraid it might be omitted.

MR. HARTENSTEIN: With all that has been said and done, I want you to understand that I am mindful of the benefits that are to be derived from our association with the National Safety Council. I am in full accord personally with what has been done, but I want to be clear on something to take back to my people. I don't want to be foggy on anything that has been done.

CHAIRMAN WARFEL: I appreciate that. It occurs to me that perhaps you are one of a very few who, because of your remoteness to the scene of what has occurred in the last few weeks when the A. R. A. suggested this merger, are not as familiar as some of the rest of us with the activity that has been carried on so far. I know you are as loyal personally to the National Safety Council as any one of us, and that you are only seeking to protect the interests of the carrier you represent.

I should now like to receive the report of the Committee on Nominations, to be presented by Mr. Fred Metcalfe.

FRED M. METCALFE (Northern Pacific Railway, St. Paul, Minn.): In view of the contemplated consolidation about which you have just heard, the Nominating Committee recommends that the present officers retain their offices in the Steam Railroad Section of the National Safety Council pending the anticipated early consummation of the consolidation. The Nominating Committee has, therefore, prepared no list of candidates.

CHAIRMAN WARFEL: You have heard the report of the Committee on Nominations, understanding, as I presume you do, that it is made for the reason that it is anticipated that both Sections will be merged into one very shortly and that the officers of the Safety Section of the American Railway Association will become the officers of our joint association, and those of us who at present hold office in the Steam Railroad Section of the National Safety Council will immediately have our offices abolished upon the completion of this merger and, therefore, the Nominating Committee suggests continuing us in service for the short interval until this merger is completed.

Do I hear a motion to adopt the report of the Nominating Committee?

C. E. HILL (New York Central Lines, New York City): I move the report of the committee be adopted and the Secretary be instructed to cast the vote of this body for our present officers.

(The motion was seconded by Mr. John Long, put to a vote and carried.)

CHAIRMAN WARFEL: The Chairman of our Poster Committee Mr. L. G. Bentley, Superintendent of Safety of The Chesapeake and Ohio Railway Company, Richmond, Virginia, will present his report.

Report of Poster Committee

By L. G. BENTLEY

Chairman

The usual practice of issuing one Steam Railroad Section poster per month has again been followed during the past year.

Eleven posters have been produced, of which two were striking in their appeal to the youth of our Nation.

These posters warn of the dangers of walking and playing on railroad property, and the sales amounted to approximately 6,320 copies each, which was the widest

distribution of any poster prepared by the Steam Railroad Section during the past year.

One poster was prepared for use by station, warehouse and pier forces of which approximately 5,000 copies were distributed.

In an effort to meet the most pronounced hazard of railway employees of all classes, a very strong poster was offered to members portraying the danger of stepping on railroad tracks without looking. Of this poster we sold approximately 4,500 copies.

Two posters were prepared dealing with "Standing Clear as Coupling is About to be Made" and "Playing on the Front Steps of Switching Engines", both of which practices are covered by the standard Book of Rules or special instructions, and both are gradually coming under the influence of these requirements. The sales were approximately 3,500 copies each, and hardly justified the labor and study of preparing them, as this distribution among 285,000 train service employees was very sparse.

During the year, your sectional executive committee decided that it would be better to do away with posters having to do with railroad operation in favor of more posters dealing with hazards to the public and shops.

This has been done and, during the year, four posters dealing with shop hazards were produced, with an aggregate sale of 21,000 copies, or an average of 5,000 copies per poster.

These posters were all carefully prepared and each represents a current shop hazard together with appropriate advice as to precautionary measures.

During the latter part of this year, a change in size was made. Inasmuch as the posters are generally placed where they may be observed at fairly close range, it was felt that the size could be cut in two without detracting seriously from the effect, and at the same time make it possible to serve the members at lower cost.

It is somewhat early to decide whether or not this move has been justified by the increased distribution.

The last poster is a somewhat novel appeal to the motor driving public. It is an attempt to impress motor car drivers with the locomotive engineman's attitude and interest in the prevention of highway crossing accidents. The sales of this poster are incomplete.

It should be remembered that these special Steam Railroad Section posters are but a small part of the regular monthly issue of posters produced for the membership.

Many of the hazards to which railroad employees are exposed are those common to most industries and the majority of the posters produced by the Council at large relate to these common causes of accidents.

Appreciative acknowledgment is hereby registered of the valuable assistance rendered the poster committee by headquarters staff in Chicago and particularly by Mr. Kershaw, the director of the poster division.

Your committee respectfully urges you to make greater use of this valuable educational service.

MR. HARTENSTEIN: Mr. Chairman, I want to extend my congratulations to the Poster Committee for the last poster referred to by Mr. Bentley, which conveyed a striking lesson on safety to drivers. We bought liberally of the posters and we also bought 5,000 of the circulars to distribute from ticket office windows. I think if we can have more of those posters that convey a lesson to the automobile drivers it will be of great assistance in reducing crossing accidents.

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): I move we accept the report of the Poster Committee.

(The motion was seconded by Mr. Hartenstein, put to a vote and carried.)

CHAIRMAN WARFEL: Gentlemen, in opening this discussion on the grade crossing problem, and a further discussion of the maintenance of way question which was brought up this morning, I should say we should first confine our attention to the

grade crossing situation because that has not been touched upon at all in open discussion. I will ask Mr. Herbert Rowe of the Delaware, Lackawanna & Western to come forward.

Mr. ROWE: I have the pleasure of being here today in several capacities, first as a member of your organization, second, representing my road, third, representing the American Railway Association, and fourth, representing the Joint Committee on Grade Crossing Protection.

I think it was Mr. Walsh who called particular attention to the fact that the locomotive engineer has the key to the problem. I agree. I disagree with Mr. Walsh when he tells us that our educational program is not of so much importance. I don't know whether he used that word but he made the inference. The fact is, however, that the reason we are getting better locomotive whistling at the present time is because of the publicity work that has been done of an educational character, and the educational character is absolutely essential for the information and guidance of the public and for creating a sentiment which will be favorable to those ideas which are sound and reasonable and should be carried into effect by the railroads and by the public.

I am here today, gentlemen, at the invitation of your Chairman, as a representative of the Joint Committee on Grade Crossing Protection, American Railway Association. I may be able to tell some of you just about what that is. This Joint Committee is a sort of executive body that has been created by the Board of Directors of the American Railway Association, as a form of clearing house for the ideas that may be presented by other organizations within the Association, and for the initiation of matters upon its own account.

I am going to tell you frankly that the Joint Committee as a whole are very staunch believers in the principle that the protection of grade crossings is a public duty. Heretofore in some states it has been regarded solely as the function of the railroads and the obligation of the railroads. Public sentiment is changing today and the enlightened men in public life and those having charge of such propositions as grade crossing protection are recognizing that they have a definite burden in the protection of the public at railroad crossings, and I am happy to state that there are many public officers today who believe that the whole cost of protection at crossings is a public charge, and should be a public charge and not a railroad charge. There are other men of intermediate views, but I think we are coming to the time when the burden of protection of the highway will be passed on to the taxpayers directly instead of in the round about way which it must come out at the present time.

CHAIRMAN WARFEL: I am sure everyone of us appreciates what Herbert Rowe had to say. Now, we want to have your discussion on all these points.

L. G. BENTLEY (The Chesapeake & Ohio Railway Company, Richmond, Va.): I want to testify to what Mr. Walsh and Mr. Evans and Mr. Rowe said about the efficacy of sounding the whistle up to the crossing. Some eighteen months ago on the railroad that I represent, we adopted two longs, one short and a long, the last long to be drawn out until we reached the crossing. In the year immediately following the adoption of that rule, we reduced our highway crossing accident fatalities 58 per cent, our non-fatalities 72 per cent, and we think so well of it we have inaugurated that in our new standard Book of Rules.

J. L. WALSH (Missouri-Kansas-Texas Railroad Company, Dallas, Texas): I want to ask Mr. Bailey the type of switch stand that was involved in that passenger train derailment.

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): It was a high target stand.

Mr. WALSH: For the benefit of those of you gentlemen who are using the ground-throw high target stand, which is supposed to be safe, I might say we had an accident similar to the one Mr. Bailey related to you, where the lever was pointed toward the track and at about 50 feet from the highway grade crossing we hit a truck and dragged it along until it engaged the ground throw lever and by that means opened the

switch points. We immediately adopted a new system whereby we point the ground throw lever the other way. It is very important to watch that.

C. F. LARSON (Missouri Pacific Railroad Company, St. Louis, Mo.): Reference was made to the markers on the highway. I just want to relate an experience on the Missouri Pacific Railroad. On one of our divisions in Kansas we have had three bad accidents in the last ten months involving deaths and serious accidents to motorists running into the side of moving trains over a highway crossing. The crossing is constructed absolutely in conformity to the standards laid down by the state of Kansas, but just where the highway joins that portion that goes over our track, or just a few feet beyond it, there is a dip in the highway in a small ravine where they didn't elevate it.

The highway for about three miles west of our track descends to this point and suddenly makes the dip and comes back to the railroad right of way. The trouble in the case of each collision was that at night when the car ascended out of this dip onto that portion that goes over the railroad track, the light was focused so that it went over the top of the tank cars.

Now, the people involved in all of those accidents were entire strangers in that part of the country, tourists coming back from the West to their homes in the West, and they had probably never been on that highway before. It is adequately marked with markers on the pavement three hundred feet back from the track, but there is a trap there; they run down into this dip and start up and the light shoots over the top of the cars.

We have no remedy except to appeal to the Highway Commission of the State of Kansas to lift that road up out of the dip. That is a unique cause of accidents. In each case the trains were moving rapidly over the crossing and struck those cars with such force that the automobiles were entangled under the cars, and we should have a remedy.

With reference to the whistling that has been discussed so much, I think the Missouri Pacific almost immediately followed the M.-K.-T. five or six years ago in adopting the whistling signal that is being adopted by some of the other railroads now, and I can also testify to the efficacy of that use of the whistle because it has been of wonderful help to us.

Mr. HEAVY (The Erie Railroad): What complaint do you get from citizens in towns and hamlets along your railroad as to the sounding of the whistle?

Mr. LARSON: We are constantly having those objections on railroads, but unless it is covered by ordinance, we go ahead and whistle just the same. We tell them if they would rather have funerals than whistles, they can have the funerals, and until they stop us we keep on just the same.

E. G. EVANS (Louisville & Nashville Railroad, Louisville, Ky.): The result on our road has been to cut the duration of the whistle just in half, or better than that. But we are whistling at places now where we never whistled before, so the whistling over all has increased. We have had complaints but in every case we have been able to satisfy the man who made the complaint, either by going to him myself or sending the division superintendent, and personally laying the record before him and asking him what he wants to do, kill people or blow the whistle, and in every case except one, in every town we run through, we have been able to satisfy them.

J. A. MASSEY (The Chesapeake and Ohio Railway Company, Newport News, Va.): For point of information, I would like to know what arrangements were made that the fireman might blow the whistle from his side of the engine.

Mr. WALSH: We extended the whistle lever. We first started taking it over with a cord but we later put on the same rigging over the fireman we have over the engineer. And the fireman is instructed that he is to blow the whistle when he sees the automobile approaching from his side.

CHAIRMAN WARFEL: I might add in regard to another carrier that on the railroad with which I am connected we have accomplished the same thing as Mr. Heavy through instructions, not through changes but through instructions that the whistle

be continued up to the crossing, and that the whistle blow ten seconds immediately preceding approaching the crossing. Further, we have had great success in teaching engineers to modulate the sound of the whistle, and we have instructed our Mechanical Department that any whistle that is not regulated so it can be modulated by moving the lever, should be so regulated. There is no use of waking up a man five miles away in the city in order to give a warning to an autoist 50 feet away from the train.

We shall have to interrupt this discussion to hear two committee reports, after which we will feel under no obligation to limit ourselves in any way whatever.

I should tell you that Mr. Failing, the Chairman of the Membership Committee is unable to be here today, and I can simply inform you that whereas the high spot in membership of the Steam Railroad Section was 105 members two years ago, we have lost but nine members to date and the present membership by the last report is still 96 members. I hope every one of you will exercise every bit of stamina you have in explaining to your controlling officers the value of their membership in the National Safety Council.

I should now like to receive the report of the Committee on Public Relations. That report should be given by Mr. Flanagan of the Chicago, Milwaukee, and St. Paul, but he has been quite ill. He is just recuperating and while at the hospital they have given him permission to come here tomorrow, he will probably be unable to take part in the sessions. In the meantime, he has sent his chief clerk, Mr. G. M. Dempsey, here with his report. Mr. Dempsey, will you give us that report now?

Report of Public Relations Committee

By **M. J. FLANAGAN**
Chairman

In carrying out my assignment as chairman of the Public Relations Committee, I perhaps have not covered the matter as thoroughly from the standpoint of general application throughout the country as I should have, but considerable effort was directed toward promoting safety activity in the communities along the Milwaukee Road.

No doubt, the greatest problem with which we are confronted in handling the question of safety with the general public is that of highway accidents, and while we realize that the National Safety Council is campaigning in many ways on this subject practically continually, and that in spite of this there is still room for improvement, nevertheless, the railroads are actually affected, or, I might say, most vitally concerned, in only a small portion of these accidents, those which occur at railroad crossings.

Realizing this, the greater portion of my activity as chairman of this committee has been directed along those lines. I have written numerous organizations and have arranged to have representatives of the Milwaukee Safety Department deliver addresses at meetings of such organizations as the Lions Club, the Kiwanis International, Local Chambers of Commerce, and at various other gatherings to which we were invited and where it was felt that a message of safety would result in some good being accomplished. A great many of our Division officers have also made it a point to attend various community meetings where particular stress was laid on the question of preventing highway crossing accidents.

We have endeavored to take advantage of every opportunity to furnish speakers at high schools and grade schools at points on the Milwaukee Road, in an effort to impress upon the children the dangers incident to trespassing on railroad property. In addition to this, considerable effort has been directed toward pointing out, through the principals and teachers at such schools, the need for continually cautioning the children with reference to this dangerous practice. We feel that we have accomplished good results through this means. The Milwaukee Road has been instrumental in establishing many troops of Boy Scouts at various points, which troops consist mainly of

the children of employees, and we feel that by enlisting the cooperation of these boys, a great deal of good has been done so far as the trespassing issue is concerned.

I feel satisfied that during my term as chairman of this committee the message of safety has been carried to a great many communities and schools from which good results may be expected. It is difficult for the chairman of this committee to work single-handed in spite of the assistance received from other committees in making personal contacts with the general public, and in retiring as chairman, I suggest to my successor that it might be well to request some assistance in and by appointing several members to serve with him on the committee.

CHAIRMAN WARFEL: Thank you, Mr. Dempsey.

There is another very brief report to be rendered. I will ask Mr. J. L. Walsh to read the report of the Committee on Safety Contests.

Report of Committee on Safety Contests

By **A. V. ROHWEDER**
Chairman

Your committee on railroad employees safety contests feels that no definite report can be made to the Section at this time and recommends further study before any definite recommendations are submitted.

We desire to express our sincere appreciation to the National Safety Council for their carefully planned and well executed Railroad Employees Safety Contest. The stimulation to greater achievements in railroad safety is the direct result.

Your committee desires to express particular appreciation to Mr. L. R. Palmer, secretary of the National Safety Council Railroad Employees Safety Contest Committee and secretary of the American Museum of Safety, Committee of the E. H. Harriman Memorial Award, for his outstanding contribution to railroad safety, through his fair and untiring efforts as the "working factor" in these safety contests.

CHAIRMAN WARFEL: Thank you very much, Mr. Walsh.

Mr. Frank E. Strouse, assistant to the General Manager of the Western Lines of the Pennsylvania Railroad, and Chairman of the Publicity Committee has a brief report which I wish he would read at this time.

Report of the Publicity Committee

By **FRANK E. STROUSE**
Chairman

There were ten meetings addressed and two radio talks made by members of the Steam Railroad Section this year, as follows:

March 5th—Midwest Safety Conference, Chicago—Address by Mr. Lew Palmer, Secretary of the National Railroad Contest Committee.

April 13 and 14—Central States Safety Conference, St. Louis—Address by Mr. Fredrick Larson, Superintendent of Safety, Missouri Pacific Railroad.

April 22—Fourth All Ohio Safety Congress, Columbus—Sketch "Built on a Bluff" by P. R. R. employees of the Columbus Shops.

April 29 and 30—Tenth Annual State Conference, Industrial and Public Safety, Boston, Mass.—Address by J. A. Droegge, Vice-President, N. Y. N. H. & H. Railroad.

May 1st—Rock River Valley Safety Conference, Rockford, Ill.—Address by Mr.

Frank E. Strouse, Special Representative of General Manager, Pennsylvania Railroad.

May 8th—Southwestern Regional Safety Conference, Houston, Texas—Address by Mr. Harry Guilbert, Safety Director, The Pullman Company.

May 21st—Erie Safety Council, Erie, Pa.—Address by Jacob Laub, Safety Department, Pennsylvania R. R.

May 30th—Fox River Valley Safety Conference, Fond du Lac, Wis.—Address by Mr. Fred Sargent, President, C. & N. W. Railway.

June 29 to July 4—All Lima (Ohio) Safety Week—Two addresses and two radio talks by Frank E. Strouse, Special Representative of General Manager, P. R. R.

176 letters were mailed to the presidents and general managers of the leading railroads in the United States and Canada, signed by Geo. H. Warfel, General Chairman, calling attention to the Twentieth Annual Safety Congress and the importance of having delegates attend from every railroad.

CHAIRMAN WARFEL: The chair will entertain a motion to accept the three committee reports which have just been heard.

MR. ROBERT SCOTT (Atlantic Coast Line): I so move.
(The motion was seconded, put to a vote and carried.)

ADJOURNMENT

Wednesday Morning Session

October 14, 1931

GEORGE H. WARFEL, Chairman
Union Pacific System, Omaha, Neb.

The third session of the Steam Railroad Section convened with General Chairman Warfel presiding.

CHAIRMAN WARFEL: The first number on our program this morning is a discussion of the train and train service hazards, beginning with the situation from the standpoint of the brakeman, and told by an assistant superintendent, a superintendent, and a general manager.

The first speaker is from the Chesapeake and Ohio Railway. I am going to deviate a little from what has become customary and ask Mr. Lyle Bentley of the Chesapeake and Ohio to introduce the speaker.

MR. BENTLEY: I know that we all, in the progress of our work on the railroads, from time to time develop outstanding men in our organization, men who in their zeal, their earnestness, and their enthusiasm, stamp themselves as leaders, men who go beyond their duties to perform that service to humanity that is demanded through the safety movement. It gives me peculiar and particular pleasure to present such a man, Mr. J. A. Massey.

The Brakeman's Duties in Accident Prevention

By J. A. MASSEY

Brakeman, The Chesapeake and Ohio Railway Company,
Newport News, Va.

A Nation's railroads are the foundation stones of its prosperity. Without them the whole social fabric could not long survive. They are the arteries through which flow our commerce and our subsistence. They are the channels through which the western farmers send their products to the ultimate consumer in the east; they are the avenues of communication between the interior and the seaboard; they bring coal from the mines and deliver it at the great manufacturing centers; they carry back to the west the finished products of the east; they are the medium of commercial exchange between the north and the south; they are the most reliable and most dependable means of passenger travel; they are indispensable to the development and well-being of the country. For these reasons, divorced from all sentimental consideration, the government must see to it that the railroads are accorded fair treatment since they are the bulwark of our national existence.

If the railroads are to prosper they must have moving trains. These trains must be in charge of experienced employees. The safety of these trains depends on the safety-mindedness of those to whose care the trains are trusted.

The brakeman's duties are of such importance and so many in number that I will not be able to cover them properly in a limited time. Therefore, I will try to give you some new ideas in a general way as to the importance of the safety movement and the necessity of a strict enforcement and obedience to the rules. "Obedience to the rules is essential to safety" is one of the most important safety rules and means exactly what it says.

Behind all laws, and administrative rules having the force of law, lies the penalty for violation. No matter how efficient the administration or how actively employers and employees may assist, the administration would remain but a voluntary cooperative society if not supported by penalties imposed on those who refuse or neglect to assist. A record of a small number of prompt and impressive convictions will mean more for the enforcement of safety rules than several pages of statistics.

Safety rules are designed to bring the careless and indifferent employees up to the standard of the safe and efficient employees, pointing out the necessity of the employees in helping to reduce accidents or the hazard of an accident through a complete knowledge of the requirements of his job. To know your job, you must be a good one of whatever you are.

Almost every switching movement on the railroads is covered by safety rules, and the large number of accidents, both fatal and non-fatal, is a serious indictment of train service men and other employees on observance of the safety rules. Therefore, obedience to the rules is the secret of safety.

Obedience is the divine law taught from the beginning of time and all of the suffering of mankind has been due to failure or unwillingness to be obedient to these laws.

Our civilization cannot survive materially unless it be redeemed spiritually. I do not understand how any man can approach the discharge of the duties of life without first seeking divine guidance. Every safety committeeman should be a leader in spiritual things as well as material things.

The safety movement on the American Railroads was born of necessity, the mother of all invention. We cannot stop the progress of civilization, but we can slow up that progress through our unwilling efforts to cooperate with the movement.

Safety requires thinking, and the sensible man thinks and then intelligently acts. He shoulders his part of the program, and in doing so proves himself his brother's keeper. He builds the safety foundation sufficiently strong to bear the responsibilities that are to be laid on it. He will find honesty, responsibility, forbearance, and consideration of others the best available material to build that foundation on. He must realize that none of us can escape responsibility. Each man's life is in some way an influence for good or evil, so let us use our God-given powers to set good examples and avoid the bad influences, so that we might place the human factor on the plan of perfection now reached by mechanical processes.

We have been taught by experience that the basis on which safety stands is that forethought which holds that life and limb are the first consideration and that every movement will be made in the safest way, by doing what common sense and good judgment suggest at the proper time.

The brakeman's duties require him to study the immediate problems of industry and apply himself accordingly. He must learn that regularity is of more importance than speed, and avoid giving the excuse most often given for the violation of safety rules—that of avoiding a delay. It is true, however, that time is an important element in transportation and that delays are vexatious and costly, but we must never admit that the avoiding of a delay is of more importance than safety.

The safety movement is pre-eminently the greatest ever adopted by the railroads, and has changed the viewpoint of the employee toward the prevention of accidents as well as to damage of the equipment. The chance taker is no longer looked upon with favor because, while good railroading demands efficient service, it does not require that service at the sacrifice of one's personal safety. The real and reliable railroad man is the one who thinks in terms of safety and acts accordingly. He goes about his work in a cool and deliberate way, always thinking about the safety of himself and the safety of his fellowman, and having the company's interest at heart, and he sincerely endeavors in many ways to prevent damage to equipment and property.

When I work safely, my associate workers share in the benefits, because a safe man, so to speak, lives the principals of "I am my brother's keeper," and he consequently spreads the mantle of protection over others.

There is need of a closer cooperation at this point of the discussion, the kind of cooperation that would have men communicate with confidence their ideas to others

with an effect pleasing to the mind. Only through cooperative mingling can we sell safety to the hearts of men. It would give men a chance to listen to those who have probed the depths of ruin and have risen to the heights of human spirits. Cooperation is the remedy to unite men for interest and business. To get honest cooperation it is necessary to have kind treatment coming down from the top, and to expect loyalty with respectful obedience to climb up from the bottom.

The new man comes into the service with no fixed habits along the line of work he is going to do, but he is going to form those habits and form them right away. Those habits will be good or bad, safe or unsafe, just in proportion to the impressions that are put upon him at the time he enters the service.

Only two things enter into railway service, namely: men and materials. Good, safe men will make conditions safe. Materials are carefully inspected before they are purchased and are taken good care of afterward. The same thing should apply to the men. The employing official should scrutinize his record and avoid the undesirable men. The applicant should be questioned as to his willingness to obey the rules. He should carefully study and discuss with his fellow employees the causes of injuries and accidents as pointed out in the safety bulletins and instructions. He should then be given detailed instructions and made to understand that personal responsibility and a strict obedience to the rules are essential to a safe and efficient service, bringing out the point strongly that safety is efficiency, and efficiency is safety. Educating the employee to the advantages of safety is to educate him to a meritorious and faithful service.

Accidents do not just happen. There is a reason for all things. The greatest reason for safety is self-preservation, and, as a believer in the first law of nature, my plea to every employee is to accept the safety movement and adopt it as a guide to future happiness and welfare. The surest and best way to drive out gloom is to let the sunlight of Safety be your guide.

In train service, the opportunity for further improvement in the reduction of preventable accidents by reasonable care is apparent. Railroad men know that accidents can be prevented in most instances by keeping on the alert and taking the necessary precautions.

The hazard of passenger travel has practically disappeared. It is much safer to ride upon railroad trains today than it is to walk on the streets and highways. The hazards of railroad employment are rapidly diminishing and when safe and sane thinking becomes a deep-rooted habit with railroad men these hazards will also disappear. I know from my own experience in train service that there is absolutely no justification for the large toll in death and injury. A large percentage is due to violation of the rules and is the result of reckless and careless practices which the men have acquired and to which they have become so accustomed that they do their work in this manner without realizing the chances they are taking. The success of the safety movement now is no longer one of unsafe conditions, but one of stopping unsafe practices.

One thing of great importance to all train service men is the necessity of getting their proper amount of rest while off duty, so they will be in a position to do their work in a safe and efficient manner, and give the railroad that they work for an honest day's work and not be handicapped by a brain that is slow to act and a body that is sluggish in its movements.

Somebody will ask, "What can I do to prevent accidents?" I shall try to answer you. First, and most important, you can get in the habit of saying that the safety of myself and my fellowman shall be my dominant thought. Safety is food for the mind of the employee and is just as necessary as food for the body. He must always have before him the thought that unsafe practices are liabilities which lead to physical bankruptcy. Better than gold is the thinking mind.

To the men in train service, why can't you stop kicking over drawbars when cars

are about to come together, and stop opening knuckles with your hand just about the time a coupling is going to be made? You can't say to your hands and feet that you have no need of them. Stop going between cars when they are moving or just about to move; stop mounting the front footboards of an engine approaching you; stop leaving cars just in the clear—you may misjudge your distance some time and leave them foul the next track. No condition on a yard is more dangerous than that of not properly putting cars in the clear. A railroad yard is more than just a system of tracks. It is the heart of the system and yard men should be careful. While at your work you can remember your family at home and that you have no right to do the things that might cause you to be brought home to them in a mangled condition or probably dead. They need your support and protection, so why not think of them before doing these careless things? The little careless acts seem to cause the most trouble.

All things have a beginning, so let us peep into the history of safety with the idea in view that the further we go back into its history, the better we should prepare ourselves for the future.

A careful study of the early safety laws, as passed by Congress, discloses four fundamental defects at once.

First among these defects is the incompleteness of these laws; second, the absence of direct responsibility; third, the absence of well defined standards; and fourth, the lack of responsiveness to changing industrial conditions.

Industrial conditions have changed to such an extent that accidents to train service men may be classed more as failure of the human element—the failure to visualize danger—than to mechanical failure.

An analysis of train service accidents on all railroads for the year of 1929 discloses the following casualties and their causes:

Struck and run over; killed, 423; injured, 516.
Coupling or uncoupling engines or cars; killed, 59; injured, 965.
Coming in contact with fixed structures; killed, 28; injured, 421.
Getting on or off; killed, 67; injured, 4,537.
Operating switches; killed, 1; injured, 729.
Operating locomotives; killed, 17; injured, 3,160.
Coupling and uncoupling air hose; killed, 20; injured, 328.
Operating hand brakes; killed, 37; injured, 1,755.

All of these causes of accidents show a decrease over the year 1923, with the exception of operating hand brakes. Hand brakes serve only one purpose and should serve that purpose well. The records of hand brake accidents for the year 1929 show that 13 more were killed in that year than were killed in the year of 1923, while the injured show a decrease of 415 less than the year 1923. Defective hand brakes should be discovered at inspection points and necessary repairs made to make them safe and effective. Train crews should know before attempting to operate hand brakes that no defect exists. Teaching the employees the proper methods of operating hand brakes should be the constant endeavor on the part of supervisors to prevent this type of accident. Where the brake club is used, trainmen should feel these brakes out before applying full body weight to the club in order to make sure that the chain is not knotted. Trainmen should keep the proper signals handy and use them in accordance with the instructions that are issued for their proper use.

The disregard of blue signals by train and yard men has resulted in many accidents. Men must be trained to look out for these signals at all times, and not obstruct their view. They should not be moved by anyone except the man who uses it for his protection. Train service accidents can be reduced, but not until employees fully appreciate the hazards presented in this class of operation in the daily performance of their duties. Operating rules, safety rules, instructions, and natural intelligence, all tell us to take the safe course and run no risks. Train service men may be killed while operating locomotive or cars, or may remain alive and whole as they will. Good rules, and

intelligent supervision, reasonably and justly applied, coupled with obedience and use of brains by the employees is the only way to prevent train service accidents. So let us work to the end that every employee will be a safe employee with the thought in mind that the best safety device known is a careful man.

The safety movement on the American railroads has brought about a closer relationship between the employee and the employer in an effort to correct some of its many evils of conflict.

A higher developed method of cooperation has replaced a less scientific method of conflict. The militant spirit and the hostile attitude are being replaced by a free and intelligent cooperative policy, founded on the spirit of absolute fairness. Where employee and employer have gathered together in the spirit of safety-mindedness to exchange views and to take into account the very problems each faces and where employee and employer are willing to concede that cooperation comes from a reciprocal service and not through the channels of benevolence, it becomes evident that the Safety First movement affords the only sure foundation for industrial safety.

That industry has the right to look for the encouragement of the safety first spirit among its employees, cannot be doubted by anyone who accepts the mission of the Christian spirit. To be successful safety committeemen, we must go about our daily tasks with confidence. Confidence is the father of achievement. It reinforces ability, doubles energy, and increases power. We must let our life's ambition be to live for Him who gave His life for us.

CHAIRMAN WARFEL: Gentlemen, I never suspected that Lyle Bentley was a practical joker, but a man who will put a professor of philosophy and literature up before a crowd of this kind as a yard brakeman, has certainly put something over on us. I am glad to have the opportunity at this time of introducing Mr. M. M. Cronk, of the Pere Marquette Railway.

The Prevention of Train and Train Service Accidents

By M. M. CRONK

Assistant Superintendent, Pere Marquette Railway Company,
Grand Rapids, Mich.

An article on "Obsolescence" attracted my attention recently because the author made it more than plain that it was well recognized that men, like machinery, become obsolete. While soundly true, it seems strange that such is the case. It is difficult to imagine an officer of high position being pronounced obsolete, yet, again, no more difficult than realizing a comparatively new machine as being such. Apparently, our perplexing, although challenging time, has decided that in the case of the man as well as with the machine, the ability to produce, better than any other known manner, is the measuring stick of usefulness.

All of this struck me as being a warning signal directed toward those engaged in railroad operation. In reflecting, it could not be admitted that we were doing the best possible in our prevention work in the case of train and train service accidents, and unless we do, we certainly are in danger of being found obsolete to some degree.

A good manner of securing a general understanding of our present position and methods is to review briefly exactly what we do and how we do it. It is perfectly obvious that the operating officer must stand squarely on the premise that strict adherence to the rules and regulations is the vital part of safe operation. Any tendency away from this breeds an unhealthy atmosphere with respect to safe conduct, and any official, who closes one eye to violations of rules, is guilty of exposing his division to the disease of indifference. However, we are agreed on this matter—that surely there is no great tendency in the direction of overlooking rule violations, and therefore, we are in a position to conclude that we insist upon our operation being strictly in accordance with the operating rules and instructions. Too, we insist

upon our men in train and engine service presenting themselves, at stated intervals, for re-examination on rules, as well as color, sight, hearing and general health. We also attempt to exert an influence through the application of various methods of discipline from which we hope to receive safe and efficient labor. We then have a safety organization, that functions in various manners, on various railroads, and these organizations have accomplished an immeasurable amount of good. This briefly outlines our position as it obtains today.

There has been no reference made to new equipment and power, heavier and better rails, more adequate signal devices and the host of other mechanical apparatus from which we derive so much assistance in our prevention work. There is no recognized means of measuring the proportion of train accident prevention accomplished by such improvements, but it goes without saying that our statistics would be less gratifying if the dollars were not invested in this manner.

Whether or not we are keeping pace with this influence is the question that confronts the operating officer today. Are we contributing sufficiently, in thought and action, to our prevention work as to satisfy ourselves that we are creative, that we are cultivating our field thoroughly, and that we are progressing along the intangible lines, with the same degree of effectiveness as is the case with our car shops, locomotive works, signal companies, rolling mills, etc?

A most casual comparison of a box car, coach or engine built a few years ago, with one of recent design gives us a picture of the tremendous stride we have made in the direction of a more safe train and train service operation. Now, it is not at all consistent for the operating man to take credit for this. The public's invested dollar does it for us. Our job is to use these improvements to the best possible advantage.

We have already defined in a very brief and general way our operating methods, from which we expect a safe trip with our train and to those engaged in train service. What, then, was our position a few years ago, when ninety pound rail was something we hoped to have, and the thirty ton car was the rule? Practically the same as at the present. This is another way of saying that while the laboratories and the manufacturers have consistently improved our equipment, we still find that our operating methods are unchanged, except as new apparatus forces us to certain changes to correspond with such installations.

Are we, then, approaching obsolescence as operating officers? Or has all been done that is possible? Is it merely a job of supervising henceforth? Everyone, I am sure, has read with deep interest those thorough-going reports of accidents from the office of Mr. Borland. All recognize the educational value of them and the possibility of profiting by the unfortunate experience of others. How to go about it, is the question.

We read with interest of an accident resulting in injury and death to employees and extensive damage to property because of rule violations on the part of certain members of the crew. The cause is pronounced as such, and possibly an inference is drawn to the effect that loose methods were present, and the supervisory force was found wanting. However, a more detailed analysis shows us that slow or indifferent thinking, resulting in carelessness, was actually the cause. We finally find that the mental equipment of the train service employees was not in keeping with the physical equipment making up the train. Just why we have a lapse of mental faculty is difficult to explain, but we are in possession of ways and means of reducing such lapses to a minimum, and by using such, we are on the road to real achievement and directly away from the path that leads to obsolete methods.

To start and carry on is not an easy task by any means. Neither is it possible to describe the formula with mathematical exactness because we now find ourselves in the realm of intangibles. Nevertheless, the operating officer must acknowledge himself, in a measure, responsible for any and all train and train service accidents resulting from carelessness. Now, carelessness is the result of a mental state, and

as such, stands correction. We have given altogether too little attention to the mental equipment of train service employees.

Those we will engage in the future offer no problem. The young man of today is much better equipped in this respect than was his father. What, then, is to be done concerning those now in service? It is hoped that no one will understand that it is being claimed that train service employees are not an intelligent group, because they are. However, neither can it be denied that the science of train operation calls for quick and straight thinking at every mile post. Do we, then, continue to school our men? Or are we letting the expensive school of experience do all of the work? Unless we have a downright desire to build our train service men into a group of well posted, efficient, quick and straight thinking men, inspired to eliminate carelessness entirely from their work, little can be accomplished and we are becoming obsolete. Not only that, but worse—we are guiding the group in the same direction.

So it is most apparent that operating officers are faced with the challenging task of assuming an added responsibility—a leadership that is creative and inspiring, a leadership that causes men to desire to progress along these avenues. Difficult as this may seem, it is not formidable. Most of us respond in the same manner to outward influence. It is only in degree that we differ, and the trainmaster has only to live the trip his crew has made in order to feel the encouragement or discouragement they encountered.

Let us take an example to demonstrate the thought in a concrete manner: Everyone agrees that sleep and rest are vitally necessary to efficient work and clear thinking. If our train service employee accepts a call without having sufficient sleep, he certainly is less capable of doing his work in the safe and efficient manner we require. In other words, he is more likely to act in a careless manner. Now, the creative and inspiring operating official readily recognizes this fact, and much in the same manner as the toothpaste manufacturer impresses us with the necessity of clean teeth, he impresses the group with the necessity of sleep, not by referring to it once or five times, but incessantly. This operating officer reads in the daily press that science has discovered that there is no such opportunity as "catching up on sleep." One night's sleep lost is lost forever. This is conveyed in an attractive manner to the group as are various other thoughts incident to the subject, and over a period of time, we finally have as a result a group of men, understanding fully the personal, as well as the group advantages of adequate sleep. From this fact, it is the simplest logic to perceive that careless or indifferent work, caused by a tired body or brain, will disappear in proportion as we are successful in selling the idea, and so our prevention activities are more effective, because we agree that indifferent or careless methods are means of breeding accidents to the man or the train.

And so there are an infinite number of subjects: general health, proper food, congenial associations in the home, helpful type of reading material, courteous treatment toward the public, etc., all of which serve to direct the thought trend of our train service employees, and all of which have a direct and important bearing upon their work—for who can deny that our thoughts govern our action?

Finally, the degree of success an operating officer enjoys in this direction depends to a large extent upon the amount of time he is willing to devote to thought preparation and action. The most meager success requires an unusual effort, but the rewards are lasting and gratifying. Obsolescence is at the threshold where competition exists. But, if it inspires us to greater accomplishments in our prevention of accidents to trains and train service employees, obsolescence, "like a toad, ugly and venomous, wears yet a precious jewel in its head."

CHAIRMAN WARFEL: I want to thank Mr. Cronk, on behalf of this body, for a very excellent presentation of his paper.

I now take great pleasure, gentlemen, in introducing Mr. Claude J. Brown, of the Missouri Pacific Railroad Company.

Transportation Accidents and Their Prevention

By CLAUDE J. BROWN

Superintendent, Missouri Pacific Railroad Company, Osawatomie, Kansas

It has been my privilege to attend previous conventions of the National Safety Council in Chicago, St. Louis and elsewhere, and these meetings have invariably proved interesting, inspirational, and helpful to me in many ways in my efforts to contribute my share, or "do my bit" in our nation-wide campaign—or should we not term it our international campaign to eliminate entirely, if possible, but at least minimize to the greatest possible extent, suffering, sorrow, loss and waste incident to accidents and injuries to persons in all walks of life.

I have retained in my files many of the outstanding addresses delivered at the various meetings I have attended, as well as notes jotted down during the delivery of many of these addresses, some of them several years ago, and in the preparation of this paper have had occasion to review these old notes and documents. I have marveled at the many far sighted statements made, and the accuracy of the predictions and statements as unfolded by the records from year to year, but it seems to me that the papers and addresses at this particular meeting have been even more interesting and instructive than those of any previous meeting I have had the good fortune to attend.

While at times perhaps we may feel that the safety subject has been sifted to the bottom, the last word said, and nothing new brought out, meetings of this sort convince us that experience and time provide new material, new thoughts, and new interests. This convention convinces me that the movement is really in its infancy, and that there is no indication of interest lagging in this world-wide campaign to alleviate suffering, loss and waste.

I really think it is a happy thought to occasionally include in these programs, a railroad superintendent, because I conscientiously feel that few men on a railroad come in closer contact with the safety movement, or carry a greater responsibility for its success. I am convinced that the safety campaign on any division of a railroad will be successful to the extent that the director of safety is able to arouse the interest of the division officers and supervisory forces. It goes without saying that if the superintendent is really interested, his enthusiasm for the success of safety will soon be conveyed to every corner of the division.

I promised not to attempt any slogans in the course of my remarks, but I shall risk just one, and it shall consist of one word. That word is "INTEREST" spelled in capital letters. When the safety idea has been sold to any organization, when INTEREST has really been aroused, the safety records and results will just about take care of themselves. I know I am correct in this statement, as I have had occasion to try it out on half a dozen different heavy divisions.

If any division officer is unable to tell you at any time the number of reportable injuries he has had in the line of work under his immediate jurisdiction thus far this year and the details of each, and the number he had for a similar period the previous year, then I say he is not sufficiently interested, and maximum results cannot be expected from him. This is just one of the many tests that can be applied.

"Transportation Accidents and Their Prevention"—just what can I say on that subject? One might say that it has been so thoroughly covered in so many ways and on so many different occasions that it is threadbare, but the facts are that in practically every transportation accident, new features intrude themselves. It has occurred to me that perhaps an interesting way to approach the subject might be a short discussion of a few such accidents with which I have recently had personal contact. There is a lesson in every one of them.

We had an accident early in January that was a very serious affair, resulting in

the death of an engineer and injury of his fireman. This was very regrettable and as usual in such cases, there was no good reason why it should have occurred. A spur track was being constructed just over a hill and on a curve. The switch and lead proper were in, the rail on one side spiked for something like 200 feet and the rail on opposite side in place but not spiked. Rail bender was not available at time switch was put in, but was received late the afternoon of the accident. The extra gang foreman in charge was attempting to stock the main line rail ahead of the switch point with the rail in place. The work was being properly protected by flag in accordance with the rules, but they were about to finish up for the evening, and feeling that the stocking of this rail would be a job of just a few minutes, without any particular hazard involved, the foreman sent a man out to instruct the flagman to come in, leaving three laborers and his lead man in charge of the stocking of the rail. He devoted his personal attention to work of spiking some distance from the switch stand. In placing the rail-bender it was found necessary to open the switch, and about the time the flagman returned to the gang, a train consisting of an engine and caboose appeared around the curve running about 35 miles per hour. The laborers became excited and could not get the rail bender free of the rail, with the result that the engine and caboose ran over the rail bender, into the open switch and turned over, causing the unfortunate injuries described.

In all my experience I never before came in contact with an accident exactly like that. The foreman was a man far above the average in intelligence and education. He was a man of many years experience on several different railroads and had been with our road for over two years, working on several different divisions. He had been examined on the rules several times, the last time just a few weeks prior to this occurrence, and presented his up-to-date examination certificate to the Interstate Commerce Commission Representative at the investigation. The details of this particular job had been thoroughly rehearsed with him by the roadmaster the previous day. His principal fault was in recalling his flagman with the main line obstructed. This he readily admitted and could offer no satisfactory explanation for having done so. As the engineer was removed from the engine this foreman dropped to his knees, praying fervently and loudly for his recovery and for God's forgiveness for his oversight. What a terrible load on the conscience of any man to feel that he is personally responsible for such a regrettable affair.

In February an engineer in climbing off the tank of his motionless engine, allowed his foot to go through the bottom stirrup, at the same time losing his hand hold, falling to the ground, causing him the loss of about ten days of time. This happened in broad day light, there was no good reason why it should have occurred and it can only be charged to thoughtlessness and carelessness. Our lesson from this case is that our contact, both personal and in employee meetings, as well as our follow-up should be so thorough that men will have uppermost in their minds at all times, the question of safety and the hazards involved in their work. Such an accident could not have occurred to a man of his experience had his activities been surrounded by ordinary care and thought on his part.

In March a way freight conductor was out of service for several days by reason of being jerked out of a car door as result of his jumper becoming entangled in some heavy farm machinery he was assisting in unloading from a merchandise car—an accident that should not have occurred, and can only be charged to failure of this conductor to use ordinary care. In other words he failed to think. Our contact and follow up with this man had not been sufficiently thorough to accomplish the purpose, otherwise our division would not now stand charged with such an unwarranted and foolish accident.

In April we had a fireman fall from the tank of his engine, losing several days and giving us a reportable injury, all for no good reason. His foot slipped just as he reached for the hand railing on the brakeman's cabin on back of tank, and he

pitched off onto the ground, landing on his back and hip. It was fortunate that he was not more seriously injured. This man has of course made exactly the same move on hundreds of occasions, and probably never fell off a tank before and never will again. This accident on the part of an experienced man can only be charged to thoughtlessness and carelessness, and there was no good reason why it should have occurred. In this case, as in most cases, the accident was entirely uncalled for, and our argument would be weak indeed if we should take the position that we as officers are not able to control and absolutely eliminate such injuries. Thought is necessary and it is our job to generate, stimulate and maintain thought.

This was not the first injury in which this particular fireman was involved, but it does seem to be a fact that some individual employees are just naturally unfortunate. I like to tell in our employee meetings of a switchman of Atchison, Kansas, who managed to get under about everything that fell in that county. For instance, never in my life had I heard of a switch light just politely toppling off a switch stand for no good reason at all, but it happened in Atchison Yard and that unlucky switchman was parked under that switch stand and lost three weeks as a result. Never in my experience had I heard of an engine bell for no good reason whatever toppling off the top of an engine, but it happened in Atchison Yard, and that same switchman was parked right under that bell. He lost two months that time. It is freely predicted in that section of the country that the leaning tower of Pisa, which has been standing in its present inclining position so many centuries, will fall if and when that switchman parks himself under it.

In April a hostler was injured in rather an unusual way. A dead engine was being pulled by another engine from the roundhouse to the coal chute, and while stopping at the coal chute the hostler climbed up into the cab of the dead engine to see if coal gates and slides were closed. Just as the engine stopped, its throttle flew back and struck the hostler across the shoulder and head, inflicting injuries that caused him the loss of several days, as well as the division to be charged with another reportable injury. The action of the throttle was the result of air pressure accumulating in the steam pipes while the engine was being pulled. Investigation developed that the cylinder cocks were closed. Had they been open the accident would not have occurred. This hostler was a man of experience. He admitted that he knew the cylinder cocks should have been open, and it was his duty to see that they were open. Just another accident chargeable to thoughtlessness and carelessness—an accident that could and should have been avoided, as is the case in most accidents. This hostler had not yet been properly sold on the safety idea. It is our job to keep hammering away until the idea is properly sold to every man in our service, and then, and not until then, shall we emerge at midnight on December 31 of a year not at the present time known, with an absolutely clear record for the 12 month period. I am sure such a record is entirely possible, and on our division we shall never be satisfied or feel that our job has been well done until we do accomplish just that.

If I should decide to supply another slogan, it would also consist of just one word. That word would be "THINK." I want to take the time to relate briefly the circumstances in connection with an unfortunate affair that emphasizes the importance of that slogan.

A conductor of 29 years, experience in train service was called for a double-header (a freight train with two engines) for 6:30 a. m. At 6:40 a. m. he walked out of the yard office with his waybills in his hand, "highballing" his engineer to proceed. The engines had been standing on the train for some little time, and, as is customary, the cylinder cocks were open in starting the train out of the yard. This conductor passed in front of the train, and in attempting to avoid jets of steam from the open cylinder cocks, stepped over onto a switching lead, right in the path of a yard engine engaged in ordinary lead switching, and at that moment backing up. The view was of course obstructed for both the conductor and engine crew of the yard engine by

the cloud of steam from the cylinder cocks of the passing road engines. He was rolled under the foot board and rear trucks of the tank, sustaining injuries that resulted in his death that evening. This was of course a very regrettable, but at the same time an unwarranted and unnecessary accident.

The train was pulling out of track No. 7 and the conductor involved was struck by the yard engine between the switches of tracks 11 and 12, which left him the space of four tracks with the usual clearance between tracks in which to escape the steam without danger and without fouling the switching lead. This man had been working in and out of that particular yard for 29 years, was thoroughly familiar with operation there, and of course had made the same movement time and again without even the semblance of an accident.

A man of his experience could not have been guilty of stepping between the rails of a switching lead while enveloped in a cloud of steam had he been thinking of what he was doing. There is some evidence that he did have something other than the business at hand on his mind, as he asked the yardmaster to figure his tonnage for him before leaving the yard office, stating that he did not seem to be able to figure tonnage that morning.

We had an accident on our line some time ago that we dwell upon frequently in our employee meetings, as the circumstances and fatal results emphasized so forcibly the importance of alertness, thought and compliance with rules on the part of all members of train and engine crews, and not dependence entirely upon the engineer as is so frequently the case.

A westward first class train held an order to wait at station "B" until 9:27 p. m.; station "C" until 9:37 p. m. for an extra east. A collision occurred between these two trains at 9:34 p. m. just 1,873 feet west of the west or ruling switch at "C", or three minutes before the first class train was due out of "C". Investigation indicated that this train had passed the ruling switch at 9:32 p. m., five minutes ahead of the wait order.

As a result of this collision the engineer of the first class train was killed, also both brakemen of the extra east. The conductor and brakeman of the passenger train and engineer of the freight train were injured more or less seriously. Thirty-one passengers were slightly injured and the property damage was approximately \$60,000.

Failure of an Entire Crew

This passenger train passed "C" ahead of its wait order simply because the entire crew failed to function. They were men of experience, most of them having spent practically all of their lives on that division. The engineer was an old man, but considered reliable and trustworthy. The members of the train crew were depending upon him to carry out the provisions of that order, and failed to put sufficient check of their own on the operation to see that he did comply with them. Approaching "C", the conductor was riding in the front car of his train, the brakeman in the rear car, neither of them with anything in particular to do except to check the order with their time pieces to see that this important detail of train operation was safely and properly executed. While they were depending upon the engineer, they had no business doing so. Under the rules it was their duty to know just what was going on.

"Of course the attempt of the extra east to make "C" on the order without full clearance time was a contributing factor, and responsibility for violation of the rules involved must be shared by the entire crew. Each surviving member of both crews must go through life with his conscience burdened with the knowledge that his carelessness and inattention to his legitimate duties was responsible for the death of three

of his fellow workmen. As was the case with the passenger train, other members of the crew of the extra were also placing too much dependence upon the engineer.

Alertness and attention to business on the part of all members of train and engine crews will overcome such disasters. It was realized by the framers of our transportation rules that the mind of one man could not be depended upon in such important matters and that is why the rules were so worded as to make it incumbent upon all members of train and engine crews to know the provision of train orders, understand them, and comply with them.

We have a few other cases but it is hardly necessary to dwell on any more. They would simply be a repetition of similar circumstances and results. Everyone of them could and should have been avoided, and while the individual in each case must come in for a fair share of his responsibility, the safety organization is not functioning, and an increase in such accidents rather than a decrease may reasonably be expected unless the superintendent of safety, the superintendent and members of the entire division organization appreciate their responsibility in such cases.

We know that our safety organization is functioning because it is due principally to the energy and the intelligent and well directed activity of our superintendent of safety that our reportable injuries have been reduced from 43 to 6 per million man-hours in the last five years. We realize that we are still trailing some other railroads, and still far from the goal set for ourselves, but we are inspired with confidence that the time is not far distant when it shall be our privilege and pleasure to stand on the platform of some National Safety Council convention and announce to the world that we are second to none. That is our real goal in this safety drive.

Discipline

Before closing I just want to make a few personal observations on the subject of discipline. We hear a great deal about discipline in these safety conventions. Every accident must be thoroughly investigated, responsibility fixed, and if circumstances justify, actual discipline administered. I have been in direct contact with discipline for twenty years, and being possessed of common ordinary intelligence, and intensely interested in my job, naturally I have given this important subject much thought. I am for discipline, first, last and all the time, but as discipline is probably the most important detail of operation with which the superintendent comes in contact, it goes without saying that his administration of discipline must be surrounded with thought, care, reasonableness, and above all things, JUSTICE. We should not lose sight of the fact that in dealing with the rank and file we are dealing with men who devote their entire time to certain lines of work, experts in their particular line, and if such an employee becomes involved in trouble, nine times out of ten he knows whether or not he is responsible and justly entitled to discipline. If a mistake is made by the officer handling the case in the application of discipline, the employee involved and all other employees on the division know it and know that an injustice has been done. Even though the action taken may stand, such cases, in my opinion, do more harm than good, and weaken the officer in the opinion of the men generally. As stated before, I am for discipline in each and every case where discipline is really deserved, but let's know that it is due, and if there is doubt, better give the employee the benefit of the doubt. Of course, mistakes will occur, but an officer of proper experience and temperament should not be often guilty of serious mistakes in the application of discipline. Those are just my personal thoughts but they are based on many years' experience as a supervisory officer.

CHAIRMAN WARTEL: This meeting is getting better and better. I was very much impressed by that talk, as I am sure you all were. The next speaker will pay his tribute and respect to the work brought about through organized effort upon the American railroads, and without further ado, I present to you Mr. W. J. O'Brien, of the Indiana Harbor Belt and Chicago River and Indiana Railroad.

The Value of Organized Safety on American Railroads

By W. J. O'BRIEN

General Manager, The Chicago River & Indiana Railroad Company, Chicago

In attempting to indicate the value of organized safety and outline a course of procedure having for its object and purpose greater success in our safety campaigns, we are very apt to be guided and more or less controlled by our own individual experiences.

The Chicago Junction Railway (The C. R. & I. R. R. Co., Lessee) and the Chicago River & Indiana Railroad Company are located in the Union Stock Yards of Chicago—in the heart of one of the largest terminals in the United States—and had the unenviable reputation for many years of being the most dangerous place in Chicago for train and enginemen to work. My personal knowledge of numerous instances wherein men were maimed or lost their lives during the many years in which I was in close contact with the rank and file bore out this reputation; and records covering those years prove that these bad features were true.

Advent of Organized Safety

The advent of organized safety on our properties found the "scoffers" in the majority and the so-called "old-timers" had their day of ridicule and contempt for those who took the subject seriously and really tried to accomplish something in accident prevention work.

Many narrow side clearance and overhead obstructions presented problems which were indeed discouraging. Some of the structures involved had been in existence, in their then present location, for many years and there was no legal method of compelling either their removal or reconstruction. Any improvement in cases of this kind, therefore, was possible only through patient effort with the owners of the properties. Appeals were made, predicated upon a humane desire to guard against the injury or death of men who were obliged to work for a living to support their homes and families, and invariably this line of argument proved most effective when all others failed. We found it helpful, also, in cases of this kind to make the frank admission that we were approaching the subject with the thought of guarding against an accident, in lieu of waiting until after somebody sustained an injury.

It is needless to add our employees were habitually indulging in bad practices which today they have learned to shun.

We were also faced with a serious trespassing problem involving the employees of the many industries which we served, who used the railroad right-of-way in going to and from their work, and it was no uncommon sight to see a half a dozen men and boys riding on a single train or cut of cars. Employees in various occupations on our own railroad on their way to and from work were found in many instances exposing themselves needlessly, climbing and passing between cars while making short cuts through busy yards when other means were available. Persistent efforts by the railroad and the hearty cooperation of industries worked wonders in stamping out these evils.

Briefly, we succeeded in making enough progress in the earlier years to learn the value of this work, not only from the standpoint of remedying conditions, but also the most important phase of educating the employee, although we were far from realizing pleasing results.

Last Eight Year Period

Looking back over the last eight years particularly, I can find, not only a great deal of comfort and satisfaction in the knowledge that we have acquired valuable experience through our efforts to vigorously pursue our safety work, but because of the difficulties which were met and overcome we have an abiding faith in the

future. Like many other roads, the transition which has been brought about during this period has given us the firm conviction that there is practically no problem in the future which we cannot solve if approached with the right spirit.

With approximately 1800 employees in 1923, an intensive effort was begun to teach them the safe manner of performing their duties. This program has been sustained and today is a part of each day's work. We have followed all of the well-known methods of close supervision and intensive checking up on both conditions and practices which were productive of accidents. We have endeavored by constant reiteration to so impress the minds of our employees that they will constantly think and act safely while engaged in their duties; and will recognize an obligation to look after the welfare of those who may be obliged to work with them. We have exhorted them to guard against that absent-minded moment that so often precedes an injury or death and dwell on the causes of accidents as shown by analysis of those that occurred, pointing out the laxities.

Our records of personal injuries to employees on duty 1923 to 1930 inclusive, are as follows:

Year	Killed	Injured	Ratio per Million Man Hours
1923	2	255	51.17
1924	2	144	27.44
1925	2	96	18.64
1926	2	71	13.84
1927	1	36	7.38
1928	0	20	4.10
1929	0	26	5.30
1930	0	15	3.59

You will note from these statistics that the goal set by the Safety Section of the American Railway Association calling for a 35 per cent reduction by the end of the year 1930 was reached and exceeded by our organization at the end of the year 1924, as we then had a reduction of over 46 per cent based on the year 1923 record.

However, past performances will be soon overshadowed by results flowing from the efforts of the railroads to attain the new goal of the Safety Section of the American Railway Association requiring a reduction of 33 per cent in employee casualties (as reported to the Interstate Commerce Commission) by the end of the year 1933, based on the year 1930 record and effective January 1, 1931. The task of the C. R. & I. R. R. is to reduce the lowest casualty ratio it ever had, and doubtless, the same is true of nearly every other railroad. We expect to reach the goal set and hope other railroads do likewise.

The year 1923 found us with the second highest ratio among the roads comprising the New York Central Lines and the end of the year 1930 with the lowest, achieving a reduction in that period of 92.9 per cent.

The impetus given by the contests conducted among the New York Central Lines units had much to do with our improved safety performance. For the purposes of the contest in question the units were divided into two groups and identified as "Group A" and "Group B." A trophy known as the "President's Award" was given to the road in each group having the lowest casualty ratio per million man hours based on injuries reported to the Interstate Commerce Commission and covering employees on duty in each of the years 1927, 1928, 1929 and 1930; the contests being conducted on an annual basis.

The C. R. & I. succeeded in winning the trophy each year awarded to the unit having the lowest casualty ratio of the lines in Group B.

The annual contests conducted during the years 1927, 1928, 1929 and 1930 were inaugurated by reason of the success experienced in shorter contests conducted as experiments by the New York Central Lines in the years 1924, 1925 and 1926; covering first a period of four months and later a period of six months.

These contests seemed to create "A Desire to Win" among the employees and keen

interest was displayed in the statements showing the relative standing each month which were posted in all departments.

We are very proud of the president's trophies which we have won in these local lines safety contests, especially since the competition has been so keen and all the ratios greatly reduced.

However, in February, 1931, we celebrated our fourth anniversary since an employee was killed on duty and in the year 1930 we achieved another one of our ardent desires by having no employee suffer the loss of an arm, hand, leg or foot. If there was no other reward, we would feel amply compensated for our efforts. We hope to duplicate this performance from year to year.

I think, at this time, I may say truthfully that the district in Chicago which had the reputation for being the most dangerous place (especially for train and enginemen) to work in is now considered one of the safest for yard employees to carry on their vocation, despite the fact that everything is not as yet what we wish it to be. I believe, also, that our records of recent years will compare favorably, not only with any other switching or terminal line in Chicago, but with any other similar property in any other large city of the United States.

New York Central Lines Plan

This year the New York Central Lines embarked on a new plan of counting all deaths and injuries to employees, whether on or off duty, if rightfully on the company properties. This method includes any and all injuries to employees whether or not any time is lost. Statements are issued monthly showing the casualty ratio per million man hours and the relative standing in the two groups "A" and "B", the same as was done in previous contests. The experience with this plan will, undoubtedly, be analyzed carefully at the end of the year and should prove helpful in focusing more attention on injuries and deaths that have not been reportable to the Interstate Commerce Commission or that have not occurred while on duty, although occurring while the employees were rightfully on the company's premises.

Effect of Organized Safety

The history of our local accomplishments, like those on many other lines, would never have been written if organized safety was not an established fact on the properties. The attitude of the railroad officers had a distinct bearing on the interest shown by the rank and file. It became well known among the officers and employees that a personal injury accident was not to be considered an incident in connection with a day's work; but that it was a matter of personal concern not only to the victim and his supervisor, but to the management. Further that this interest was based principally on the conviction that practically every accident was due to the fact that someone had failed in their duty and a needless loss of life or limb, or injury, had occurred. Until the position of the railroad in this respect was clarified, in some instances, an employee or supervisor involved in a personal injury seemed to consider the attitude unreasonable. Many times, we insisted that the death or injury may never have occurred if action had been taken by fellow employees, the man involved, or supervisors, who should have anticipated its occurrence and corrected an unsafe method or condition. Organized safety, in my opinion, pre-supposes a full acceptance of responsibility for the safety of employees and property by everyone on the railroad. This, of course, includes the general manager, who must frequently require data of comparative past performances and accidents or of significant incidents that may occur from time to time wherein important safety features are involved. He must further know in a general way just what is contemplated and what is being done along safety lines by each department and require of the supervision initiative in this activity, particularly with respect to the employees under their jurisdiction.

The employee, in my opinion, will not have the proper regard for safety unless it is also understood by him that the management is not satisfied with simply "getting by", but desires a lower casualty ratio to be well earned through the adherence to safety rules and safe practices and the acquisition of "safety consciousness" by the members of the organization.

We have emphasized the constant and pronounced progress made in accident prevention since organized safety was inaugurated on the American railroads. When this plan was instituted accident prevention was placed on a business basis, under a directing head. To be successful we must pursue the work with the same interest and care that is followed in connection with any other phase of railroad operation. The results flow from a well directed plan having the unqualified support of the officers and employees. The responsibility of the supervision cannot be too strongly emphasized. It is their obligation to see that the rules are obeyed and safe methods followed. The efficiency of any supervisor can be measured by his accomplishments in safety.

The success or failure of accident prevention depends almost entirely upon the support given by those in authority. The support must of necessity come from the top and filter through the entire organization. The larger credit for the success, therefore, thus far achieved belongs to the officers and employees who have accepted safety as a part of their duties and as an obligation they owe to their fellow men.

National Safety Council Recognition

The only recognition we have earned from the National Safety Council was the recent award of a "Certificate of Honorable Mention" by reason of having the lowest employee fatality ratio in our group during a period from 1921 to 1930, inclusive.

We will do our utmost to retain this coveted honor from year to year and I hope we have the keenest kind of competition.

An important phase of this matter which now confronts us (and what is true of our property is true of all other switching lines or trunk lines performing terminal switching service) is that this record was accomplished without the loss of operating efficiency. As a matter of fact, the year in which we had our best operating efficiency was the year in which we had our best safety record, proving beyond doubt that the two go hand-in-hand and must necessarily be in entire accord rather than be in conflict with each other.

Mental Attitude

Another phase of the matter which I feel is important is the mental attitude of the employees. We know from our experience that once a man is convinced of the sincerity of purpose of his superior officers in their administration of safety and the employee himself becomes in a sense an apostle of safety, he immediately becomes a better man for the railroad by which he is employed. He is more earnest, more sincere, in the performance of his duties; and more faithful to his trust because he has a keener sense of responsibility, not only for his own welfare, but for the men who must necessarily place their lives and limbs in his hands.

Unless the employee is entirely sold on the proposition himself we feel it is useless to try to win him over by either threats or fear. Of course, it must be definitely understood by all concerned that the railroad will enforce safety rules and proper and safe methods of doing the work and that the habitually careless man has no place on any railroad.

We very frankly tell our men that money matters never enter into our minds in all that we do and say in presenting programs for their thoughtful study. The interest of the employee himself and those dependent upon him is of itself sufficient reason for all that we are doing and once this is made clear and plain it is absolutely productive of the necessary change of heart.

This appeal to the human instinct is, after all, the most potent influence we have

that can be brought to bear in order to make our men see wherein their own welfare lies; and after this is done, it is not difficult to get the hearty cooperation of any man who earnestly believes that you are trying to help him and his family.

A By-Product

A by-product of safety work which we probably all failed to take into account in the beginning and which is my earnest belief, is that the employee becomes a better man at home. We actually believe he becomes a better husband and father. His whole trend of mind and thought is influenced to an extent that cannot easily be measured, but the effect is so evident that it is reflected in his every-day performance. This is, no doubt, one of the finest rewards both the men involved and the company interested can secure from such worthy efforts.

Whatever success we have had is due largely to the fine spirit shown by the rank and file of our men when they saw the light, and the willingness on their part to not only "carry-on" in a spirit of perfect harmony, but by an unexpected display of enthusiasm born of a sincere desire to accomplish the best results they have made safety a work of pleasure for the supervisory officers, who experience a keen sense of enjoyment in bringing about such happy results for our men, their families and their homes.

CHAIRMAN WARFEL: Mr. O'Brien, I certainly want to express the appreciation, the thankfulness of this group of men interested in railroad safety, for that very analytical and very excellent presentation.

I have neglected to this moment to appoint a Committee on Resolutions. I now appoint that perennial chairman, Mr. Robert Scott of the Atlantic Coast Line as chairman of that committee, and I will ask to serve with him Mr. Frank Bradford and Mr. Chet LaFontaine. I shall expect them to report tomorrow morning.

I think perhaps the visitor who has come the farthest to attend our session is Mr. José de la Torre, Ingeniero de Planos-Tipo Y Standards Ferrocarriles Nacionales de Mexico. To translate it for you, Mr. de la Torre is the Engineer of Designs and Standards of the National Railways of Mexico.

There is present with him: Mr. F. C. Iowa, General Agent of the National Railways of Mexico.

Mr. de la Torre understands English perfectly. He gets everything that is said in our meetings, and I know from conversation with him that he is very deeply interested. He doesn't speak the English language as well as Mr. Iowa, but if you will give your careful attention, Mr. de la Torre will speak to you.

JOSÉ DE LA TORRE: Mr. Chairman, Members of this Congress; Excuse my poor English talking. If I dare to appear on this platform, that has been occupied by so eloquent and skillful speakers, it is only with the object of giving you a cordial salutation from the National Railways of Mexico, whose representation has been awarded to me by its Executive President, J. Sanchez Mejorado and by Mr. Heron Cabeve, Chief Engineer of the Maintenance of Way Department.

The National Railways of Mexico gladly accepted the invitation of the National Safety Council to attend these sessions, because they are greatly interested in following the movement to protect human life and to prevent accidents. I assure you that they have not ignored this matter and they have obtained very good results, reducing in a remarkable proportion the number of personal and train accidents during the last five years.

The Executive President, aided by the chiefs of the different departments, has endeavored to introduce everything that may signify an advance in the safety branch of his administration, and this year there has been printed a book containing Safety Rules and Regulations. It is divided into several chapters for the several activities, like those of the Mechanical, the Operating, and the Maintenance of Way Departments. I myself took part in the formulation of the rules for the latter department, having been inspired by some of the rules of some of the United States Railroads,

and by our own experience. Two volumes of this book have been mailed to me and I hope to be able, before the meeting is over, to put one in the hands of our Chairman and the other in the hands of our President.

At yesterday morning's session there was a discussion of motor car accidents, and I wish to be permitted to relate the experience of my preceding Chief Engineer, Aurelio Chavez. Perhaps some of those present read of his decease. Just at the height of his enthusiasm for the formulation of our Safety Rules, he fell a victim to his duty. He was traveling on an inspection motor car. An obstacle was seen unexpectedly on the rails, and without warning the occupants of the car, the motorman applied the emergency brakes, and Mr. Aurelio Chavez was thrown from the car and his head struck the ballast, the car reached him, and he died after two days. I do not know whether or not the motorman had time to give the warning, but at any rate, we see in that incident the importance of observing the rules, one of which is: Do not brake suddenly without warning the motor car occupants.

It has been a great honor for me to address these few words to so distinguished an assembly, and I conclude my remarks assuring you that I will go home with one of the most grateful impressions in my heart, and I shall never forget that here in the United States you always commend even your public activities to God.

CHAIRMAN WARFEL: Mr. de la Torre, we certainly appreciate your undertaking to speak to this audience. We want you to carry back to the railroad men in Mexico the assurance that the railroad safety men of this country are very anxious to cooperate with them. We can be mutually helpful to each other, and if you will invite us to the annual Conference on Safety of the railroads of Mexico, I can assure you as large an attendance as you have here.

I shall ask Mr. Lona, the General Agent of the National Railways of Mexico, to make perfectly clear to you their sentiments toward this Association.

F. C. LONA (Chicago, Ill.): Mr. Chairman and Gentlemen: Mexico is certainly forging ahead, but something that may not be known to you is that we are forging ahead on the inspiration and the education we are obtaining from various countries, chiefly the United States.

Now, our management, our administrator, is greatly interested in the affairs of the railways in the States, and time and again he has delegated groups of men to come over to the States and attend conventions to get the inspiration, the information, that may be had from those gatherings, but at the present time, when we have to be careful and curtail expenses, some of the conventions have been passed up. However, our Executive President made it a very particular point to send a delegation composed of Mr. de la Torre and myself to be here, and to report to him everything of importance that has been said here. And right here, I want to tell you that everything that has been said here has been of great value, and it will not just remain within the walls of this hall or within the boundaries of this country, but it will go back home to Mexico, where thought is appreciated, where thought is gone after, thought of the highest quality, and where the activities of our brothers, the inhabitants of this country, are particularly investigated because of our relationship to the world at large and particularly to the United States.

In closing, I just want to say that the slogan of the Pan-American Union in Washington, which is to the effect that God made us neighbors; let us be good friends, has been fully understood in Mexico in a general way, and particularly on the part of the Management of the National Railways of Mexico.

CHAIRMAN WARFEL: I have been informed that there is in the room a gentleman who may be known to some of you older than myself in the organized safety work of the railroads, and I think it would be a nice thing, before closing, to ask him to come to the platform. I will ask Mr. Carl Bailey to bring the gentleman to the microphone and introduce him to you.

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): Mr. Chairman and Members of the Steam Railroad Section, National Safety Council: When

safety work first began to function on the American railroads, the Sante Fé was probably one of the first adherents to the cause. When that organization was effected many years ago, the gentleman I am going to introduce was one of the first active safety representatives of the adjacent Topeka and Sante Fé Railway, working with our dear old friend, Isaiah Hill.

It gives me very great pleasure to introduce Mr. Tom Roberts, special representative of the General Manager of the Western Lines of the Sante Fé Lines, from Los Angeles.

MR. ROBERTS: There has been much said on different subjects in this meeting that I have been quite interested in, and among other things, considerable has been said about supervision. What I have to say about supervision, I want to say from the standpoint of a conductor. Having served four years in that capacity, I believe that I have some conception of a conductor's viewpoint. Just at this time, I am wondering to what extent, instead of our bearing down on supervision and pointing out to them their failures, we ourselves are going among the rank and file and talking to them about safety and trying to inspire them with the thought and the purpose we are trying to put over.

Speaking for the railroads in my section of the country, and I do so rather advisedly, the supervision is absolutely on the job, and when I attend one of our safety meetings which are held quite frequently, I find that the supervision has a speaking acquaintance, if you please, with every man that is present.

Mr. Carrow yesterday gave us some very enlightening figures, and I am not attempting to enlarge on that, but there is one point that I do want to add to what he said, and we are indebted to one of our division engineers for this information. In one of our safety meetings not very long ago, the exact figures that Mr. Carrow gave us yesterday were given to the meeting and this gentleman told us that if all these people that had been killed and crippled in the United States in 1930 were laid shoulder to shoulder, they would extend a distance of 280 miles. In other words, it would take a passenger train running forty miles an hour seven hours to pass by what was done in the way of killing and maiming people in the United States in the year 1930. Gentlemen, it is not much of a commendation to the American people that they permit a condition of that kind to exist, an occurrence of that kind to take place in this beloved land of ours. I am delighted to be here, glad to see and know we have so many present, and I wish you God speed in your work.

CHAIRMAN WARFEL: Thank you very much, sir, and we hope you will participate in our general discussion this afternoon.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

GEORGE H. WARFEL, Chairman
Union Pacific System, Omaha, Neb.

The fourth session of the Steam Railroad Section convened with General Chairman Warfel presiding.

CHAIRMAN WARFEL: I believe most of you are acquainted with the fact that the man who starts off the session this afternoon comes to us from a railroad that is accustomed to having outstanding men, one of the oldest and one of the best railroads of the West, the railroad that has the honor and distinction of being the cradle of organized industrial safety, the railroad that gave us Ralph C. Richards, the railroad that has never faltered in its determination to make safety mean what it ought to mean in industrial life and in railroads.

It is my pleasure to introduce at this time Mr. H. A. Parish of the Chicago and North Western Railway Company.

Collisions and Derailments

By H. A. PARISH
Assistant to General Manager in Charge of Safety, Chicago and
Northwestern Railway Company, Chicago

From an article prepared for the Central Manufacturing District Magazine published in Chicago by Charles E. Hill, general safety agent, New York Central Lines. I quote the following:

"The only true measure of success in any phase of business activity is through a process of comparison with what may be termed a normal accomplishment."

The method of comparison set up as a general rule stimulates a line of thought if the figures are consistent with the general trend of the times and the methods of operation.

American Railroads furnish reports to the Interstate Commerce Commission according to code, covering collisions and derailments, and the Interstate Commerce Commission, Bureau of Statistics, in turn, furnishes its summary of accidents by month to the American Railroads. It furnishes us with the analysis of train and non-train casualties and the subject matter in the report, under headings of kinds of accidents, separates collisions, derailments, locomotive boiler accidents, other locomotive accidents, and miscellaneous accidents. This report gives us in general all of the details except the cost of collisions and derailments.

The Interstate Commerce Commission is authorized to prescribe a form for making these reports.

Webster's definition of a collision is "The act of striking two bodies violently together", and I am of the opinion that if the collisions on the road were separated from those in yards that we could deal with this general subject more accurately.

This paper deals only with collisions and derailments, which are "train accidents." We report a collision when two bodies come together on any track wherein the damage amounts to \$150 or more. These bodies, which of course mean to us both cars and locomotives, can come together on any track, whether it be a yard track, a passing track, an industry track, or on a main line, and when the damage exceeds \$150 it is called a collision and reported as such to the Interstate Commerce Commission under "train accidents."

I wonder how many of us, when we peruse the summary of accidents that are

reported by Steam Railways to the Interstate Commerce Commission under the heading of "Collisions and Train Accidents", have any idea as to just how many of these collisions, classified by most railroads as rough handling, occur in switching movements in train yards?

The different railroads have a condition, in so far as train yards are concerned, that is widely diversified, and for a matter of discussion I think we should have the consensus of opinion of the members present as to just how many of us can really arrive at a direct picture of this situation in so far as collisions are concerned. Just what do they mean to us, as reported by the Interstate Commerce Commission, in so far as their importance is concerned?

We do not have them classified as rear-end collisions, head-end collisions, side-swiping collisions, or collisions wherein cars come together at a speed in excess of three to five miles per hour in train yards or main lines, and I am wondering whether the report, as furnished by the Interstate Commerce Commission, gives us the real definite information that might be valuable to us in making a study of the subject of collisions.

The same thing applies, of course, to derailments.

During the period from 1926 to 1930, inclusive, there were reported to the Interstate Commerce Commission 215,743 accidents in train and train service. Of course you understand that this includes all train accidents wherein the damage was \$150 or more. We have no figures or records of non-train accidents and for comparative purposes we are using the figures given us in train and train service accidents under "Collisions and Derailments."

During this five year period (1926 to 1930) 1926 produced the highest number of accidents of this kind and the year 1930 the lowest. In 1926 there was reported to the Interstate Commerce Commission 70,820 collisions and derailments while in 1930 there were 26,757 collisions and derailments—a decrease of 44,063 cases or a 72 per cent reduction, and we may assume that the reduction in non-train accidents was about the same.

During this same period we had 86,500 train accidents, that is, collisions and derailments, which resulted in damage to railroad property amounting to \$97,846,475, or an average of 17,300 train accidents per year, and a property loss and damage to Railway Company property averaging \$20,000,000 a year. Of this total amount of 86,500 train accidents, 72,843 were collisions and derailments, which is 84 per cent, and the loss to company property from these collisions and derailments for the five year period was approximately \$90,000,000, or 90 per cent of the total property loss to company property from this cause.

In dividing the accidents and monetary loss between collisions and derailments we find that 22,091, or 30 per cent, were chargeable to collisions, while 50,752, or 70 per cent, were charged to derailments. Of the monetary loss 26 per cent was charged to collisions and 74 per cent was charged to derailments.

In this period and of this total number of accidents charged to collisions and derailments only 8.77 per cent of the collisions and 4.4 per cent of the derailments resulted in casualties.

There were 373 persons killed and 6,957 injured in collisions, and there were 694 killed and 6,894 injured in derailments. In collisions 95 per cent were employees and 82 per cent of the employees were trainmen. In derailments 48 per cent were employees and 44 per cent of these employees were trainmen.

Let me say this about collisions and derailments. I do not have any data as to what is done on any other railroad than the Chicago and North Western with reference to preventing collisions and derailments, but on the North Western we started a campaign in 1929 to reduce collisions and derailments, a large majority of which were occurring in train yards. All superintendents and master mechanics started this campaign by holding monthly meetings with their staff in order to go over the detailed figures in connection with the loss and damage to property and injury to

employees and others in connection with collisions and derailments, and we started a vigorous campaign to eliminate this class of accident. In other words, we applied intense supervision as a method of reducing collisions and derailments. Trainmasters, general yardmasters and road foremen of engines organized themselves in yards, held meetings with employees, outlined to them the importance of strict observance of rules, and I can say that the results obtained were very satisfactory. Almost immediately we had a gradual reduction in collisions in train yards.

We had a reduction of side-swiping collisions and we found that we could control this situation by the same method.

We all agree that the general decrease in the number of cars handled in train yards in the last two years has had a tendency to reduce collisions and the potential hazards of accidents resulting therefrom.

We insisted upon enginemen and firemen keeping a vigilant lookout at all times, particularly when passing around curves, through stations and yards. We insisted on their keeping a constant lookout when engines were backing up on leads and in switching service. We checked enginemen, without exception, on visiting on engines. We found, in a great many cases, where trainmen and enginemen were prone to visit. We insisted that a fireman would not be permitted to run an engine unless he had passed the engineer's examination and had had experience as an engineer. We checked our switch lights to see that they were properly focused and we checked our switching leads to see that they were properly lined up. In other words, we impressed train and enginemen with the importance of using every precaution to prevent damage by reason of collisions and derailments.

In going into the general causes of failures of switch equipment in train yards it was called to my attention that we were having a number of miscellaneous derailments that come under the classification of derailments, as reported by the Interstate Commerce Commission, which are caused by broken lugs on crank castings in switch stands where these lugs break under traffic, and at this time I call your particular attention to the four-way crank castings used on certain switch stands. On our own railroad we no longer equip any switch stands with breakable lugs nor do we replace broken lugs in making repairs to old stands and we find that we are gradually eliminating a lot of miscellaneous accidents because we are taking off breakable lugs from our switches.

Our experience with flood lights in train yards develops the fact that in yards where these flood lights are in operation our collisions and derailments are greatly reduced.

The general use of fuses by trainmen in signalling while backing long trains in on sidings has certain advantages with reference to controlling the yarding of long trains. We get some good results during foggy weather in the general use of fuses for work of this kind. We do not use them promiscuously but use them only in cases of necessity.

With the present personnel of experienced switchmen and yardmen there is no reason to assume but that, if the proper supervision is exercised, a great reduction can be made in so far as collisions and derailments in train yards are concerned.

The same supervision that is required in train yards is extended in so far as road trains are concerned.

Instructions were issued covering running inspection of trains. Section laborers, men working in the bridge and building department, signal maintainers, towermen, operators and agents were all required to give inspection to passing trains. On double tracks the crews, both in freight and passenger service, are required to watch each other's trains while passing and signal each other in the event that anything is found wrong with the equipment. We have on record many cases where employees have been merited for preventing accidents and derailments by stopping trains when defects in equipment were noted.

These are some of the remedies that were applied on our line for the purpose of

reducing derailments due to failure of running gear, hot wheels, hot boxes and other equipment failures.

Our car department gives us 100 per cent service on equipment and this, in my opinion, is the fundamental. Cars leaving our important train yards are serviced as to journal bearings and running gear; particular attention is paid to the condition of triples and brake cylinders and we give a great deal of attention to seeing that air brakes are working properly before the train leaves the terminal. A defective triple in a train of 90 or 100 cars is a prime factor in making trouble and we do everything we possibly can along the lines of a thorough terminal inspection before the train leaves the terminal.

Another important item is the proper train handling in order to avoid severe shock to equipment which results in derailments.

I am satisfied that the railroads generally are scrapping a great deal of their old equipment, and I know, on our own line, that this has had a tendency to greatly reduce derailments.

Rigid train inspection on the road by all concerned is absolutely essential to bring about the best results.

Our greatest cause for concern, of course, in collisions and derailments is the reportable accidents to employees in train and engine service.

We were able to reduce this casualty list in 1929 and 1930 by intense supervision and holding the parties responsible who were slack in their work. We show definitely that out of 19,768 accidents, or railroad collisions (we are dealing now with collisions) the negligence of the employee was to blame for the collision. There was an expenditure of approximately \$23,000,000 wherein we had 425 persons killed and 6,666 persons injured—330 of the persons killed were employees and 2,440 of the injured were employees—292 of the employees killed were trainmen and 2,023 of the injured employees were trainmen.

In this same period we show that 1,412 collisions were due to defects of equipment, and in these accidents there were only three persons killed and only 53 injured.

We also show, in this same period, that only 42 of the collisions were due to defects in maintenance of way and structures, so you can see that the negligence of employees is largely responsible for the causes of collisions.

In derailments we had 6,620 at a cost of approximately \$7,000,000 wherein 129 persons were killed and 908 were injured—82 of the killed were employees and 64 of the 82 were trainmen.

However, in derailments we find there is a little different situation in so far as defects or failure of equipment is concerned.

In collisions we only had 1,412 accidents where defective equipment was involved, but in derailments there were 23,128 cases involving an expenditure of approximately \$33,000,000 wherein a total of 25 people were killed and 490 injured—20 of these being trainmen killed and 448 trainmen injured.

Definitely then, the negligence of the employees and the defects or failure of equipment are, in a large measure, responsible for the expenditure of approximately \$100,000,000 and the loss of 671 lives of employees and injuries of approximately 5,000 employees in the period from 1926 to 1930 inclusive.

The history of the American railroads in the years 1929 and 1930 indicates definitely that men can be trained to prevent them from injuring themselves and others. We have made a remarkable showing, particularly during the year 1930, when the casualties were lower than at any other time in the history of American railroads.

We have a field before us with reference to preventing collisions and derailments that is just as important, and I make the statement without fear of contradiction, that proper supervision combined with the spirit to get behind these failures will bring about the desired results for us.

CHAIRMAN WARFEL: Thank you very much, Mr. Parish. That was a mighty practical presentation from a man who knows what he is talking about, as evidenced by the way he talked about it.

The subject of collisions and derailments is so definitely tied in to the subject of train service accidents that I think we should have the presentation of the entire subject before we have this discussion. I am going to ask Mr. Lew Palmer to come to the platform.

LEW R. PALMER (The Equitable Life Assurance Society, New York City): Mr. Warfel, I am sorry I am not capable to discuss that splendid paper, but as you have indicated, I speak for general accidents. It is very gratifying that all class one railroads effected in seven months, 1931 as compared to seven months, 1923, a reduction of 75.6 per cent in your total casualty rate; and also a 19.5 per cent reduction as against a similar period in 1930.

I just want to say that any of you men who are not on our mailing list who would like to have these records for your road, can receive them by writing either to the National Safety Council or directly to me.

May I say that I have watched the development that has come about here at this Twentieth Congress, the joining of the twins back into more or less the old family, and I simply want to say that it recalled to my mind the fact that Ralph Richards, if he had been here, would have said, "Well done, boys, you did just what I wished you would do."

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): I want to tell you gentlemen something in half a minute to illustrate the inestimable value of the statistics put out by Mr. Palmer. The Interstate Commerce Commission has, of course, for years put out their statistical information, but it is usually several months, sometimes more than half a year, before they can get all of the details and have them printed, and the unusual value of Mr. Palmer's figures consists in the fact that they are so promptly gotten out, as in the present instance where he has the seven months' figures out for the present year.

A very prominent railroad executive received his most recent publication and transmitted it to the next executive below him and simply inquired why it was his railroad occupied the position that it did, and if I talked an hour and a half about the value of those figures, I don't think I could say anything further in the way of illustrating how the executive officers of this country are taking cognizance of their standing as indicated in the statistical information put out by Mr. Palmer.

CHAIRMAN WARFEL: A discussion of train and train service accidents cannot help, I believe, but bring to the minds of all of you here the very enlightening and very interesting reports we get from the Bureau of Safety, Mr. Borland's Bureau, that was alluded to here this morning I believe by Mr. Cronk: those reports of accidents that occur on the various carriers set forth in detail so clearly that if you are, like myself, gifted with a little bit of imagination, you can just see vividly the way those accidents occurred and profit so largely from reading of them and talking about them in your safety meetings.

We have in the audience the man who writes those accident reports for us, and I would like to ask Mr. Lovering of Mr. Borland's Department to come up here so that you may get a little better acquainted with him.

MR. LOVERING: The accident investigation activities of the Commission at the present time are remarkably light and I hope they continue that way. I think one of the reasons that we are not so very active at the present time is because of the law under which we operate, we only get on the ground after the accident has occurred, so we are in the position of getting around there after the horse has been stolen.

It has seemed to me that you gentlemen in safety work are given a very excellent opportunity at present, while business is slack, to look over the transportation machine, pick up any loose spots you may find about, find out some of the practices

that have been followed occasionally here and there that are not strictly according to Hoyle, and get ready for the next period of activity. There is no question but what it is coming, and I think possibly it may be a little bit nearer than some of us think it is.

So far as our own work is concerned, we are not having any collisions to speak of that require investigating. We are having I would say slightly more than the normal number of derailments, and here and there a few bad track conditions are coming to light. There is nothing serious about it yet, but the thing to do is to watch out, to see that it does not get serious, because if we get a period of heavy traffic within the next six months or a year, and there isn't very much opportunity for track work during the winter, we want to be able to handle those things with safety.

CHAIRMAN WARFEL: I can realize with what reluctance Mr. Lovering would come here to talk to a group that is trying to put him out of a job. If you caught the significance of what he said, that the work of his Department has not been very heavy of late, you will understand what a compliment that is to this organization. I hope that we can succeed in making the railroads of America so safe that the Safety Bureau won't have to make any investigations, and then we can employ the service of Mr. Lovering in writing some of these enthusiastic booster letters instead of accident reports. I think we would all appreciate them equally as much.

Now, I am going to call upon the vice chairman of this organization to substitute for me during the balance of the afternoon.

(Vice Chairman W. A. Booth took the chair.)

VICE CHAIRMAN BOOTH: Our program this afternoon calls for a discussion of train and train service accidents. The first gentleman is to speak on the subject of "Coupling." I am going to ask each man who discusses these various questions—coupling, hand brakes, switches, and so on—after he is through with his paper to take a seat here and lead in the discussion, because you fellows know everybody present.

Mr. Walsh, will you introduce Mr. Blythe?

J. L. WALSH (Missouri-Kansas-Texas Railroad Company, Dallas, Texas): I regret very much that I misplaced the biography of the next speaker and I will just have to introduce him as a switchman and a gentleman. We call him Sandy on our railroad but I see he appears on the program as Mr. C. M. Blythe, and I take pleasure in introducing Mr. Blythe.

Coupling

By C. M. BLYTHE

Switchman, Missouri-Kansas-Texas Railroad Company, Parsons, Kan.

You know, I am a switchman. We are more for work than talk. There aren't very many switchmen that will say anything but "good morning" and "good-bye," and that is about as much as I have to say today.

I want to speak to you about the coupling and uncoupling of engines and cars. The deaths from accidents in that work were 37; the injuries, 1,135, in 1928. In 1929 there were 59 deaths and 965 injuries. In 1930 there were 30 deaths and 604 injuries. Now, with cars and engines equipped, as they are, with automatic couplers, I can't see how that many men could get hurt at that business. There is no necessity for a man's getting in between engines and cars. He is operating all levers out at the side. If one doesn't work, he can go around and get another one; there are two. That looks to me like an awful price to pay for working with automatic couplers.

My daily work, of course, is switching cars, but I have a little more hazardous job than just switching, in that I fill and pull a rip track at some period every day

of my daily work. There are more opportunities there for being hurt than any other place on a railroad. I handle bad order cars and the place where we put them, on our rip track, the car will follow me out every time if I don't climb to the top end and tie it down.

I have been trying for a good long while, while I have never been a member of the Safety Committee of our railroad, to sell safety to the men that work with me. I have been the boss on this one engine for over 20 years and I have never broken the skin on a man since I have had it. I have had every class of switchmen you could think of, old-timers, high strung, nervous men, students, but there is only one thing that I tell them: when we go down into the track to get bad orders, that is an agency for the Grim Reaper. He lives right on this track; take your head in with you and don't watch anything except what you are doing. If somebody has something to tell you, quit your work and walk over and let him tell it to you, then go back and go to work. You can't handle bad equipment and think of something else.

Of course, sometimes I get a man on there who tells me this is all poppy cock, this is just a money-making affair for the railroad, and I tell him he is exactly right. He hasn't had the thing misrepresented to him and he hasn't formed a wrong idea about it. A railroad company would rather have him out there working than in a hospital with somebody else working in his place. He is sold on the right idea that it is a money-making scheme for the railroad, and also for him. If he gets his arm cut off they will give him five or six thousand dollars, but I show him in just a very few minutes that in less than three years he can earn every bit of that money and if he wants to quit at the end of three years, he should save \$5,000 and walk off altogether and not lose one arm in getting off.

We have safety meetings on regular dates, and I say to them, "Come down to the meeting and we will hear Mr. Walsh talk," and you know, they have more excuses than a shoemaker. They try to put you off until ten o'clock the day after the meeting is over because they don't want to go. Now, I have never been a member of this organization in my life, but the boss will tell you that he would have to almost sweep out to see that I wasn't there. I can learn more from him in one of his little meetings than I could figure out for myself in a month, because he has the ideas of every man on the M.-K.-T. Railroad. He travels from one end of it to the other to get those ideas, and when he brings them down to me, if I find somebody in Kansas City has a better proposition than I have got, I am going to get in on it. I don't want anybody to make a better success of my business than I am making of it.

That is the only way we profit by this safety work, to get where we can hear it and understand it, where it is talked. A man learns more through his ears than by any other means, if he will listen.

As I said a while ago, I haven't much to say here today. I am a poor speaker and I have heard so many good speakers since I have been here that I kind of feel like a mule with a hundred dollar harness on.

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): Mr. Blythe, what do you do when you find a brakeman violating the safety rules?

MR. BLYTHE: I get him by the shoulder and turn him around where I can look him in the eye, and I talk to him, just like I would want somebody to talk to me if I violated a rule. You can't talk to a man unless you can get his undivided attention and you can't get it by talking to the back of his head.

MR. CARROW: Have you had any cases where the fellow would not come around for just a quiet, gentle, fatherly talk?

MR. BLYTHE: No, sir.

H. A. PARISH (Chicago and North Western Railway Company, Chicago): I would like to ask whether or not you hold safety meetings at regular intervals during the work. Do you have any method of holding meetings in the train yard,

getting them together in a building somewhere, or do you have just the regular monthly meetings?

MR. BLYTHE: With the crew I work with, the only meetings I hold are when Mr. Walsh comes to our little town.

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): I take it, men, that the little town Mr. Blythe speaks of has a Safety Committee practically continuously under his guidance.

MR. BLYTHE: Brother, I have been called a crank for a good long while, but a lot of them like it now.

VICE CHAIRMAN BOOTH: If there is no further discussion on this subject, gentlemen, I shall call upon Mr. C. W. Hammond, Assistant General Safety Agent of the New York Central Lines, New York City, to discuss this subject from the angle of operating hand brakes.

Operating Hand Brakes

By **C. W. HAMMOND**

Assistant General Safety Agent, New York Central Lines,
New York City

One of the outstanding problems that confront us today, when we start to discuss train service accidents is, "The best method to pursue in preventing hand brake accidents."

We have been confronted with this subject for the past ten years, when it was first given consideration before a meeting of the Steam Railroad Section, National Safety Council held at Boston, Mass., September 26-29, 1921, and it has been a very important subject ever since.

Before we start to recommend a remedy for any class of accidents we must know when, where, and how they occur, then we are in a better position to analyze the causes and take corrective measures to prevent a recurrence.

In making an analysis of accidents due to operating hand brakes, we find that the Interstate Commerce Commission, Bureau of Statistics, show 21 separate causes, two of which are outstanding, and therefore, should be given first consideration.

During the year 1930, there were 26 employees killed on duty, and 1,154 injured, due to operating hand brakes, as against 37 killed and 1,755 injured during the year 1929, a decrease of 30 per cent in killed and 34 per cent injured.

Taking the total number of 1180 casualties, due to this class of accidents during 1930, we find that 322 casualties or 27 per cent were due to losing hold, slipping or falling; not otherwise specified and 169 casualties or 15 per cent were due to sudden stopping, starting lurch or jerk of train or car, or 42 per cent attributed to these two causes.

I am not unmindful of the importance of the other 19 causes furnished by the Interstate Commerce Commission, and the necessity for care that should be exercised to avoid these injuries, but on account of the frequent serious injuries, due to these two causes that I have enumerated, is one of the principal reasons, why we should try and recommend a remedy, ever remembering that, when an employee falls from a car, either moving or standing, it frequently results in death or serious injury.

There has always been a question in my mind, as to whether employee casualties due to losing hold, slipping or falling, have in every instance, been properly classified as an injury due to operating hand brakes for the following reason. Perhaps the last time an employee was seen alive was when he was riding a car off a hump and was noticed operating the hand brake. It might have been dark, with a hand brake that would not control the car. The employee has visions of a 10 day suspension staring him in the face if he breaks up the car, or its contents. The result is, he keeps trying to stop the car, until he gets too close to other cars, then when he

attempts to protect himself, by getting back in center of car, or down the side ladder, collision occurs and he is knocked from car with serious results. What was the primary cause of this accident? In many instances, it is due to the fact that the brake was not tested before depending upon its use, to determine its efficiency before car was detached from other cars. This feature should be covered by safety rules on all railroads, not only to prevent injuries to employees, but loss and damage as well.

Perhaps this injury could have been classified under the caption of "Getting on or off cars, instead of operating hand brakes, as the injury was due to the employee trying to save himself by getting off the car, rather than by being injured while operating the brake.

Losing hold, slipping, or falling, is also caused by foot slipping on brake step board, oftentimes covered with ice and snow, kinked brake chains, that do not wind up evenly on brake shaft, and suddenly give way under extra hand brake pressure, also causes the operator to be thrown off balance with the result he falls with serious results. Brake step stirrups, that do not allow proper clearance for brake chain to wind up evenly on brake shaft under all circumstances, are dangerous because they cause an overlapping of brake chains, which gives way under extra stress on brake wheel, causing the operator to be thrown off balance. This feature should be given consideration by the railroads, to the end that sufficient dimensions be given brake step stirrups to prevent any liability of brake chains clogging or overlapping. Kicking brakes have been the means of many employees losing hold and falling, account of being struck by brake club flying around and striking the operator, causing him to lose his hold and fall, and can only be prevented by the operator of the brake anticipating that every brake that is applied or released may be of the kicker type, and so locate himself while operating the brake, that his body will not be struck with club should brake wheel fly around.

The practice of strong-arming brakes without using brake pawl, has also caused many accidents of this nature and should be prohibited. This practice seems to prevail, more especially when employees sit on top of car facing the direction which they are moving, rather than stand on the brake step board to operate the brake by the use of brake pawl. Releasing brakes on cars, which have been set by hand after air brakes have been applied, should be given careful consideration, as invariably the brake wheel will spin around as brake is released, and the operator often is struck by brake club.

Losing hold and falling from cars is also caused by car rider being knocked off by following cut of car striking car which he is riding. Sometimes there appears to be a dual responsibility that causes this class of accidents. First: the rider of the leading car being so intent on controlling the speed of his cut, oftentimes reduces its speed to such an extent that he does not get into clear of the switching lead before being struck by following cut, which he has not taken cognizance of until too late to avoid collision, with the result that he is knocked from car. Second: the following cut should have been under proper control at all times and the rider of this cut should anticipate that this condition might arise at any time and should have controlled his cut of cars accordingly. These practices prevail more frequently in hump yards where car riders are employed and are generally more prevalent at night.

Injuries due to sudden stopping, starting, lurch or jerk of train or car, can be prevented in many instances by being ever on guard, always remembering that a standing car may move at any time and a moving train or car may stop at any time without notice.

Another good safety rule to follow is always sit or stand in center of car except while operating hand brakes. This will prevent many accidents due to this cause. When operating hand brakes, be absolutely sure that you have a firm hand and foot hold, until car has been detached from other cars, as a sudden stop when cars are not cut off has been the means of jerking employees off the leading end of cars.

We are making progress in reducing hand brake accidents, and will continue to make further reductions for two specific reasons. First: through the organized efforts for safety on railroads, coupled with the obedience to safety rules on the part of the employees, who have been educated to follow safe practices, the employee realizes as never before that safety has not only benefited his railroad and was not inaugurated through selfish motives, but it has its humanitarian features as well; therefore, he is endeavoring to do his part by refraining from improper practices and also sees that his fellow co-worker does likewise.

Second: the railroads for several years have been applying brakes to their freight equipment which gives additional braking power to the operator of the brake, or the approximate equivalent of the air brake pressure. This has been accomplished by the installation of jack up levers on old and new equipment and therefore does away with the direct pull on the cylinder lever, and increases the braking power about 40 per cent.

Some railroads have standardized on other types of power hand brakes which can be operated with one or both hands, and does not require the use of brake club. Several reports that I have received would indicate that accidents due to operating hand brakes of this type, have shown a marked decrease since they have been installed. I have stated that we should know when, where, and how accidents occur. This gives us a working basis to center our safety activities, pick out the weak spots that are contributing to many of our accidents, and try and recommend a remedy.

The question before us now is where are the weak spots? What class of service is contributing to these accidents? By again referring to our 1930 figures we find that of a total of 26 employees killed and 1154 injured, 17 of the deaths or 65 per cent, and 702 of the injuries or 60 per cent were yardmen, eight deaths or 31 per cent and 443 injuries or 38 per cent were roadmen and other employees contributed to the remainder of one death and nine injuries.

We can therefore see that inasmuch as the majority of hand brake accidents occur in our yards, there is the place to concentrate our safety activities, although not unmindful of the fact that we should not relinquish our efforts to try and educate all other employees operating hand brakes, and teach them the necessity of exercising care while doing this class of work. My remarks have been based on my 26 years' experience as a yardman and 14 years in safety work. Therefore, I contend that, inasmuch as I was never injured while operating hand brakes, what I have done certainly others can do. I am looking forward to the day when accidents due to operating hand brakes will be the exception rather than the rule; we will then see an employee who has been educated to safely operate an efficient hand brake.

May God hasten the day.

VICK CHAIRMAN BOOTH: Gentlemen, there should be a thorough discussion on this subject of hand brakes. It is perhaps one of the most live subjects that can be brought before any of these safety conventions.

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): I would like to ask Mr. Hammond if he can go to a hump yard or any other yard and determine to his own satisfaction whether or not a man is working safely in connection with that operation, and I would like to hear him go into detail as to how he does it.

MR. HAMMOND: It is my business to go around on hump yards occasionally and while we have the old men on the job today, of course we find one occasionally who doesn't handle the brakes exactly according to Hoyle. In many instances you will find someone using the brake club in the right hand and pushing on the brake wheel with the left, while the orthodox way is to use the brake club in the left hand and pull with the bare hand on the brake wheel. Then you find the fellow who wants to strong arm the brakes, which we know from experience has caused

injuries. We find him on the wrong side of the brake wheel when he stands on the brake step board.

There is no set location on some railroads for the brake pawl. Some have it on the right-hand side of the brake shaft and others on the left-hand side. Perhaps there has been a question in the minds of some of you as to the exact location of these brake pawls. In so far as the experience I have gained from railroading is concerned, I would prefer them to be on the right-hand side, because then I can get a better braking purchase and more swing on my body, and so I try to educate the man along those lines.

Of course, some men are left-handed and claim they can work it better on the left-hand side, so you have to work it out on the job, Mr. Carrow.

Mr. CARROW: Can a competent inspector go into a hump yard or any other yard and watch the detailed operations from beginning to end and pick out where the individual men are being inefficient?

Mr. HAMMOND: I think so. I was making an inspection with several superintendents on one of our large humps and I called one brakeman's attention to a bad operation and he said, "The club turns in the brake wheel."

I said, "Brother, I beg to differ with you. It doesn't turn in the brake wheel."

He said, "How are you going to prove it?"

I said, "The best way is to take the club away from you and ride a few cuts for you." The first cut was two cars of grain, he told me what track they were going on, and I was bound and determined I was going to ride the car down there and show him, and I did, and when I got to the foot of the hump I said, "Did you see this brake club turn in the wheel?" and he said, "No."

I said, "Wait until we get a square brake shot." We had to wait up on the hump for ten minutes and along came two cars of oil. Anybody who knows anything about riding cars knows that oil is the hardest thing in the world to ride over a hump. The first brake required 100 per cent and I was going to show that fellow not only that the club would not turn, but that I could take two cars of oil off the hump with one brake, which I did.

After I rode the cut down and was walking back up the hump with him he said, "Mister, who are you?"

I said, "They have given me the title of assistant general safety agent."

He said, "I guess you are all right, but you are something else, aren't you?"

I said, "What do you mean?"

He said, "You must have handled these clubs before."

I said, "Yes, and I designed the club you are now using."

Mr. CARROW: Do you require the man to get on the car before it gets to the apex of the hump?

Mr. HAMMOND: Yes. Our safety rules require that the hand brakes shall be tested before depended on for use.

Mr. CARROW: Is it possible to teach him to pull the thing so he will fall on top of the car instead of off the car? Do you do that?

Mr. HAMMOND: Not necessarily. It depends altogether upon the location of the brake pawl.

Mr. PARISH: May I ask just how much dependence you put upon the hand brake on a tank car? Just what is the efficiency of a hand brake on a tank car compared with the hand brakes on other types of cars?

Mr. HAMMOND: They are comparable, I believe. All tank cars that have been built since 1925 have, or are supposed to have, this jack-up lever which gives us the approximate air brake pressure.

Mr. PARISH: Do you let more than one loaded car of oil go over the hump and put one man on to ride them?

Mr. HAMMOND: If we have two cars, we put two men on them.

Mr. PARISH: What is your experience, if any, with the Ajax brakes? Have you any of that type?

Mr. HAMMOND: We have three hundred on high side gondola cars that are working out very satisfactorily.

Mr. PARISH: Where are they placed, on the end of the car or on the side next to the ladder?

Mr. HAMMOND: Right on the end of the car, and they are working out very successfully there.

Mr. SMITH (Milwaukee): In what position do you advise a man to be in handling the ratchet type of brake?

Mr. HAMMOND: There are several different types. What type do you mean?

Mr. SMITH: The side swing.

Mr. HAMMOND: I have made a practice of being on the left-hand side.

Mr. SMITH: Do you hold the grab bar with one hand and operate the brake with the other?

Mr. HAMMOND: Yes.

G. J. SHREEVE (The Belt Railway Company of Chicago): No doubt in your travels you have found men who insisted on doing the work contrary to your orders, have you not?

Mr. HAMMOND: Yes.

Mr. SHREEVE: What method of educating them do you have, and how do you discipline them in cases where they don't follow your instructions?

Mr. HAMMOND: I have always been able to educate the man to my way of thinking. I have shown him the method I have used and the one we think is the safest way, and he generally lines up without very much argument.

Mr. SHREEVE: In case they did not follow your instructions, you would discipline them, would you not?

Mr. HAMMOND: I wouldn't, no, that is not within my power, but I might recommend them for discipline.

Mr. SHREEVE: That would be the policy of the company?

Mr. HAMMOND: I think so.

Mr. SHREEVE: I was very much interested in your remarks. Your instructions are identical with ours. However, we find after we instruct them that we have to follow them up pretty closely and see that they follow out the instructions. At this time our accidents, of course, are greatly reduced due to two factors: we have no inexperienced men, and the hand applications have been improved so much that it is hard to try to guess the percentage of the improvement. There was a time, eight or ten years ago, when we had a great deal of trouble with hand brakes, but by this time they are working pretty well, as our safety showing has indicated.

Mr. CARROW: This gentleman has intimated that he has some system of teaching the men on his hump yards. It might be helpful to us if he were to tell us what procedure he follows.

Mr. SHREEVE: We have instructions that all men must mount the cars and test the brakes before they are cut off. We have a yardmaster located at the top of the hill so he can watch both sides; it is his duty to see that the men mount the cars and test the brakes, and to also watch and see that the cars are not cut off and run down the hill until the brakes are hand tested to see that they are in good condition.

Mr. CARROW: I would be glad to hear you answer the question you asked Mr. Hammond, about discipline.

Mr. SHREEVE: We instruct our men, the superintendent, trainmaster, and yardmaster, to instruct the brakemen when they first go to work. They are watched pretty closely, and if we find men who are not carrying out our instructions we warn them that we issued the instructions for their good and for the good of the company.

and we want them carried out. Then if they insist on strong arming the brakes and not carrying out the instructions, we take them out of service.

Mr. CARROW: I take it then, that if you had a man who failed to get on the car before it got to the apex and test the brake, he would without question be subject to discipline.

Mr. SHREEVE: Yes. Every once in awhile the superintendent, the trainmaster, or myself, goes up on the hill and watches to see whether the instructions are being carried out.

J. A. MASSEY (The Chesapeake and Ohio Railway Company, Newport News, Va.): I am employed in a yard where we handle particularly heavy trains, coal trains, and on our hump we have 26 classification tracks. We handle approximately four or five thousand cars a day. Our cars in the receiving yard are given a thorough inspection. Such hand brakes as are not safe and dependable are tagged as such. Special care and precaution is taken when those cars come over the hump to see that they do not go down over the yard if not accompanied with a car that is equipped with safe and dependable hand brakes.

In the year 1929, I was appointed a member of a committee that was appointed for the purpose of investigating hand brakes and hand brake accidents. My study has taken me over practically the entire United States on portions of almost every road. I have attempted to discuss and study the conditions arising at various places so that when the question of hand brakes was discussed I would be in a position to give some valuable information. I said this morning that hand brakes only serve one purpose, and we have too many different types trying to serve that purpose. My policy as an individual, in instructing men in the proper use of hand brakes, is that whenever there comes into my terminal a car that is equipped with some new and untried hand brake, I make it my duty to have this car examined and I make a personal test of this hand brake as to the method of operation, for the purpose of conveying my information as to its operation on to those who might have to use it in the future.

On our railroad some time ago we had a near fatality resultant from a kicker effect developed through the use of a brake club. To describe this kicker effect in hand brakes, it is necessary to understand the application of hand brakes. The flat places on a car wheel have caused many a brakeman to lose his life. During the process of these wheels turning over, the flat places striking the shoes, it develops a kicker effect on the wheel in the man's hand, and if he does not have the pull in and the brake sufficiently secured, he will be more than apt to be thrown from the car. Most every man who has had actual experience in riding cars will verify that statement, that that is one thing that is causing a tremendous lot of our personal injuries during our daily course of operation.

Well, on our railroad we developed a hand brake that we can apply without the use of the brake club and its ratio is approximately four to one. That is the effect of an air brake.

In the hump yard that we have at our local terminal, when our cars come in they are carefully inspected for defective hand brakes, and in the past 60 days we have not dumped the doors of one single loaded car, due to properly instructing the hump riders in the proper method of hand brake operation.

I can tell from experience the moment a rider takes over the brake wheel whether he can control that cut or not. Any man who has had practical experience in dealing with hand brakes knows that there is a proper and an improper method of applying them.

Mr. SHREEVE: If I understood you correctly, you said you inspect brakes in the yard before the cars are shoved over the hill. Is that right?

Mr. MASSEY: Yes.

Mr. SHREEVE: How do you test them, by tightening up on the brake chain in the wheel or putting the brake shoes against the wheel, or what is your method?

Mr. MASSEY: Our theory is that every hand brake you can wind the chain up on and bring the shoes against the wheel is a good brake. The power of the hand brake lies in the leverage and if a hand brake comes to a sudden or abrupt stop, we class that hand brake as defective because it is lacking in power. That is our instruction, that if they find a brake that comes to that abrupt stop during inspection, they will tag it as defective.

Mr. SHREEVE: You said you switched 4,000 cars and that you have 26 classifications. Do I understand that you test all the brakes that way?

Mr. MASSEY: The inspectors are required to do that. The best evidence of the effectiveness of that is that during the past 60 days we have not had an accident on our hump due to hand brake operation.

Mr. SHREEVE: The time factor has gotten to be so vital in these large terminals now that I just don't understand how you can go along and test each brake in that manner. It would seem impossible in a yard like we have. We have 104 classifications of tracks in our yard with thousands of cars and it would take an army of men to test the brakes if they had to go through an inspection of that kind.

Now, as I mentioned a minute ago, accidents have been greatly reduced due to the hand brakes being put in better shape. If all of the railroads in the United States, the loaders of cars, will pay strict attention to their hand brakes, put them in shape, we are going to reduce accidents on the hump yards where hand operation is still employed, by 75 per cent. I would like to learn some way, if I could, of putting ourselves in shape to do a 100 per cent job in handling cars, and I would recommend that we spend more money in our inspection if I thought we had the time to do it and it would accomplish what we would like to have accomplished, but under the present conditions, I just wonder whether we can go through with your method.

Mr. MASSEY: Perhaps I can explain that to you just a little better. We have what we call a coal yard that leads to our coal bin. We dump 962 cars in a 24-hour period. The yard leading to the coal yard has a grade of 1.2 per cent. It is necessary to set a hand brake on every car that goes into that yard so that the cutters may come and release the cars one at a time. The brakeman who rides that car to the pit is required to test his hand brake before the car is cut off. If he finds that the brake is defective, the car is not cut off alone, it is cut off with an accompanying car. If it is not what it should be, although he can control it, he has the pocket tag and he tags that car and switches it onto a shop track we have particularly for that purpose.

In our receiving yard our inspectors are required to test the hand brakes before the trains are cut. We have only a small receiving yard, eight tracks holding 150 cars, and during the process of inspection the inspector is required to take hand brakes that are defective out of operation.

H. A. PARISH (Chicago and North Western Railway Company, Chicago): May I ask where you put the tags: do you put them on the side of the car or do you tag the brake?

Mr. MASSEY: We tag the side of the car, and it is marked that the accompanying car is the one that has the safe brake.

Mr. PARISH: Do they put them on the same night they come in and permit them to go to the hump and switch and cut over the hump and depend on the tags on the side of the cars to determine whether or not they have had order hand brakes?

Mr. MASSEY: They do.

* QUESTION: What percentage of hand brakes do you have in operation?

Mr. MASSEY: I am not prepared to give you the exact percentage in use at the present time, but our inspection has become so rigid that it is just now and then that we find hand brakes that are really being operated with our own equipment.

VICE CHAIRMAN BOOTH: Gentlemen, I am reasonably pleased with the progress we are making with this program. We are practically on time, and in order to

continue so we will have to pass on to the next paper which is on "Operating Switches," by Mr. Henry S. Corbin, Supervisor of Safety, Atlantic Coast Line Railroad, Wilmington, N. C.

Operating Switches

By H. S. CORBIN

Supervisor of Safety, Atlantic Coast Line Railroad Company, Wilmington, Del.

The importance of this subject is emphasized by figures of the Interstate Commerce Commission, showing there were 380 accidents last year resulting in two employees killed and 378 injured while actually operating switches. In addition to this number there were eight persons killed and 140 injured due to "negligence of employees" in connection with the operation of switches; bringing the total number of accidents to 1,093, and casualties to 10 deaths and 518 injuries in the operation of switches and in connection therewith. It is my thought that no effort of the safety department of any railroad can be directed in a way that will effect greater benefits, tangible and appreciable, than a close study of this subject.

No estimate has been made and there are no figures available showing the number of minor injuries of less than three days of disability. I have no doubt that cases not reportable to the I. C. C. would more than treble the number reported, and each be a potential reportable case.

There is an economic side to be reckoned with in this part of railroad operation. Aside from the cost of personal injuries, there are serious delays and damage to equipment that often result from accidents of this kind. This, along with the reflection on efficiency, cannot be overlooked.

Casualties sustained while operating switches are listed under the following causes:

- Switch lever flying up.
- Switch lever or ball falling on or catching hand, foot, or other part of body.
- Slipping or falling on ice or snow on tracks or elsewhere.
- Tripping, slipping, or falling, not otherwise classified.
- Caught between locomotive or car and switch lever or stand.
- Struck by locomotive or cars.
- Sprain or strain of parts of body, not otherwise provided for.
- Foot, hand, or other part of body caught in or by mechanism of switch.

Among the causes of accidents in switch operation, listed as due to "negligence of employees" we find:

- Switch set in wrong position.
- Switch thrown under locomotive or car.
- Wrong switch thrown.
- Failure to latch or secure lever.
- Failure to see that switch point fitted up properly.
- Switch thrown before car cleared derail.
- Switch, running through.
- Derail, running off.

Accidents from switch operation are so varied, and the action of employees entering so largely into the causes, makes it necessary that more consideration and effort be given to the plan of education and moral training.

Obedience to the rules is essential to safety in the performance of duty of all railroad employees. The main cause of accidents of any nature in railroad operation is failure of employees to familiarize themselves with the Standard Operating Rules, and do as required by those rules. I am fully convinced that enforcement of our Standard Operating Rules, coupled with a clear understanding of the purpose of organized safety efforts, will be far more effective in controlling accidents, not only

due to operating switches, but of all kinds, than additional rules bristling with penalties. The appeal from the humanitarian side is strong and perhaps there is no better argument.

Direct supervision can do a lot in training men to think and work safely. The kind of a man a foreman is, far more than what he may say, will determine the extent of his influence and ability to properly supervise others.

In brief, I have endeavored to impress you with the need of more attention to this part of railroad operation with the view of giving more thought to a cause that is contributing to the most destructive and distressing accidents on our American railroads.

I shall now go briefly into some of the details of maintenance, installation, operation, observation and performance in connection with the subject.

Line of road switches should be located for clearest vision and safest operation. Yard switches should be placed on lead, located so it will not be necessary to cross tracks after switch has been thrown.

Maintenance of switches is important, particularly with reference to close fitting switch points. Badly worn switch points should not be permitted to remain in main line track, and especially in single track where traffic faces the point. Bolts in points and frogs should be kept tight and oiled frequently to prevent rust and wear. Likewise, the switch stand should be kept oiled and adjusted for easy operation.

The roadbed around switches should be built up to a level and kept free of obstruction, such as weeds, tools, materials, freight shipments, etc.

Unauthorized persons should not be permitted to use switch keys nor have them in their possession. The use of switch keys other than those provided by the company is decidedly objectionable.

Employees required to get off cars or engine should see that they have sufficient distance from switch stand to get off without injury. They should not attempt to get off cars or engine when moving at a high rate of speed.

Standing position while throwing switches is a matter that should be studied with the view of preventing strains and sprains. The force necessary to throw the switch should be put on the muscles of the legs and arms rather than the back.

After the switch is thrown, when necessary to cross track it should be done with care, and close observation made of the switch point to see that it fits closely. Employees should keep back a sufficient distance so there will be no chance to throw switch while cars are moving, and by no means must hand rest on switch. Main line employees should strictly observe all operating rules and instructions.

Employees whose duty it is to throw switches should lock them and know they are in proper position. After lock has been applied it should be tested to be sure it is locked. When necessary to break a switch lock the proper officials should be notified by wire, and if on main line the switch should be spiked down; if in yard have lock replaced at once.

Track motor cars should be handled carefully over switches and speed reduced to a point of certain safety. Employees on track motor cars in passing over switches should observe closely switch points, switch stand targets and lights. Switches should not be used for track motor cars and trailers when there is sufficient force to lift the cars over the switch.

We all know switches that are not properly installed and maintained are a hazard, and when they are not carefully and thoughtfully handled they are dangerous.

A PERFECT PERFORMANCE IN THE OPERATION OF SWITCHES IS THE ONLY WAY TO AVOID DISASTER.

VICE CHAIRMAN BOOTH: Any discussion?

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): I was hopeful that Mr. Corbin would go into a little more detail in regard to personal injuries in connection with operating switches. We have had an epidemic of foot injuries in

connection with ground throws on small switches. The fellow gets his foot in the way and when the ball comes over, his foot is injured.

So we started the plan of providing a guard on the old type switches so that when the switch is thrown completely over the guard keeps the ball off the ground, and we have finally overcome that hazard. I would like to hear a discussion of the operating of switches with reference to the personal injury element. While the paper outlined very carefully the necessity for using switches in avoiding accidents, I think it referred more to train accidents than personal injuries.

F. HAKTENSTEIN (The Lehigh Valley Railroad): I, too, was interested and in hopes we might hear something from Mr. Corbin relative to personal injuries as a result of throwing switches. Some time ago we had a great deal of trouble with switchmen, in throwing hand switches, throwing what is known as the ball of the switch on their toes or on their feet which usually resulted in injuries to their toes or feet, and we had to threaten some pretty drastic measures or action in our effort to put a stop to it. And while there has been a vast improvement during the past year in the number of that kind of injuries, we have one occasionally now.

We recently adopted what are known as the safety shoes and we hope to get those on our yard men so as to make an injury of that kind impossible. Our shop men and our track men have gone to the use of safety shoes very freely. I think in the last six months they have bought in the neighborhood of 3,800 pairs on our railroad, and they are very well satisfied with them, and we are in hopes of getting them onto our yard and switchmen.

C. F. LARSON (Missouri Pacific Railroad Company, St. Louis, Mo.): I possibly can't offer a remedy, but I think that throwing the switch ball over on the foot is nothing but pure carelessness. We had an epidemic of that at our Kansas City terminal about two years ago and without making any physical changes we made a mental change by a certain action on the part of our superintendent on that terminal, and we have had none since.

Mr. HAKTENSTEIN: That is the kind of action we have taken.

Mr. BAILEY: I would like to ask how you brought it about. What instructions did you give that required the switchman to throw a ground throw switch properly?

Mr. LARSON: Not being a switchman, Mr. Bailey, I can't answer that question specifically. I simply say the superintendent took that kind of action with the switchmen on that terminal, and they kept their toes from under the ball thereafter. That is all I know about it.

C. M. BLYTHE (Missouri-Kansas-Texas Railroad Company, Parsons, Kansas): I had the pleasure of working for the Union Pacific at Cheyenne for several years. They used to have a square block-out and you had to put your foot on a block to get it under. I don't know whether they still have that or not. I have been away from there for 25 years.

Mr. BAILEY: That will solve the problem, to have a guard placed on the tie so as not to permit the ball to go the full throw.

There is another thing that has come into vogue just recently on many of the high class railroads: that is the spring switch. We have had two injuries in the last eight months due to the hand throwing of a spring switch. At the end of a double track or passing track, a fellow coming toward the switch had to head into the spring switch and get off and hand throw it, and with the extra effort that was necessary, he sustained a hernia. Now, that is going to be a cause of accidents, and reportable accidents at that. When we investigated, we found the fellow had taken a piece of pipe and set it up there; he had put the pipe on the end of the lever to throw the switch. If the switch should be hand thrown, it should be hand thrown without extra leverage. I wonder if other lines are having the same trouble.

Mr. CORBIN: I know of one such minor injury on our railroad and instructions went out immediately to discontinue the use of pipe, and like most of our instructions, it was lived up to.

Mr. BAILEY: Was it a spring switch?

Mr. CORBIN: No, but we have gotten away from using a pipe in connection with throwing switches. It is not a part of our equipment.

VICE CHAIRMAN BOOTH: Our next subject, gentlemen, is "Getting On or Off Locomotives or Cars." I will call on Mr. Carrow to introduce the speaker.

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): Gentlemen, Mr. Neff is still a young man but he has been a brakeman and a conductor and a safety agent, and he is now connected with the Safety Department in the capacity, so-called, of a safety inspector, but he has really developed into an analyst, and this is the procedure he follows, as do all of our inspectors.

We have 34 divisions and of course we don't attempt to do the superintendent's job or anybody else's job. Our purpose is only to make enough investigation and observation to keep a line on the performance of each unit, especially those that are a little in arrears. He makes a complete study of all of the accidents, train and train service, that occur over a period of, say, six months. He has just finished the Eastern Pennsylvania Division which has about 15,000 employees. That is a general division made up of four superintendents' divisions, and he has analyzed every accident and every investigation paper in that whole general division over that period.

When he finishes he has a complete resumé of the situation, made from the standpoint of the departments involved, from the causes of the accidents, and the location of the accidents. If it happens, as it does frequently, that a division is long on "getting off and on" causes, he makes a definite study and analysis of that. If they have a great many accidents due to being struck by trains, he makes a study of that. He studies any cause or combination of causes that is causing accidents.

The only reason I took the liberty to tell you this is that it seems to me to be leading the way for a simple solution of our safety problem. Instead of making a cursory or general inspection and taking a sort of general hit or miss action, we are trying to diagnose specifically what the disease is and to prescribe specifically the remedy. And Mr. Neff, the next speaker, is one of the men who is doing that for the Safety Department of the Pennsylvania Railroad.

Getting On or Off Locomotives or Cars

By P. F. NEFF

Safety Inspector, The Pennsylvania Railroad Company, Philadelphia, Pa.

Getting on or off locomotives or cars in 1930 resulted in 46 deaths and 2,830 injuries to train service employees that were reportable to the Inter-State Commerce Commission. This is only one side of the picture for there were thousands of others injured from this cause wherein the disability was less severe; therefore, the elimination of accidents from this cause justifies every minute any of us can possibly give to it.

In discussing this subject it is necessary that we take notice of every act involved from the time the employee leaves the ground until he is safely located on the top or brake board of the car and vice-versa, because, until he has reached such a location, he is still in the act of getting on or off.

We have had in effect for a long time certain rules to govern employees performing this phase of their work, such as, "Boarding the leading footboard of an approaching engine", "Stepping to track from footboard of moving engine", "Getting on or off at high speed." We tell them to watch to avoid injury from "Tripping, slipping or falling", "Turning ankle on coal, boards, stones, materials, etc.", "Stepping into holes or openings or from or through bridges or trestles"; and still personal injuries while getting on or off locomotives or cars occur daily, which indicates we have a long way to go before we can feel we have successfully met this issue.

It may sound strange to you, but my studies of individual cases over a long period of time reveals that a large majority of injuries from this cause occur when the employee is getting on or off equipment that is standing still, movements of one or two miles per hour included, because they are slower than a man can walk.

There is a reason for this in the fact that the average man in train service knows if he falls getting on or off moving cars he is liable to be run over, whereas, in standing equipment this hazard is eliminated, therefore, he does not use the facilities provided in the proper manner or the same judgment when getting on or off standing equipment that he uses when it is moving. Another reason is that the injured employee is more or less censured for failing to use the proper precaution instead of being instructed how to safely and efficiently perform this duty. There is no good reason under the sun why any man should be injured when getting on or off standing equipment, day or night, if he knows how and does so in the proper manner.

If getting off standing equipment results in the majority of the personal injuries under this cause, due to turning ankles, slipping and falling, it is only right and proper that we should seek the cure for it first. The cure is a simple one, here it is, "Use the grab irons and sill stirrups provided and retain hold on the equipment until the foot is firmly placed on the ground". If this is done I will guarantee there will be no more injuries from turning or twisting the ankle, leg or hip or stepping into holes or through or from bridges and trestles. With reasonable enforcement, it will also prevent injuries from jumping off end sills, decks of engines or swinging between cars.

In getting on or off cars or locomotives, the improper use of the ladders or steps has resulted in numerous injuries to train service employees. The ladder rung on a box car or tender of an engine is only about two and one-half inches from the side or end in a great many instances, whereas it is three and one-half to four inches from the toe of the average man's foot to the ball, and the habit of a large number of employees of placing the foot at direct right angles to the rung when going up or down prevents the foot from being firmly placed on the rung. A slight amount of grease on the rung or the bottom of the shoe, ice and snow or other slippery condition, presents a hazard hard to overcome when placing the foot on the ladder rung in this manner. Another dangerous position created is that it places the majority of the weight of the man on his arms instead of his feet which causes his body at the center to extend three feet or more from the car where it is likely to come in contact with structures or obstructions alongside of the track or cars on an adjacent track.

The proper way to place the foot on the ladder rung is to turn the foot slightly sideways and have a portion of the ball of the foot engaged on the rung and if this is done the weight of the body will be on the feet and the body held close to the car, thus holding to a minimum the danger of slipping or falling or coming in contact with obstructions.

When clearances permit, the use of the front end ladder of a moving car or the rear end ladder when cars are following in switching operations, or the end ladder between moving cars, should be discouraged. A slip off of any rung usually means death or very serious injury as the employee falls direct to the track.

In going to the brake board, use the side ladder to the level of the board and have a firm hold on top grab irons before stepping around the corner of the car. This reduces the hazard to one chance of slipping and being run over instead of four as is the case when the end ladder is used entirely.

When going around the corner of any car use both side and end grab irons and never swing around the corner with only one hand hold expecting to use the brake wheel for the other hold, a slight lurch of the car often times makes you miss the wheel.

When a train is on the road or clearances are close and it is desired to go from a low car to the top of a box or hopper car, the end ladder is the proper ladder to use,

but a firm hold must first be had on the ladder before the step is made to such car in order to take care of any slack action that may take place while in the act of stepping or ice or snow on the end sill when cars are so equipped.

At one time we only had end ladders on cars and now that we have the side ladders let us, at least, indicate that we know they were put there to make it more safe for train service employees performing their duties.

In coming off the top of a car or tender, never face outward as it prevents the ball of the foot being properly placed on the rung or step. The heel is a poor thing on which to turn the body and in addition the hand hold is back of the body where it is almost useless if the foot slips. Always face the equipment from which you are alighting.

The tendency of employees to swing out from a car or locomotive, either standing or moving, with articles, such as dinner boxes, grips, bundles of clothing, supplies, etc. or to board cars or locomotives with articles in their hands, which prevents reasonably free use of both hands while doing so is another cause of a number of serious accidents which can be eliminated, if prohibited.

I have given you a positive preventive for accidents that occur during the act of stepping from the standing locomotive or car to the ground and certain specific instructions that will hold them to a minimum when using ladders or steps on either standing or moving equipment and my only wish is that I could give you the solution for the accidents that occur while getting on or off moving equipment, a solution that would overcome the hazard of stepping on coal, stones or into holes, etc., a solution that would work both day and night. I am sorry to say, regardless of the intensive study I have given this subject over a period of years and the hundreds of men I have discussed it with I have been unable to develop a positive preventive for accidents from this cause unless we would prohibit the getting on or off moving equipment, which is not practicable. We must always bear in mind that we are running a railroad and in any instructions issued, the efficiency as well as the safety of the operation must be considered. All train service work is dangerous but it can be done safely and efficiently if the proper method of doing it is determined.

There are certain underlying principles of action involved in performing the duty of getting on or off moving equipment which if properly brought out and instruction and demonstration given will do much towards eliminating this type of accident. Demonstration would probably give you a better understanding of what I am about to say, but as that is not possible, I trust I will be able to make my meaning clear with words.

The principle thing to be remembered when boarding a moving car or locomotive is that the body must leave the ground from the ball of the foot and never from the heel. In order to do this the man must either face the equipment to be boarded or the direction in which it is moving to avoid any twisting motion to the ankle, leg or hip.

In making what is commonly known as a "standing jump" and by that I mean facing the direction opposite to that in which the car or engine is moving, the employee encounters the greatest hazard. Boarding cars in this manner can be done safely under certain conditions, such as, when the step to be mounted is inside the outside line of the car or the grab iron is ahead of the step. To get on the front end of a freight car in this manner should be prohibited because the foot is on the step before a hold is secured on the grab iron.

Boarding the footboard of an engine or tender when it is on the rear of the movement invites the use of more improper methods than that of boarding cars. It is well to remember that a "standing jump" should not be attempted to the footboard of the pilot under such conditions, because when such a method is used the body is turned on the heel of the foot which often results in a twist of the ankle, knee or hip of more or less degree. The proper way to board this footboard is to face the

direction the engine is moving, put body in motion, take hold of the grab iron and step to the footboard with the near foot.

It is positively wrong to use the vertical grab iron on the corner of a high tender, equipped with an end sill and attempt a "standing jump" from the inter-track space to the footboard.

First—Because you cannot see the board to which you are about to jump or it's condition.

Second—The speed of the engine will whip the body around the corner of the tender which makes uncertain the placing of the foot safely on the footboard, and,

Third—If any other trainmen are already on the footboard there may not be room there for you or you may come violently in contact with them which might result in injury to either one or both.

When making a "standing jump" by using this grab iron, use the sill stirrup on the side of the tender then step around to the footboard. Otherwise, when mounting this footboard, face the direction the engine is moving, put the body in motion, use the hand rail on the end sill and step to the footboard with the near foot.

In getting off of the footboard of an engine or tender always get off at the end and step direct to the ground. To step off the back of the footboard, either standing or moving, invites injury if you fail to get your foot firmly placed on a tie, or the surface of the ground is uneven or slippery.

Getting on or off moving cars or engines, especially after night when a man cannot be reasonably sure where he might be stepping, is one phase of this problem hard to overcome, and the only solution I have to offer is that this act be limited to those employees only whose duties require it and then only when absolutely necessary for the proper performance of such duty. Getting on or off moving equipment when unnecessary for the proper performance of duty should be discouraged, however, as my studies of this subject indicate a large majority of these accidents occur getting on or off standing cars or locomotives or those moving less than three miles per hour; herein lies the largest field for our efforts to reduce the number of injuries from this cause.

The average train service man does not perform his duties wrong because it is wrong. He usually performs them the way he was taught and the way he has been doing them all his railroad career. That is why when he meets with an accident he is unable to explain how it happened, and it is the duty of every train service supervisor to study and observe the methods employed and correct any derelictions detected before an accident happens.

In conclusion, it is my judgment, as a result of past studies and experiences, too much effort cannot be put forth to determine in detail, at the investigation, just HOW the injured man got on or off at the time of his injury in order to develop any improper moves on his part that might have contributed to it and issue the proper instructions to him and all other employees subject to this hazard.

In the absence of facilities for practical demonstration I have tried to convey to you with words the results of my studies of this problem and some of the causes of personal injuries to train service employees while getting on or off locomotives or cars that to my knowledge are not covered by specific instructions on any railroad. Some day I hope to see them covered completely. I trust I have been able to make my meaning clear to you and I thank you for your kind attention.

VICE CHAIRMAN BOOTH: I think this is perhaps one of the most important subjects we have to discuss. I remember back 30 or 35 years ago in the designing business they paid strict attention to grab bars and hand holds and ladders and foot holds, and even in those days we used to say, "Is it safe?" But since that time the Interstate Commerce Commission and the American Railway Association have come into being, and they are very strict about requiring that these things be

examined from time to time, and the method of getting on and off as Mr. Neff explained it to you has certainly been a revelation.

MR. COLLEY (Chicago, West Pullman and Southern Railroad): We have found that illuminating the foot boards on locomotives in terminals has been a big help in reducing hazards in foot and other injuries.

H. A. PARISH (Chicago and North Western Railway Company, Chicago): May I ask if you have specific instructions on The Pennsylvania Lines that prohibit an engineman or brakeman from getting off an engine when facing outward?

MR. NEFF: Yes, we have specific instructions on that.

MR. PARISH: In the event a trainman or engineman has to get down on the engine to take orders from the hook, do you permit that?

MR. NEFF: He might get one foot down, that is all.

MR. PARISH: Do you recall what the instructions state in regard to that? Is he to get out on the gangway of the engine and on the step?

MR. NEFF: We don't have such a condition. The man can stay in the gangway and reach the hook.

MR. PARISH: Do you have the ladder on the back of tanks in the center of the tank or on the side to the right?

MR. NEFF: Just slightly to the right of the drawhead looking toward the tank.

MR. PARISH: Do your men have to climb up on the beam and walk over to the ladder, or is the ladder close enough to the end of the tank so that they can get up on the step and reach it?

MR. NEFF: They have to get up on the end sill to get over to the ladder.

MR. PARISH: Have you had accidents in the winter by reason of men walking over and holding on with one hand?

MR. NEFF: No, we haven't had any, to my knowledge.

MR. PARISH: But you do have a positive and definite rule that a man cannot get off an engine facing the opposite direction?

MR. NEFF: Not a rule, but special instructions. It will be a rule some day.

MR. PARISH: On the Pennsylvania lines, do you permit men to get on the leading foot board of an engine in the direction of movement?

MR. NEFF: No, sir, not stepping from the track. In one or two places we permit one man to ride there on instructions to superintendents. The rest of the places it is taboo; nobody rides on the front foot board.

VICE CHAIRMAN BOOTH: Thank you for calling attention to those various things, Mr. Parish. It is a very live question.

We will pass on to the subject to be presented by Mr. W. F. Esch, of the Chicago, Milwaukee, St. Paul and Pacific Railroad, Milwaukee.

Struck or Run Over by Engines or Cars

By W. F. ESCH

District Safety Inspector, Chicago, Milwaukee, St. Paul and Pacific Railroad, Milwaukee, Wis.

What is safety anyhow? Let's see just how we shall define it. Safety is the state of being safe—of being free from physical injury. In its broader sense it is simply a condition whereby men live longer and suffer less. It is a protection—security. It means immunity from accidental mishap. It means human conservation.

But you say, the law of self preservation is as old as the world itself. Then why this continuous campaign for accident prevention? Why must we appeal to our employees to stay alive?

In spite of this well recognized law of self preservation a large number of homes were darkened for all time through accidents of the class "Struck and Run Over by Engines or Cars." That fact, it seems to me, partially answers these questions

and furnishes ample inspiration for continuing this work with all our energies; and that is why I am talking to you today relative to this class of accidents which are caused by carelessness and rule violations.

The problem of safety is universal. It should be shared by every official and every employee on the railroad. It is one of the most important problems of the officials, just as it is one of the most important problems of each individual. It is everybody's business to stop these unnecessary accidents so that they shall not be repeated. It is everybody's task to protect his own life and the life of his fellow-man as far as he is able. And it is everyone's duty to voluntarily accept his share of responsibility in working for the safety of himself and others, therefore let us give this subject due consideration.

Undue skepticism is a direful complaint. It leads nowhere and is frequently the cause of failure to attain that which is uppermost in the minds of us all—the prevention of accidents. Golden opportunities are constantly presented to those whose minds are not confused by doubt. You have often heard the statement that as long as we have railroads we are going to have accidents. It is the statement of the skeptic. Do not permit the skeptic to dissuade you from gathering the true facts relative to the class of accidents covered by the subject "Struck and Run Over by Engines or Cars." We cannot get away from facts. Bitter as their logic may be, we must accept them as part of the law of the universe.

If I have learned anything at all from long years of safety work it is the fact that accidents do not just happen, that in nearly every case they are caused by acts or omissions of human beings. If this is true, the conditions under which we suffer accidental mishap, it would seem, could be corrected by warning of the dangers involved and remedying the conditions which lead to human destruction.

When a surgeon finds a case which calls for immediate action, he does not hesitate. He uses the knife because he realizes that it is the only action that can save the patient. Some railroads, I believe, are now facing this same situation. Perhaps many of them are loaded down with these unfortunate accidents which are millstones around the neck of every supervising official. Recovery is possible by seeing that all employees are properly instructed relative to the importance of complying with the rules. There is really only one thing to do. Act as the surgeon would. Use the knife. Education. Cut yourself loose from the heavy load that is bearing you down, and apply safety education in an effort to stop the loss of life and limb.

Accidents due to being struck and run over by engines or cars may be classified as follows:

Caught between engine or car and switch lever or stand while operating switch.
Struck by cars while coupling or uncoupling air hose, steam hose and safety chains without proper protection.

Falling from and being struck by cars while operating hand brakes.

Coupling or uncoupling engines or cars, caused while adjusting drawbars or knuckles by hand or foot while cars are in motion.

Stumbling, slipping and falling also contributes to this class of accidents due to wearing improper clothing.

Crossing tracks closely in front of moving engines or cars is often the cause for this class of accidents.

Walking along, crossing over and working on tracks without looking in both directions to see that there are no engines or cars approaching often result in very serious accidents.

Employees not using the designated crossings going to and from work are often struck by moving equipment.

Keeping the yards and terminals free from all foreign material which may cause an employee to fall over the same and under moving equipment.

Keep a safe distance from moving equipment to avoid injury from falling objects or projections on engines or cars.

Place cinders on the leads in yards and terminals during the winter months to keep employees from slipping and falling into moving equipment.

Require employees to dress in such manner as not to interfere with proper vision and hearing nor prevent the free use of hands and feet.

Why do human beings learn nothing from the experience of others and little from their own experience? Probably some do not care to pay attention and prefer working mechanically. The trouble with a great many employees is that they tire of doing the same thing over and over day after day and to obtain relief from the monotony they let their minds wander. Occasionally during one of those spells of mental relaxation they awaken to their sorrow in a hospital with a painful and serious injury. Some never awaken.

Many employees are like the reed driven by the wind, like the chip afloat on a stream with no directing will of its own, always full of alibis and ever ready to blame others for their shortcomings.

Few of us realize that we still have that magic power which is always active in youth. It has been truly said, "Every child is a genius and every genius a child." It is will-power that starts us working in an effort to prevent accidents which fall in this class. When will-power weakens, these unnecessary accidents occur and we float along with those who have strayed from the safe course. These accidents can be prevented by education, by stimulating the will-power, by converting the skeptic.

I well imagine that if Commander Byrd was asked to give the outstanding reason for the success of his polar flight he would promptly answer, "Preparedness." It was a consideration in every one of a thousand details before he ever sailed from New York. It was the anticipation of every possible hazard that might have meant failure.

This same spirit of preparedness, this same self discipline, which plays such an important part in safety, should play an equally major role in the daily conduct of each of us to insure our personal security, our freedom from accidents. We should all plan to reach the objective of solving the problem we have before us this afternoon.

Certain instincts of danger are pretty well defined in every one of us. We know, for example, that if we walk across a number of tracks in a busy yard without looking in both directions, we will be struck and run over by moving equipment. We know pretty well what will happen if we should walk down a main line track in between the rails. Such instincts are natural. They are a part of us. They are basic.

The trouble is that most of us fail to consider those dangers which, although not so apparent, may be equally disastrous. We become calloused. We ease up on our self discipline. Our mental processes become mechanical and we ignore risks on the ground at which we would shudder on a moving engine or car.

If we are to avoid this class of accidents we must train our minds to make calm analysis of every act where possible danger is involved. This is a very important problem in train operation. The motivating power must come from within—not from without.

The great majority of us look both ways before we start across the tracks. Why? We have trained ourselves to do this. Unfortunately, many employees have not so trained themselves. Those are the cases we receive a report on and very often read about in the daily papers.

After all, there is nothing experimental in this matter of self-discipline. It has been practiced on the Milwaukee Road with surprising, almost unbelievable results, and the safety bureau has done remarkably well in this task of training all employees to train themselves.

The great loss of human life and the toll of suffering among surviving victims is a concern of grave importance. This subject of safety is one of vital importance to all employees and touches upon their well being. As such it calls for action and

cooperation in eliminating dangerous conditions and unsafe practices because you owe it to yourself, your fellow employee and your family.

Customs change slowly. I know a few meetings and a few speeches will not revolutionize local opinion. Safety demands never-ending activity. That is why it is necessary to keep saying it over and over again—to present the picture in constantly changing colors and new frames. The seed takes root slowly and without apparent progress. Men's habits must change as a condition precedent to the flowering of safety. These specific evidences of progress that I have mentioned show that we are slowly uprooting the ancient fallacy that accidents are fore-ordained. They indicate that at last we are reaching men's minds and men's hearts. In fact we are breaking the manacles of habit.

VICE CHAIRMAN BOOTH: Thank you, Mr. Esch, for your valuable paper.

I see Mr. Phillips in the audience. I am going to call on him to say a few words. I am sure we are all delighted to see him here.

D. G. PHILLIPS: Mr. Chairman, Ladies and Gentlemen: We have been talking about supervision and about discipline. Now, fellows, those are two things that we want to go into pretty thoroughly before we do too much talking, before we give our superintendents too much advice. To begin with, here is what supervision is: it is that course of action on the part of a supervising official that gets the men under him to do what he wants them to do. I don't care how he does it, if he gets it done that is supervision. Now, don't think for one moment you can lay down any hard and fast rule as to how a man shall exercise supervision. No two men can supervise exactly alike and get the desired results. Each man should supervise in that way in which he is the most effective.

On the Wabash Railroad we had two superintendents who had the two best records on that railroad. Their methods were absolutely opposed to each other. If one superintendent found a man shoving over a drawbar, he went up to him and slapped him on the shoulder and he said, "Bill, what in the dickens are you trying to do? If you want your foot cut off come out to the yard and I will take an axe and cut it off," and he talked to the men in that way and got away with it. The men quit shoving drawbars.

The other superintendent, if he saw a man doing that, went up to him and said, "John, do you want to work for the Wabash Railroad? If you do, don't you ever let me catch you doing that again because if I do, you are at least going to take a vacation." He got the same results as the other fellow. On both of those divisions the practice of shoving over drawbars was absolutely stopped by those men in about the same length of time, by methods that were absolutely different. So don't give your superintendent too much advice about how he ought to supervise. He knows that a whole lot better than you. Leave the job up to him. The thing you have got to do is to tell your superintendent on what ought to be done, and I will guarantee that he will do it.

Now, I want to say a word on this last subject that has been discussed here, being struck by engines and cars. Yesterday Tom Carrow called our attention to the fact that there was a discrepancy in the ratio in which we had reduced our fatalities with the ratio in which we had reduced our injuries. Now, if you want to square that ratio, I know of no better way to do it than to go into that field where they are trying to prevent men being killed on account of being struck by engines and cars, because in 1930, 440 railroad employees were killed on that one account. Almost half of the fatalities on the railroads of the United States were men killed doing something they ought not to do and something that can be easily stopped, and if we want to square that ratio, let's turn our attention to that field at once.

Now, I am going to tell you what we are going to do on the Wabash, because I don't want you to think for one minute that because the position of safety superintendent had ceased to exist on that railroad, there is going to be any let-up in safety work on that railroad.

We outlined a program relative to the use of railroad tracks, realizing that one-half of the employees being killed were being killed because of the improper use of tracks. Now, here are the four things that I outlined, and we were taking them up in order and making a special campaign on each of them, one at a time; that is, while the supervising official was not supposed to overlook the other things, we specialized on one thing at a time.

First, in crossing tracks, never step on the rail, step over.

Second, when necessary to cross tracks, never pass within less than ten feet of the end of a car standing on that track.

Third, never walk on the track or follow a track when possible to walk some place else.

Fourth, never step on a railroad track without first looking in both directions.

If we can get our employees to observe those four things, over 400 of the 440 fatalities will be eliminated.

We have now finished that first campaign. We find our men no longer step on the rail. They always step over it. We are patting them on the back, we are telling them, "Well done," and we are going on to the next thing, passing too close to the end of a car. We are going to finish those four in order and we are going to put them over.

I want to say to you, as I said a moment ago, if you go to your railroad and take up those four things, make them a definite program, and I would suggest you take them one at a time and in the order I mentioned, in less than a year you will have almost entirely eliminated fatalities on account of being struck by engines or cars.

VICE CHAIRMAN BOOTH: It has always been a delight to have Mr. Phillips with us. Is there any further discussion, gentlemen? We are under the heading of general discussion. If there is no discussion, I would be glad to entertain remarks by any speaker.

C. F. LARSON (Missouri Pacific Railroad Company, St. Louis, Mo.): Since we have no specific speaker, I should like to have my assistant, Mr. W. H. Mooney, relate an accident which occurred recently on the Missouri Pacific Railroad. It was a unique accident, there has never been another like it to my knowledge, and maybe he can tell you something that will prevent others having the same thing happen.

W. H. MOONEY (Missouri Pacific Railroad Company): Mr. Chairman and Gentlemen: The accident referred to by Mr. Larson was the explosion of a flagging equipment case.

The brakeman involved took his flagging case, got up on the steps of the rear car, and set it down on the platform, and as far as he knew the world came to an end then. It exploded with such force as to bend the diaphragm of the Pullman car, blow off a hand hold, and break all the glass in that end of the car, and the man involved sustained severe injuries to his hand, two fingers and the thumb were taken off, there was a cut across his face and lip and a cut on his head. His legs from the knees down, where particles had struck him, looked like he had the measles.

This man was an extra man. The case was a case used as extra equipment and was kept at Little Rock, Arkansas. The man went in to Texarkana on train No. 3 with this box which he had examined himself before going out on the trip. He had had no occasion to use it. Then he went out on train No. 8 and he got this box and looked at it superficially to see that it contained the proper flagging equipment, and then he took it over to the train and got on, at which time the explosion occurred.

There was some thought that the man might have had some enemies. That didn't develop to be true.

Our flagging equipment cases are something on this order. (Drawing on blackboard). Here is the case for the flag, the end of the flag sticks out there; this is the box for the torpedoes. We have three compartments here on either side of the case for the fuses. After the accident I got hold of some old used cases. I found

this partition here is wood, and I found, too, that this wooden partition in many of the old cases was either cracked, broken, or completely gone, permitting the fuses to rest on the torpedoes, some with the point down and some with the head down, as the case may be.

We thought possibly some of the fuses had pierced the torpedoes, causing the explosion. I called on a man who is a specialist in dynamite, who runs the big Rockstone Quarry at Little Rock, and told him about this case, and he was under the impression that that did not cause the explosion, but he did tell us several interesting things. He said they had for 24 years used an iron tamper to tamp dynamite in the ground, with no serious results. After that length of time they had an explosion and four men were killed, and since then they have used wooden tampers. They use wooden knives to cut the dynamite stick.

But, he told us this: the explosive agency contained in the torpedoes, the nitroglycerine or ammonia nitrate, or whatever it might be, in getting overheated would leak and it was then in a dangerous condition and it would not improve when it cooled off. He said that when they received a shipment of dynamite that was discolored in the boxes, they wouldn't accept it. If the dynamite they had on hand showed indication of leaking, they buried it or destroyed it in some manner. He said that iron coming in contact with explosive agencies could cause an explosion. It might today and then wouldn't again for ten years. That is the reason they quit using the iron tamper.

He was under the impression that some of the torpedoes had been old, age giving the same effect as heat, or that they had become heated, allowing some of the explosive agencies to leak out on the outside of the torpedoes, and possibly the point of the fuse scraped that, which, in his opinion, would cause an explosion.

Now, there is a place near Little Rock and near this man's quarry, where there is a bluff two hundred feet high. At the base is solid hard rock. I took one of these cases that had the partition out and put six fuses in there, point down, resting on the torpedoes, and I went to the edge of the bluff and dropped it, and no explosion occurred, and when we picked up the battered box we found some of the torpedoes bruised and mangled, and some of them were pierced by the point of the fuse, but not one of them had exploded.

Before we did that, we had tried throwing a case eight feet, ten feet and twenty feet. This brakeman had simply set it down. On our railroad we have them put the case on the rear platform. There is a shoulder strap here and a metal hand grip on this side, and the brakeman usually hangs it up with the strap over the rear end plate. He said he simply set it down without using the strap and as he set it down the explosion occurred.

We thought it might have possibly been a manufacturing defect, but the manufacturers had never heard of such an occurrence before. Mr. Larson thought it might be interesting for this group to know about it. If there is anything you would like to ask about it, I will be glad to explain it further if I can.

C. T. BAILEY (Oregon Short Lines Railroad, Salt Lake City, Utah): I would like to ask about the type of torpedo. Were you using the meteor type?

Mr. MOONEY: They were the square torpedoes with flat lead clips.

Mr. BAILEY: That isn't the meteor type. They have wire clips. We tried out the meteor torpedoes a while back for greater intensity of sound, and our Mechanical Department and Stores Department objected to stocking them for the reason that they had hung up one of those cases, an engine kit, in the engineer's supply house, over a steam pipe, the temperature was about 130 degrees and one night the supply man came into the house and found where it had taken fire. They attributed it to the type of torpedo used, and as a result we discontinued their use. In fact, we were just making tests with them to satisfy the request for a louder torpedo. I just wondered if it was that type.

H. A. PARISH (Chicago and North Western Railway Company, Chicago): Were all the fuses damaged and had all the torpedoes exploded?

Mr. MOONEY: The case was a mangled piece of tin, and we didn't find any torpedoes, and the brakeman figured there had probably been fifteen torpedoes.

Mr. HEAVEY (The Erie Railroad): Were they metal or pasteboard covered?

Mr. MOONEY: Tin.

Mr. HEAVEY: In our flagging can, as we call it, there is no wood in the receptacle, and we have the fuses with the points down at the bottom of the can and the torpedoes on top of that in a special receptacle for them. We had a condition in three cases, that I know of, which we didn't call an explosion. It seemed as though they caught fire and burned up, but didn't explode. We use a short tubular torpedo, I don't know just what kind of a metal it is, with lead covering.

The can is all blocked tin or metal with the flag receptacle on the outside. The flagman in both the engine and the train service keeps a piece of waste on top of the torpedoes to keep them in there securely. I think we had one case that was something along the line of what Mr. Bailey described. The can was hanging over the boiler head in a locomotive. It didn't create any trouble other than to destroy the can and its contents. There was no explosion; it just simply caught fire and burned up. The fuses burned up.

Mr. MOONEY: The one thing that concerned us especially was the effect on the morale of the flagmen. I happened to be there the day after this happened and the flagmen were all concerned about their equipment and in the next few days we issued more new cases than we had issued for six months. And when I was riding on a train, I saw the flagman get off to flag and he held his case as though he was afraid of the thing. It was something they had never heard of before.

Mr. BAILEY: As I understand it, this kit was an extra kit taken out of stock. Was the stock, as it was kept, in any location where there was extreme heat which would cause that generation of the torpedoes which might create a condition that would lead to an explosion?

Mr. MOONEY: No, there was no heat of any kind around, that is of an artificial nature, but it had been extremely hot down there for a month.

D. A. KLUMPH (Pere Marquette Railway Company, Grand Rapids, Mich.): Was an investigation made to determine, or did you know whether the fuses had previously become damp or had been wet and then dried out?

Mr. MOONEY: The point was brought up, but the brakeman didn't know when the fuses in this particular can had been issued.

F. HARTENSTEIN (The Lehigh Valley Railroad): Were the fuses set in this case point down toward the wooden partition so that when the case was set down, if it was set down hard or suddenly, they would go through and penetrate the torpedoes?

Mr. MOONEY: Most of the cases I looked at did have the fuses pointed down because if the points had been sticking up if they had had to get them out they would have injured their hands.

Mr. HARTENSTEIN: Did your investigation develop anything conclusive as to what caused the explosion?

Mr. MOONEY: No, sir. The nearest we came to it was what the dynamite man thought, and we rather believed him.

Mr. HARTENSTEIN: I don't believe it has anything to do with dynamite. If the case were set down hard and the point of a fuse pierced a torpedo and exploded it, the others in the case would naturally explode too.

Mr. MOONEY: The ones we dropped off the cliff penetrated the torpedoes and they didn't explode.

VICE CHAIRMAN BOOTH: Mr. Mooney, we thank you for this interesting explanation. I imagine the representatives of the different railroads here will go home and scrutinize their kits.

ADJOURNMENT

Thursday Morning Session
October 15, 1931

GEORGE H. WARFEL, Chairman
Union Pacific System, Omaha, Neb.

The fifth session of the Steam Railroad Section convened with General Chairman Warfel presiding.

CHAIRMAN WARFEL: No doubt many of you think we have passed the point of mechanical safety. If you are under that impression, I imagine you are going to have it dispelled this morning. You have seen many mechanical safeguards down in the Exhibit Hall. You may have a little doubt as to whether or not many of these mechanical safeguards are necessary. We are going to have a talk this morning on the subject, "Guarding Mechanical Equipment."

We have a man to discuss the subject who knows his stuff. I want to introduce Mr. W. D. Keefer, of the National Safety Council.

Guarding Mechanical Equipment

By W. DEAN KEEFER

Chief Engineer and Director, Industrial Division, National Safety Council,
Chicago

(Mr. Keefer exhibited and explained, as follows, twenty-five lantern slides, the original photographs of which may be borrowed any time upon request from the headquarters office of the Council-Editor.)

Slide No. 1 shows a special type of crane hook with which to lift the dome cover from a steam locomotive. The hook has a wide face that holds the dome cover in a rigid position and keeps it from tilting too much to one side or the other.

Slide No. 2 shows a special rack for holding compressed air tools. This rack is especially convenient for the men in the tool room. It keeps the tools off the floor where they may be damaged or where they may create tripping hazards.

Slide No. 3 shows a special cradle for hoisting the air receiver into place on the side of a steam locomotive. The offset in the cradle makes it possible for the crane man to make a direct vertical pull in spite of the running board on the side of the locomotive. The spring link in the cradle eliminates the possibility of tearing the running board from its fastenings when the air receiver is hoisted into place.

Slide No. 4. A circular saw is one of the most dangerous machines operated in industry and every saw should have a well designed hood guard. If possible, the stock should be drawn into the saw with an automatic roll feed as illustrated in this slide.

Slide No. 5. If automatic roll feed cannot be adapted to a circular saw, a hood guard of the same general type as the one illustrated in this slide should be used to prevent kickback and also to prevent accidental contact between the operator and the saw blade.

Slide No. 6 shows several types of efficient guards for wood shapers.

Slide No. 7 shows a typical guard for a wood jointer.

Slide No. 8. Men operating grinding wheels should be required to wear goggles. Many companies also install glass screens as shown in this slide to protect the eyes of operators.

Slide No. 9. Illustrates the danger of trying to hold the work on a drill press by hand. Work should be clamped to the table.

Slide No. 10 illustrates two types of steel drums or barrels for storing materials in industrial plants. One type of drum has straight sides, preventing the danger of a worker having his fingers caught between two adjacent drums. The other type of drum is belled out in the middle so a worker's hand could not be pinched between two drums at their open ends.

Slide No. 11 shows a simple metal hand hook used by workers who have occasion to couple platform trucks equipped with the old style link and pin couplers.

Slide No. 12 illustrates a special type of hand truck which enables one man instead of two or three men to handle an air jack in a railroad shop.

Slide No. 13 shows an adjustable chip screen guard fastened to a vice to protect nearby workers from flying chips.

Slide No. 14 shows a special type of crane hook with a handle at the side and a safety latch.

Slide No. 15 was a picture of a crane cab in a railroad shop with the crane signals painted right on the side of the cab. This minimizes the possibility of misunderstanding between the crane operator and the men giving signals on the floor.

Slide No. 16 shows a special saddle for hoisting wheels and tires. The saddle has a lug at each end to keep the wheels and tires from falling off and to help keep the load properly balanced.

Slide No. 17. Steel floor plates are usually piled flat in vertical tiers. This slide shows the safer method of storing steel floor plates on edge with frequent vertical partitions so one or more plates can easily be removed without disturbing the others.

Slide No. 18 shows a special press and block arrangement for removing axles from wheels. The block is suspended from the ceiling with a pulley and counterweight arrangement.

Slide No. 19 shows the method used in one car shop to keep planks from falling from adjustable scaffold brackets.

Slide No. 20 illustrates a transfer truck for moving mounted wheels around the shop.

Slide No. 21 shows a well designed portable coupler for trucks, several of which may be moved at one time from one part of the shop to another.

Slide No. 22 shows pictures of two shops, one in which it is obvious that the principles of housekeeping have never been considered or applied; in the other, aisles are well marked and maintained and everything is in shipshape order. It usually is not difficult to tell something about the accident record of a shop simply by seeing how well the general housekeeping rules are enforced.

CHAIRMAN WARFEL: Gentlemen, I am sure we are all very much indebted to Mr. Keefer, first for his collecting these slides, and for his interesting and instructive talk in connection with them.

Any one of us knows, anyone who has given it any thought at all, that there is no collection of the best safety devices selected after all others had been rejected. The purpose of a talk such as this is to stimulate thoughts in the mind of each one of us as to how the situation can be improved on our own property. You see a coupler, you see a buggy, you see a guard, and some of you will say, "I saw one somewhere that I think is better than that." That is fine. Send the picture of your device in to the National Safety Council. If you will send Dean Keefer the pictures of these things that are being used on your road which you think are interesting, one of these days we will have that collection of the best safety devices that have been produced.

I am going to ask Mr. Beatty to introduce the next speaker. And now, Mr. Secretary, will you take the chair?

(Mr. J. L. Walsh assumed the chair.)

D. H. BEATTY (Southern Railway System, Birmingham, Ala.): Mr. Chairman, Members of the Convention: I appreciate the opportunity of introducing the next speaker. Early this year the National Safety Council awarded a certificate of commendation to Findlay Shop of the Southern Railway System for its record in freedom

from casualties. That shop up until February, 1931, had worked twenty-six months, and it had accumulated 6,900,000 man hours without a single reportable injury.

The man who will present the next paper is the master mechanic in charge of that unit of men while that record was being made. The record was not made, gentlemen, by any oratorical effort. The record was made, I believe, by close supervision, by well coordinated effort on the part of the supervisory forces, doubly encouraged by the enthusiasm and fervor that certainly existed throughout that entire shop organization.

It is, therefore, a pleasure to introduce to you Mr. C. G. Goff, Master Mechanic, Findlay Shop of the Southern Railway System.

The Motive Power Department's Responsibility in Accident Prevention

By C. G. GOFF

Master Mechanic, Southern Railway Company, Birmingham, Ala.

Perhaps no other department has a greater responsibility in the prevention of all classes, types and kinds of accidents that ordinarily occur in the operation of the modern railroad than does the mechanical—or motive power—department; for within the scope of its operations and in the performance of its product in service occur practically every type and kind of hazard that befalls the transportation industry, and therefore not only must the employees of this department be on guard at all times against accident to themselves and associated employees, but they must also be constantly alert to the dangers of neglect of duty in the preparation of locomotives or other equipment for service on the line or elsewhere.

Well might the motive power department be considered as the heart of the operating department, for upon it rests the responsibility for furnishing throughout the arteries and veins of the railroad the power upon which it must depend for safe and dependable transportation; and therefore upon the success of this accomplishment depends not only the safety of the lives of passengers, employees and the public, but also the safety of the traffic and equipment involved—to say nothing of the track, structures and other properties.

It may therefore be readily seen that in the conduct of the activities of this department there must be no failure of supervision or workmanship in the inspection, testing or preparation of equipment for service, and if the department is to successfully discharge its responsibility every one concerned, from the highest executive to the most common laborer, must realize and appreciate this fact, and failures to either successfully assume or discharge this obligation and duty cannot be overlooked or tolerated.

While it may be true that safety, or organized accident prevention, was more or less neglected or overlooked altogether for a period of more than three-quarters of a century in the earlier operation of our railroads, it cannot be denied that within the past twenty or more years this most vital phase of operation and education has been generally recognized and actively prosecuted. It would therefore seem to us that it is indeed time there should be more graduates from the kindergarten and intermediate grades of self-protection and accident prevention to the higher and more accomplished degrees of safe, dependable and reliable supervision and workmanship, for a close analysis of accidents and injuries will oft-times reveal that apparently not even the primary principles of accident and personal injury prevention have been learned or else they have either been carelessly or negligently overlooked or disregarded; and

this is especially true in the case of the older employees, some of whom have been in the service for even more than twenty years.

It would also seem that twenty years or more would be long enough, with the facilities and opportunities afforded for a liberal education in accident prevention, for even the most backward student to have graduated from the evils and dangers of bad practices, careless, negligent or inefficient conduct; and to those who have enjoyed these opportunities and failed to take advantage of them there is no more important or more necessary time than the present to awaken to a full realization of this responsibility and duty which we owe to ourselves, our families, our neighbors and to our employers. It is therefore toward the bringing of the older employee to a more dependable realization of his responsibility in accident prevention, and the careful selection and training of all employees, that we must direct our efforts in the making of further progress in personal injury and accident prevention.

Before any successful accident record may be accomplished it is first necessary that such a desire exist within the heart and mind of the executive, and this desire must be enthusiastically transmitted and demonstrated throughout the entire organization until it is shared alike by each individual employee. Safety work, involving as it does the very life-blood of human beings, the dependency of families, the happiness of homes and the economic success of both individuals and industry itself, cannot be relegated to a position or item of purely cold-blooded business, but must ever be inspired by that humanitarian and moral principle that we are indeed our "Brother's Keeper."

When Safety is a Vital Factor

After it has been definitely determined that accident prevention must be a vital and necessary part of all operations and embodied as a principle and rule of conduct it is then necessary that the accident frequency and severity be determined, arranged and kept progressively by system, by group of shops, by individual shop, by department and sub-department, by supervisory foremen and individual employee, and all failures or successful accomplishments should be promptly and appropriately recognized or handled.

On our own railroad a system-wide safety contest is conducted on an annual basis, with appropriate trophies awarded by the management to the most successful units in accident prevention; and we are happy to say that not only has Finley Shop, which we have the honor to represent, won the trophy in competition with other shops for the past two years, but it has also been honored by recognition and a certificate of commendation by the National Safety Council.

Our shop safety organization, or committee, consists of a representative from each department or from each class of service, and monthly meetings are held for the discussion of unsafe conditions and practices, and for the betterment generally of working conditions. Each safety committeeman makes daily and constant inspection and observations to detect unsafe physical conditions, defective tools, equipment or facilities and improper or unsafe practices; and when same are observed is authorized to take immediate and necessary action to insure correction or to handle same with officer in charge.

Absolute harmony must at all times exist between supervisory officers and safety representatives, and each item or suggestion should receive not only careful but friendly and considerate attention. Every accident and injury, regardless of how slight, is immediately investigated and appropriate action taken to prevent recurrence. Each supervisor is held personally responsible for the safety of the employees under his jurisdiction, and any failure to keep his department in favorable standing on the comparative report is promptly handled,

and this contest spirit has proven very helpful in inspiring interest and enthusiasm.

In addition to the many other generally recognized and adopted rules and practices for the reduction of hazard and the promotion of safe practices, the following are mentioned as having from experience proven effective:—

Daily and constant inspection and observation for physical hazards and unsafe or improper practices, by supervisory forces and safety committeemen.

A daily report in writing from each foreman covering safety, fire, and housekeeping conditions in his department.

Safety made a vital part of all operations and discussed at all staff and supervisory meetings.

A weekly inspection made of every department by the entire supervisory staff to determine safety, sanitary and housekeeping conditions.

The placing of older employees in positions most free from hazards.

Appropriately worded danger signs for use while working on steam lines, cranes or other positions of hazard where other employees might cause injury by opening valve, starting machinery, etc.

Cables, chains and cranes periodically inspected, and all chains periodically and regularly annealed and inspected.

Mechanic apprentices attending regular monthly safety meetings.

Maintaining of safety bulletin boards in clean, fresh and attractive condition.

Keeping warning signs and signals in proper condition with color fresh and visible.

Prompt handling and posting of all bulletins, posters, circulars, comparative standings and other literature and instruction received from system safety department and other sources.

Preparation and posting of safety bulletins, slogans, etc., originated locally and by employees of the shop.

Good Housekeeping Important

Good housekeeping conditions throughout the entire plant are an absolute requirement, and the providing of safe, sanitary, wholesome and attractive working conditions is as essential to successful safety promotion and accident prevention as is any other one thing, for it has been demonstrated that the accident prevention record may often be determined by conditions existing in the "back yard or wash room." Goldfish and trout pools, American beauty roses, chrysanthemums and landscape gardening may seem out of place in a railroad shop, but from experience they are recommended as affording at least a change of scenery from the well remembered mud hole, scrap pile and weed patch.

As to the safety record of Finley Shop, the best that we have so far been able to do was during the period from December 19, 1928, to February 19, 1931, during which time we worked 6,802,859 man-hours without an injury reportable to the Interstate Commerce Commission; however, we are hoping to improve this record in the future.

Like many of the other old timers of the pre-safety movement days, we too were not "so hot" for safety ourselves when, through the activities of the safety department, gear wheels were being guarded, scrap iron was being moved, materials and tools were being properly inspected and stored, and the safety doctrine was being preached in every nook and corner of the shop. However, after witnessing the blessings that it has brought, the friendly and cooperative

feeling between management and employee that has resulted, the increase in production, the increased efficiency in operation, and the economic savings effected, we are forced to admit our conversion to the fact that "Safety is of first importance in the discharge of duty, and cooperation is essential to success."

Discussion

CHAIRMAN WALSH: We thank you, Mr. Goff, for your paper. Anyone who has made a record such as you have in the Mechanical Department is certainly competent to tell us how to do it.

We will hold the meeting open for a discussion of this paper if you care to discuss it now.

THOMAS H. CARROW (The Pennsylvania Railroad, Philadelphia, Pa.): Mr. Goff, I am sure all of us want to know more about this very excellent record, and we can tell from the way your paper reads that it is a real honest achievement. Now, I would like to know what part discipline played in this thing.

MR. GOFF: That depended upon the circumstances. We applied discipline where it was necessary, but as someone stated here yesterday, there are times when discipline does more harm than good. It depends altogether on the circumstances surrounding each case. Every case is investigated and where we find we have an employee who is continually getting hurt and who doesn't live up to the safety rules, we apply discipline, but where we can, we try to avoid that. I think we get better results without it.

MR. CARROW: Have you any figures, either in your mind or on record, of the number of less than three-day cases?

MR. GOFF: I haven't any in mind. I think possibly they would run eight or ten a month.

MR. CARROW: You don't have any figures in your mind as to the number of first aid cases, have you?

MR. GOFF: I imagine we have about twelve minor injuries a month. Some of them don't lose any time at all. Some lose three hours, a half a day, or two days.

MR. CARROW: How many employees do you have?

MR. GOFF: At the time the record was made, we had an average of 1500.

MR. CARROW: You would judge that you had from fifteen to thirty less than three-day accidents a month?

MR. GOFF: I judge they would average around twelve or fifteen a month; that is minor injuries, less than three days.

MR. CARROW: Did you investigate those?

MR. GOFF: Every case is investigated by the Safety Committeemen and by the foreman in charge and by myself.

MR. CARROW: What proportion of those would you say resulted in recorded discipline?

MR. GOFF: The percentage is not very high. I would say two per cent or something like that.

MR. CARROW: Our experience has been that out of a hundred first aid cases, less than three-day cases, that is all sorts of accidents, at least 80 per cent of them—and that is a conservative figure—are due to the violation of some rule.

MR. GOFF: It is not altogether due to a violation of some rule. It is just a case of the employee being injured carelessly in that way.

MR. CARROW: In other words, to make my point clear and to get your experience, should we understand that out of, say, fifty cases which you would investigate, you would hold the employee responsible for approximately 35 or 40? Now, what would be the nature of that responsibility? Would you record it on anything other than the discipline record?

MR. GOFF: We keep an individual record of each employee and where we have any serious trouble of any kind, we make a note on his record.

MR. CARROW: That is what some people call a personal record and it is kept in

addition to the discipline record. If you had an employee who was injured today, what reference would you have to find out whether or not he is a repeater?

Mr. Goff: We keep an individual record of the persons injured. I can go back for at least five years and check our record and see every person that has been injured in that time, the details of the injury, how it occurred, the time lost, and all about it.

Mr. CARROW: You mean you have the record opposite the man's name?

Mr. Goff: We keep a book record in alphabetical order. If you wanted to find how many times I had been injured, for instance, you would take the personal records and turn to my name and then go back in the files and dig up everything that has occurred to me as far as personal injuries are concerned. You could find it for a period of at least five years.

C. W. HAMMOND (New York Central Lines, New York City): I think perhaps I might have misunderstood Mr. Goff, but I would like to have him explain this daily report that these departmental foremen make out.

Mr. Goff: We have a mimeographed form that is given to the departmental foreman in every department. The foremen go around the shop in the afternoon, after the whistle blows, and they make a check of any condition that might affect the safety of the men in the shop, as to fire or anything of importance, and they make a note on this form as to whether or not they find any bad condition and what it is. These forms are then turned in the first thing in the morning.

Percentage of Three-Day Injuries

CHAIRMAN WALSH: I would like to ask Mr. Goff how many of the twelve or fifteen non-reportable injuries he has in the month cause the loss of three full days.

Mr. Goff: That is a pretty hard question to answer offhand, but the percentage of the three-day accidents is pretty low. I don't suppose we average more than one or two a month.

C. E. HILL (New York Central Lines, New York City): Now, with some 1500 employees, as I understand it, you have an average of from twelve to fifteen injuries per month, that is non-reportable injuries. Do you have a first aid station in your shop?

Mr. Goff: We have a first aid cabinet and we have a few men in the shop, who are mechanics themselves, who can administer first aid if necessary.

Mr. HILL: Then, if an employee sustains an injury—and when we say an injury we mean a scratched finger, a splinter in the finger, dust in the eye, or anything of that sort—in the first place you don't have a first aid nurse and the foreman or someone in that locality will take care of that.

Mr. Goff: Yes, someone who has the key to the first aid cabinet.

Mr. HILL: Then are those slight cases of splinters or scratches that don't result in lacerations included in those twelve or fifteen?

Mr. Goff: The only ones included are the ones that go to the doctor. If it is a scratch or something like that that doesn't amount to anything, we wouldn't make a note of it, but we would just put some mercurochrome on to be on the safe side.

Mr. HEAVEY (The Erie Railroad): I wonder if you could give us the percentage of minor eye injuries in those minor injuries you referred to.

Mr. Goff: Well, the eye injuries run heavy. In fact, we have more eye injuries than any other kind.

Mr. HEAVEY: If your first aid man in the shop is successful in removing the foreign substance, do you require the individual to go to the doctor anyway?

Mr. Goff: Yes, we don't take a chance on the eyes.

CHAIRMAN WALSH: We will have to defer further discussion until we come to general discussion on the program.

The next subject is "The Store Department's Responsibility in Accident Prevention."

It is with pleasure that I introduce to you Mr. C. L. Wakeman, of the Wabash, formerly of the Union Pacific.

The Stores Department's Responsibility in Accident Prevention

By C. L. WAKEMAN

General Storekeeper, Wabash Railway Company, St. Louis, Mo.

Records reveal that 96,000 persons were killed in accidents, and 6,000,000 additional injured in this country last year. Just think of it! If a whole city of 100,000 souls were to be wiped out, the world would be horrified and the event mourned all over the face of the globe.

The fatal and other accidents we hear about are accepted as passing information, except it be when our friends or acquaintances are among the unfortunates. If the causes for the accidents last year were classified, at least 85 per cent would be attributed to carelessness and unsafe practices and conditions.

The sad and serious aspect of the situation is that the numbers killed and injured keep increasing each year.

Accidents and injuries on railroads—which are the daddy of the slogan "Safety First"—are decreasing. It is obvious that the application of any principle or method gains in effectiveness if it is done in accordance with recorded results and experience.

A review of Interstate Commerce Commission table of non-train accidents to railroad employees on duty reveals a reduction of 77.6 per cent from 1923 to 1930, which is certainly gratifying.

The I. C. C. table mentioned, includes non-train accidents to employees in all departments. It can properly and justly be stated that the Stores Department through their efforts in accident prevention work, direct and indirect, have played a part in making such a reduction in accidents possible.

The Stores Department was established to provide a means whereby its activities are placed in the hands of specialists to govern the ordering, destination inspection, storing, distributing and disbursing of all materials, tools and supplies, and operate scrap and reclamation plants.

In performing these functions—which requires an organization consisting of storekeepers, clerks, foremen, mechanics, chauffeurs, truckers, laborers, forces to operate cranes, other material handling devices, automotive equipments, supply trains, etc.—the stores department work is just as hazardous on an average as in any other field of railroading. The opportunity for preventing accidents and displaying efforts in removing causes for accidents is just as great as any class of railroad employees, and in some respects more so, as the Stores Department is primarily a department that serves and contacts personnel and activities of all departments.

The success in any worthy undertaking may properly be measured in terms of right motives, hard work, diligence, application of useful knowledge gained, and persistency.

No safety record was ever established by luck; instead, by controlling or preventing accidents before they happen, by removing the cause through effective and well directed efforts.

The responsibility of the railroad Stores Department in accident prevention is in direct proportion to the activities displayed in safety work by influence and example, and inculcating in stores department employees and others the habit of being safety minded.

Safety rules, instructions and regulations to cover practically every activity in stores department operation have been prepared by committees of the American Railroad Association, Purchases and Stores Division. These are simply recorded experiences. They have produced favorable results. We know we are still con-

fronted with the fact that avoidable accidents continue to happen in handling material and supplies.

Every department in railroad work can point to its special safety problems and also to the specific methods which have proved successful in attacking these.

Some of the injuries that were formerly the most prevalent have been reduced the most; such as eye injuries, due to the use of goggles; and stepping on nails and stumbling over obstacles, which have been practically eliminated account of proper policing of store houses, packing rooms and yards.

The Three Activities

Accident prevention falls naturally into three activities, namely:

Designing and installing protective devices and application of safety measures.

Educational propaganda which will make workers more careful of themselves and others.

And lastly, the collection of data which will show progress and indicate what hazards are most dangerous and determine where concentrated efforts should be put forth by supervision, disciplinary action, etc.

In respect to the first items, much good has been done through the careful designing of store houses, oil houses, ramps, elevators, etc.; building of concrete platforms and roads; the use of auto trucks, tractors and trailers to replace man drawn trucks for transporting material; the use of locomotive cranes with hooks and magnets for handling rail, piling, timber, ties and other heavy material, also scrap. The use of lift trucks and skids makes for the handling of material more safely in transporting and storing material, intershop delivery, for shipments to and from points along line, due to less handling. The use of skids has also been extended to shipments of material from manufacturing plants to railroad store houses.

All materials, and particularly heavy items such as rail and piling, are loaded with regard to their being handled safely at destination.

The rules and regulations prescribed by the Interstate Commerce Commission for the transportation of flammables, explosives and other dangerous articles, are followed by the Stores Department in handling, storing and shipping such commodities of company material to which it applies, and other employees taught to so handle when in their custody.

The Stores Department endeavors to furnish material and supplies of the proper size, quality, etc., for the purpose required. A great many items are purchased to conform with specifications, as to composition and otherwise, which does throw a very definite safeguard around inferior material getting into use. But when you consider 40,000 different items of material, tools and supplies, are used for maintaining railroad property, there is many a chance that defective and inferior material including tools, would get into use if it were not for the efforts of the Stores Department. This also applies to items manufactured and repaired or recovered from scrap at reclamation plants. Proper care is practiced and articles gauged, tested, and inspected insofar as necessary to provide material, including track tools, that will meet requirements, the same as in the mechanical department shops or in an outside manufacturing plant.

The supply train, operating on schedule dates, delivering material, tools and supplies to agents, sectionmen, signal maintainers, extra gangs, etc., is conducive to safety as it eliminates the extra handling of company material that would be necessary in packing and shipping. It picks up all defective or unsafe tools and replaces with safe tools. Also affords superintendents and other operating forces a splendid opportunity to contact line forces and observe conditions on the ground.

In considering educational propaganda and other agencies which will make

workers more careful of themselves and others, the old philosophy assumed that the worker was sufficiently skilled or careful to look out for himself and if he was injured because of negligence on his part or on the part of a fellow worker, the employer was not to blame. The first principle of accident prevention, therefore, is that of executive recognition, interest, support and participation.

The managements of our railroads have supervisors or superintendents of safety to cooperate with and coordinate the efforts of all departments in the safety movement. Superintendents of safety are filled with a conviction of the economic and humanitarian necessity for organized safety work, and his participation comes from a real desire to be of service to his fellow man. When a safety program or campaign has been carefully formulated he has to inoculate someone else with the idea. Chairmen of safety committees and members of committees are charged with the duty of carrying out these campaigns.

Committees of Representative Groups

The personnel of the Stores Department safety committees are composed of a representative group of all classes of labor and the members are rotated. These committees work in conjunction with division or terminal safety committees. Through the activities of these committees special attention and consideration have been given to problems that are peculiar to the Stores Department and the basic idea of rendering real service is stimulated in its members.

I have said before—and it is fundamental—that we learn and benefit from recorded results and experiences. A most interesting advertising medium is, employing bulletin boards, displaying cartoons, diagrams and pictures portraying in a startling and personal manner the need of caution, also placing on the board reports of injuries on the railroad, including the name, occupation and location of the injured, nature of injury, and cause. This has a tendency to prevent similar injuries.

In the Stores Department the foreman is the key man in accident prevention. The authority to issue an order involves the responsibility to see that it is properly executed, and those to whom he reports clearly have a right to demand of him that proper measures be taken to control accident-producing conditions.

It is hard to over-estimate the influence of early training and impressions. A lasting impression upon new employees is the pledge slips to be signed by the individual workers, as it makes them feel they have a definite part in producing safety for the company.

One of the paramount duties of a foreman is to select men that are physically and otherwise fitted to do the job to which they are assigned. Productive labor of any kind is generally mental and manual. Thought precedes action. No work should be performed mechanically and without thought. The answer is just this: The foreman should cause his men to think, and properly and effectively direct their efforts.

Statistically, a very impressive comparison is the relation between the cars loaded and unloaded and the reportable and other injuries. The Wabash Stores Department loaded and unloaded 16,000 cars during 1930—in other words 160 trains of 100 cars each—of company material, with only two reportable injuries. The scrap and reclamation plant has worked three years with no reportable injuries.

The thing that is important in preventing accident is human efforts, gladly and vigorously put forth. It will make "Safety First" more than a mere slogan. It will make safety a living, driving force for good in our every day life.

CHAIRMAN WALSH: Thank you, Mr. Wakeman.

"The Car Department's Responsibility in Accident Prevention" will be discussed by Mr. P. A. Summers, of the Atchison, Topeka and Santa Fé Railway.

The Car Department's Responsibility in Accident Prevention

By P. A. SUMMERS

General Car Foreman, A. T. & S. F. Railway, Dodge City, Kansas

This subject covers a lot of territory when we realize that it is up to the car department on all Steam Railroads to keep all the rolling stock, except locomotives, in a safe and serviceable condition; it is then easy to understand why the car department must necessarily play a very important part in the prevention of accidents; not to only prevent accidents to car department employees, but to employees in other branches of the railway and to the general public also. Our railroads have but one source of income whereby they may exist; that is, transportation of freight and passengers. The average Class 1 railroads own and control about 100,000 cars, including both freight and passenger. Therefore, quite a large percent of all steam railroad pay-rolls are paid to car department employees to keep these cars in a safe and serviceable condition, so the personnel of the car department of every railroad must bear in mind that their department is one of the largest, and unless they feel their full responsibility in the prevention of accidents, their individual road will never get anywhere in that endeavor.

You gentlemen will, no doubt, expect me to say something along the line of how we car department men try to keep the cars in a safe condition so they may be handled and operated with safety to all employees and to the general public, but I am not going to do very much of that as I do not feel it is needed nearly so much as it is to give you my opinion of why car department employees need mental training along safety lines while performing their duties if they are to do efficient work and turn out safe equipment. Get your men to fully realize their responsibility in prevention of accidents to themselves and others, and you will not need to worry much about their turning out work that will stand the test. We know that a defective car wheel, grab iron, sill step, draft gear, running board, air brake, and numerous other parts of cars are potential hazards, and if not properly maintained, may cause personal injuries or fatalities to others. It is not such a hard task to teach car department men to see these defects, but it does take some real effort on the part of the supervisor to train his men that they can and must perform their work without personal injury to themselves and fellow men; car men continually given proper training along these lines are going to turn out efficient work and safe cars for others to handle.

This brings me to the statement that I have quoted a great many times, which is: "The finest and best move railroads ever made toward accident prevention was when they woke up to the fact that the proper method to use is to check the matter up strictly to the foreman." In my opinion, that has done more toward reducing the number of accidents than any other one thing. No man is entitled to be called a "boss" or supervisor and draw the pay of same, unless he is an artist in his line of work; he must not only be endowed with ability to put art in his work, but he must be a teacher also. The average man from the time he becomes of age until he passes out of this life, is nothing more than a grown-up boy in need of constant teaching and coaching, and in my judgment the car department's responsibility in accident prevention lies solely with its teachers, who are supervisors.

I recall about five years ago the Santa Fe was having quite a number of car department injuries consisting of mashed fingers and hands, and in a few cases, the loss of these members; that were, in most cases, seemingly due to the careless or indifferent manner of replacing or exchanging truck springs under freight cars; in a few instances it was the jack under the car that failed, but in most cases the jack was improperly set, and slipped out while the truck springs were being taken out or replaced, there being no tripods or "horses" placed under the car to sustain the

weight when, or if, this happened. Of course, when an accident of this nature occurred, the foreman in charge would offer a great many alibis trying to prove to his superiors that the injury was unavoidable, but the last case of this kind of which I have knowledge was where a carman lost a hand when the jack slipped out, catching his hand between the truck bolster and spring seat. When the report of this accident reached our assistant to the vice-president, he immediately detailed instructions to the mechanical department heads, explaining how this could be and should have been prevented. The order he issued for future guidance contained but seven short words, and I have often thought that these seven words contained more real "Safety Scripture" than many speeches to which I have listened in Safety Meetings. These seven words were: "If this happens again, discharge the foreman." That was about five years ago, and I have not heard of any such cases since; which seems to me is substantial proof that foremen will get from their men just such a display of interest in accident prevention as the men find displayed by the foreman.

I can best tell you how the car department can prevent accidents by stating what we have done and what we are now doing in the car shop over which I have jurisdiction. This shop is located at Dodge City, Kansas, on the Santa Fe Railway. It is a small shop compared to many others over the country; we have, the year round, 75 car men, but you who are familiar with car department work, know that the average small car shop has to do more or less the same class of work as is done in the larger shops. We are now nearing one half million man-hours worked without an injury of any kind, reportable or otherwise; in fact, our last personal injury was on the 24th day of July, 1929. Prior to that date, we had a good record, which was spoiled by an injury which resulted in a carman helper laying off three days with a bruised heel, caused by two other carman helpers pushing a material truck onto the heel of the helper who was standing on the track of the truck. We immediately held an investigation and disciplined all three men; two of them were disciplined for carelessness in pushing the truck onto the other fellow's heel, and the man with the bruised heel was disciplined for not being on the alert and getting out of the way.

Now, you may think in teaching safety to the men whose work I supervise, that I am hard and severe, but do not be misled, for that is not our practice at all; this hard boiled stuff among supervision passed away on our railways many years ago; we know that kindness pays in this safety work just the same as it pays in all other walks of life, and kindness mixed with the proper amount of firmness, I believe, is the most effective method of teaching safety to workmen.

I could use ten times the amount of time that has been assigned to me telling you of many things that car departments must do to prevent accidents, such as keeping ladders in good repair; all tools in safe serviceable condition; how to properly jack up a car; why goggles should be worn when necessary; why boards with protruding nails should be picked up; and go into detail about how cars can be repaired without injury to the carmen, but to do all of that would only lead me back to the most important thing in safety work, and that is "education." Any workman with average intelligence, regardless of whether he is a carman or engaged in any other line of work, performs his tasks in exactly the manner in which he has been taught to perform them. Practice safety and teach your men safety, and accidents will vanish. In other words, to get things to coming your way it is first necessary to go after them; good ideas are worthless unless put to use, and every teacher of Safety should have gumption enough to realize that the present condition of his department is the result of his past actions. No teacher of safety should ever be ashamed to own that he has been wrong, which is just an intelligent, kindly way of saying that he is wiser today than yesterday.

There is a beginning to everything, and the beginning in accident prevention must be at the time of employment; it never just happened that some department made a good Safety record; it takes days, months, and years of constant teaching to make such records, and when we realize that, if given the right ideas in the beginning,

our beginners are, in a comparatively short time, our most dependable workmen, we should readily see that it pays to begin teaching Safety at the time of employment.

I understand this delegation of "Safety" men, to whom it is my pleasure to speak, are, to a great extent, supervisors of men and, of course, have various ideas as to how safety should be taught; no doubt all of them are good, some better than others, and we should all be able to learn something from the other fellow's ideas, hence I will use the remaining time allotted to me in giving you my idea of how safety should be taught to a car department man from the day he is employed. If, perchance, my ideas hold any value for you, all good and well; if not, then you need a better teacher, for the lesson must be learned in part or all. In order for me to enact the part of a car foreman, we will imagine this convention hall is a small 6 x 8 car foreman's office, located near some car shop or as commonly called, a "Rip Track." I am going to employ a young man and supervise him in car department work for several years, and during these years, you understand, I am to feel my responsibility as a car foreman in helping to prevent injuries. We will call this young man John. John enters the office seeking employment.

"Good morning, sir, what can I do for you?" John tells me he is looking for work and after asking him several questions, his age, whether married or single, how much education he has, what he has been doing the past few years, and his family history, in general, I have made up my mind that he is a pretty good prospect, of average intelligence, and seemingly with a mind capable of being taught many things he should know. "We have a vacancy for a helper, but before deciding you are the man I want, there is an important question I must ask you. If I decide to employ you, will you promise me, on your word of honor, that you will do your best to perform your work in such a manner that you will not cause personal injury to yourself or fellow men?" He answers in the affirmative, of course; his application is then filled out; he registers his clock card, and is proud that he has landed a job. Right then is the proper time for the car foreman to put some "safety kinks" in John's gray matter that will stay with him all through his life, and he cannot spend a few minutes of the company's time any more profitably than making the right impression on the beginner.

"John, are you ready to go to work?—That is fine, as far as it goes; come into the office, I want to talk to you a few minutes." He enters the office wondering what I am going to say. "Sit down. Now, you promised me that if I would give you a job, you would do your level best to perform your work in such a manner that you would not get hurt or cause any of your fellow workmen to get hurt. That is what I want to talk to you about." It will take me about five minutes to explain to him what we are trying to do toward preventing accidents; explain to him the many hazards of car department work; make it clear to him that a troubled mind is a dangerous mind, that a clear, quick thinker will soon prove to be a valuable employee, that the men who think safely are able to turn out more work and make a higher efficiency than the men who are occasionally getting injured, and most of all, make it clear to him that if he gets injured, he and the ones at home depending on his pay check, are the first and greatest losers.

John will be placed with an experienced man; the foreman passes him a great many times each day, often stopping, and in a kind firm way gives him some pointers on how he can best perform the work he is doing. The foreman continues to watch him, and after a few months he is beginning to feel that some day he is going to graduate into a valuable car mechanic. John has shown a commendable interest in his work by asking questions; has, a few times, called to the attention of the foreman and safety committeemen, some things he thought might be unsafe. He is doing his part toward making a Safety record in our shop, but one day the foreman, walking through the repair track, sees John nailing on car siding with his goggles hanging around his neck, slipped

them down while using his hand saw, and forgot to put them over his eyes when he started nailing siding.

"Whoa! What is going on here? John, I am surprised to catch you disobeying our goggle rules. Item No. 27 in our goggle instructions, is that when nailing car siding or flooring, goggles must be worn, and you forgot to replace them. Eh? I have been considering you a pretty safe man, so we will let it go this time, but beware, do not let it happen again. By the way, you were telling me just the other day about your wife and that fine baby; just shut your eyes and keep them closed for a while—looks pretty dark, doesn't it? Now imagine how it would seem to be led home by one of your fellow men, and not be able to see that wife and baby after you get there—all right, now open them. You have two pretty brown eyes, and for the sake of that wife and baby, take care of them." John never again failed to obey the goggle rules.

While I am stating the experience of this imaginary John, please bear in mind that this is to be applied to every man in the car department, and it may be necessary to tell him more than once about the use of his goggles, the goggles being only an illustration of the many other protections he may be caught failing to use. We often hear the statement that in order to get results or break up an unsafe practice, it is not enough to tell a man once, twice, or many times, but to keep telling it to him again and again. I cannot agree with the man who makes such a statement. I believe we should be explicit enough in our instructions to him that he may thoroughly understand what is expected of him, so that we will not have to keep repeating them. I think there is no better way for words to lose their effectiveness than to hear them repeated from time to time. It is just like a courageous boy whose parents are continually saying to him "don't do this" or "don't do that"; the words are spoken, but they lose their effectiveness and leave no impression on the mind of the child. However, it may be necessary to tell one man something more often than another, in order for it to take effect, but regardless of whether it takes once, twice or three times, for your sake and most of all for his sake, when you do tell him, say something.

John has now been with us for several years; during this time he has been hearing that there is usually something better for the man who goes after it. He started in at the lowest pay, came up through the ranks, graduated into a car mechanic, and has never had a personal injury. Being a good prospect when he started, and by careful training he has played the game fair and done his part toward forming an organization in our shop of which the Management is proud, but he is not exactly satisfied, and well enough that he is not—for beware of the satisfied man. As already stated, he has a family, a home, and a bank account, and has heretofore met his responsibilities. He is ambitious and wants something better. We are going to place him on the most responsible work in the car department, the inspection of trains in the transportation yards. The car inspector who makes the inspection of trains in the transportation yards at our terminals, in my judgment, carries as much responsibility in the prevention of accidents as any class of employee we have on the railways.

John hears that he is wanted in the office; he does not dread to go; has not been called in many times in the past few years, and when he was, he derived benefit in some form, whether it was constructive criticism or a pat on the back, and he has had both.

"Come in, John; sit down. How is the family?—That is fine. I have your bid on the vacancy for a car inspector in the transportation yards, but before starting you on this job, I have some very important things to tell you. You are now undertaking the most responsible and most hazardous work in the car department, but it is possible for you to make your work just as safe or unsafe as you care to make it. In the past few years you have heard of car inspectors

being injured or killed in transportation yards due to failure to use their blue signals; you owe it to your family and to this railway company, as well as yourself, to use your blue signals at all times. Watch yourself when crossing from one track to another, remember there may be a moving car or engine wherever there are tracks. In the past few years you have helped pick up some bad wrecks caused by car failures; some of them were caused by a defective wheel, arch bar, draft gear pulled out, falling on the track, defective air brakes, and various other defective parts that were visible to inspection before complete failure occurred; and remember, we have known of some bad accidents that were caused by one little cotter key missing from the brake rigging. You have heard of some of our trainmen and switchmen being injured due to a defective running board or other safety appliance parts on cars, and remember every defective part of the safety appliances on a car, if allowed to continue in service, might cause personal injury or an accidental death to some of your fellow men. So watch out for the other fellows Safety, John, and do your level best to give us the brand of inspection that will help to prevent accidents; that brand of inspection is also the most efficient, and necessary to the successful operation of this railway."

"Remember that on every train you inspect, some one is going to ride after your inspection is completed, and that a broken bolt or missing nut might be the cause of an accident. On a freight train it may be a member of the crew or possibly the attendants of live stock; on a passenger train there may be several hundred passengers, but whoever it may be they are just as dear to their loved ones at home as you are to yours, and remember this, the Safety of these people is depending on you. Give every train that you inspect, the same brand of inspection that you would if you realized your wife and babies were on that train."

So, "Leaders of Men," let us, for the sake of accident prevention, apply the experience of this fellow to every man we supervise. No doubt many of you have hundreds of men under your supervision. For the sake of humanity, for the pleasure of living, and for the love of life, let us put something more than mere words into our instructions and teachings.

CHAIRMAN WALSH: Mr. Summers, we appreciate very much that very splendid talk.

We are now ready for the report of the Committee on Resolutions.

Report of the Resolutions Committee

By ROBERT SCOTT
Chairman

The Resolutions Committee desires to present for your consideration the following resolutions:

"Whereas, The National Safety Council Steam Railroad Section, in regular session, at Chicago, appreciates the excellent work of our Program Committee for the many splendid features provided; and

"Whereas, The members and guests wish to formally express their gratitude for this very fine program; therefore be it

"RESOLVED, That the Steam Railroad Section extends its sincere appreciation and thanks to that committee for their interesting, instructive and inspirational program; and,

"Whereas, This section, the Steam Railroad Section of the National Safety Council, having provided much pleasure and at the same time a program instructive in character thus enabling those in attendance to more enthusiastically and intelligently carry on the work of accident prevention; be it therefore

"RESOLVED, That sincere appreciation is hereby tendered to all those who contributed to the success of the program and to all those speakers who brought to us such valuable messages at such a great personal sacrifice. Be it further

"RESOLVED, That the appreciation of the members of this Section be extended to the officers and all committees for their untiring efforts in carrying on their work during the past year. Be it further

"RESOLVED, That the Steam Railroad Section in session assembled express their sincere regret at the inability to be with us today of those few early supporters and staunch members of this Section who by their vision and foresight made possible the fine success of this organization.

Resolution of Condolence

WHEREAS Divine Providence in all His wisdom has seen fit to remove from our midst our worthy member, James D. White, General Safety Agent of the Illinois Central Railroad and Past Chairman of this Section, and

WHEREAS, our Section and all of its members has lost a most valuable friend and co-worker.

BE IT RESOLVED that the Steam Railroad Section, National Safety Council in session at Chicago, Illinois, October 12-16, 1931, go on record as expressing sincere regret over the loss of this lovable character, and

BE IT FURTHER RESOLVED that these resolutions be spread upon the minutes of our Section and a copy forwarded to the members of the family of the deceased.

Mr. SCOTT: Mr. Chairman, I move the adoption of these resolutions.

(The motion was seconded, put to a vote and carried.)

Mr. CARROW: Mr. Chairman, I have a very short announcement which I feel sure the members of this organization would like me to make.

I want to say that Mr. W. A. Booth and Mr. T. A. Walsh would undoubtedly have been elected chairman and vice chairman this year, and our esteemed friend on my left would have ultimately been made chairman, had we had an election this year. Since it is not in order to elect them to those offices on account of the consolidation, I want to propose that we indicate our unqualified approval of the slate that was to have been presented by the Nominating Committee when they named Mr. W. A. Booth of the Canadian National Railways as Chairman of the Section, and Mr. James Walsh of the Missouri-Kansas-Texas Railroad as Vice Chairman of the Section. Although it is impossible to place them in those positions, I ask you to vote your approval of so doing by rising.

(The audience arose and applauded.)

CHAIRMAN WALSH: Mr. Carrow and Gentlemen: Speaking for Mr. Booth as for myself, I will say we both appreciate very much your kind sentiments.

Honors Conferred

C. E. HILL (New York Central Lines, New York City): I think it is within the bounds of parliamentary procedure to go just a little farther, and whether it is legal or otherwise, I am going to make this proposal. I am going to move that this body go on record as voting to make W. A. Booth of the Canadian National Railways and J. L. Walsh of the Missouri-Kansas-Texas Railroad temporary Chairman and Vice-Chairman of the Steam Railroad Section of the National Safety Council.

In his modest way, our acting Chairman will think it is hardly prudent for him to put the motion. Therefore, I ask all those in favor of this motion to please rise.

(The audience arose and applauded.)

VICE CHAIRMAN BOOTH: I appreciate this honor very, very much. I thank you

from the bottom of my heart for this wonderful ovation you have tendered both Mr. Walsh and myself.

CHAIRMAN WALSH: Gentlemen, I approve of the remarks of the new Chairman, and not being able to make them myself I just have to subscribe to what he has said.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Textile Section

Officers 1930-31

General Chairman—E. E. PLACE, American Mutual Liability Ins. Co., Boston, Mass.
Vice-Chairman—C. H. EAMES, Lowell Textile Institute, Lowell, Mass.
Secretary—PAUL W. VIETZ, Plymouth Cordage Co., North Plymouth, Mass.
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Chairman Poster Committee—FRED W. SEHL, Aetna Life Insurance Co., Hartford, Conn.
Chairman Program Committee—IGNATIUS MACNULTY, American Woolen Co., Boston, Mass.
Chairman Publicity Committee and News Letter Editor—GUY W. SWALLOW, Nashua Manufacturing Co., Nashua, N. H.
Chairman Engineering Committee—G. W. COOK, Travelers Insurance Co., Hartford, Conn.
Chairman Statistics Committee—SYDNEY INGHAM, Ludlow Manufacturing Associates, Ludlow, Mass.
Executive Committee—THE OFFICERS AND
 ARTHUR BARLOW, Armstrong Cork Co., Lancaster, Pa.
 HARVEY SAUL, The United Finishing Co., Providence, R. I.
 JOHN H. SOUTHAM, Sanford Mills, Sanford, Me.

Tuesday Afternoon Session October 13, 1931

E. E. PLACE, Chairman
 American Mutual Liability Insurance Company, Boston, Mass.

The first session of the Textile Section convened with General Chairman E. E. Place presiding.

CHAIRMAN PLACE: As a resumé of last year's activities, I want to outline a few of the things we tried to accomplish.

In November we had the first meeting of the Executive Committee in Worcester. It was at that meeting that Mr. Ignatius McNulty proposed the idea of having group meetings in the different sections of the country. He thought if he could get a meeting started in New Hampshire, another one later in Maine, still another in Rhode Island, etc., that we would increase the activities of the Textile Section of the Council. The first meeting was held on Feb. 26 at Manchester, New Hampshire, and approximately 50 delegates were there. It was held in cooperation with the New Hampshire Manufacturers Associates and the Commissioner of Labor and Industry,

John S. B. Davie. As a result of that meeting, a motion was made that another be held in the latter part of the summer, inviting other industries, in New Hampshire. This meeting was held in the latter part of July at Concord at the State House and there were again about 50 or 60 delegates, representing all different kinds of industry. These were the first safety meetings ever held in New Hampshire.

The next meeting was held in Maine at Lewiston and we had another delegation of about 50 or 60. It was held with Judge Cleaves of the Associate Industries of Maine, and Commissioner Beales of the State of Maine. It was at that meeting that Mr. W. J. Brennen, who is General Chairman of the Paper and Pulp Section of the National Safety Council, made his first appearance as safety engineer for the State of Maine.

The next state was Rhode Island and our conference is scheduled to follow this Congress here. That will give us three state meetings in the interest of textile accident prevention, and we hope to get started in other sections of the country.

Our membership is holding about even. Last year, we had 134 members. This year, I believe, the final count on Oct. 1, was 132.

We have had other interesting meetings. One was at Plymouth Cordage Company, where we were guests. The meeting was followed by a trip through the plant where we were instructed in the art of making rope safely.

The News Letters have gone out regularly, or rather irregularly, but they were six or seven in number.

In developing a program for this Congress, it was thought to get as many approaches for the subject of accident prevention as we could. We had in mind a very ambitious program. Certain parts have not come through as we planned, but on the other hand, some of the most important parts have come through and the program that is going to be put before you will be satisfactory and interesting.

The first paper scheduled is by Mr. H. T. Martin and I take pleasure in introducing him to you at this time.

Falls, and How They can be Prevented

By H. T. MARTIN

The Fisk Rubber Company, Chicopee Falls, Mass.

Considerably more coordination between the head and feet will do more to reduce the number of accidental falls than anything else. When I say head, I refer to the brain, eyes and ears. Next, we must set our house in order, anticipate the causes of falls with their resultant injuries and make the necessary physical changes before the accident occurs.

Falling is something of a habit. As infants, we fell out of bed, and later, when we began to walk, we were almost continuously falling, and as a matter of fact we have been falling ever since. We usually appear ridiculous and those who witness the fall generally consider the episode very funny. Most falls result in a black and blue spot here or there, and that's the end of it. Some falls, however, have far more serious results.

Let's consider, in this instance, only falls to adults. People fall from high places to the level and the distances run from a few inches to thousands of feet, with varying results. They also fall from the level into excavations, or places below level; and strange as it may seem, they fall while walking, running, or standing on the level.

Falling is not confined to any particular sex, nationality, creed or class. The pastime is indulged in by all persons during all seasons of the year and all hours of the day and night, although it is more popular in winter—thanks to Jack Frost and his satellites. It is, and always has been, a major outdoor and indoor activity.

Do any of the members of your family stand on rocking chairs? Are your tools in good shape? Are your floors slippery? Is there any protection at the second floor

no accident prevention program could possibly have been in force for any considerable length of time without discovery of the prevalence of the type of accident we are discussing, and the aftermath of such discovery would be, broadly speaking, two-fold: physical changes in the plant, and education of the people in it.

Outside the shop very little has been accomplished in this field of accident prevention. On the streets and in the homes falls occur in great numbers but accurate or complete figures are not available.

Home Falls

We do have some knowledge of the seriousness of the matter in cities where local safety councils are functioning. Information regarding accidents occurring in the home is not available unless the results are fatal. I believe all safety councils have experienced great difficulty in organizing any really effective home safety campaign. It is true the home is reached through radio, press, the children, clubs, and so on, but there is no supervision as there is in the factory, and any compliance with suggestions is purely voluntary, and because of the common belief that safety talks are meant for the other fellow, accident prevention work in the home is practically non-existent.

In industry falls became cause for investigation and action almost immediately. Great strides have been made by industry in the way of accident prevention, and after compensation acts went into effect. Employers soon found that falls were responsible for many painful, serious, expensive injuries, necessitating loss of time and production, also having a decided bearing on insurance rates.

Some of you may not agree with this statement. Just pause a minute and consider your own home. Is it physically safe in all respects? How about the cellar stairs? Are they in good repair? Hand rail? Where are the brooms and mop pail stored? Staircase? How about the electrical appliances? Are they in order? I might go on almost indefinitely. The home is still more dangerous than the shop and if we had the facts, I daresay, in spite of all the publicity given to automobile accidents and the terrible toll of human lives year after year, that more accidents occur in the homes than on the highways.

Springfield, Massachusetts, has a very efficient and effective safety council, well organized and working cooperatively with all city departments, and from their files I submit the following figures:

For the year 1930, to September 1st, industry was responsible for 10 fatal accidents. The automobile was responsible for 20 fatal accidents. The home was responsible for 30 fatal accidents.

For the year 1931, to September 1st, industry was responsible for 9 fatal accidents. The automobile was responsible for 10 fatal accidents. The home was responsible for 21 fatal accidents.

Of the twenty-one accidental home fatalities occurring in Springfield's peaceful "City of Homes," 16 were the results of falls,—more than by automobiles.

Three people fell down stairs.	Ages 40—49—92 years.
One fell from piazza.	Age 17.
One fell from bannister.	Age 7.
One fell from window.	Age 53.
One fell from chair.	Age 78.
One fell on ground.	Age 86.
Eight fell to the floor.	Ages 56—66—(2) 75—77—79—82—86.

At a glance, even though the exposure is limited to one city with 150,000 people, it is evident that old people are not safe at home. Why or what caused these people to fall is not disclosed by the Safety Council. We must guess at the causes of the falls which resulted so seriously. Was it lack of proper safeguards or physical incapacity? Most of them were probably preventable.

Industrial Falls

Industry goes deeper in searching for causes of its accidents and attempts to learn from the accumulation of all obtainable facts just what caused the fall, and if it can be definitely determined, corrective measures are taken which invariably will be opposite to the cause. For example, if worn stair treads caused the fall, fix the stairs. If inattention was the cause, put your best efforts at work to teach employees to be more attentive. If poor housekeeping—good housekeeping is the answer. If physical disability was responsible, correct it possible.

Some indication of the part played by falls in the industrial accident picture may be had from the following figures taken from reports of the Industrial Safety Division of Massachusetts Department of Labor and Industries. Investigation of accidents arising from non-machinery causes produced the following facts:

For the year ending 6/30/27 Falls of Persons represented 15.5% of total.
 For the year ending 6/30/28 Falls of Persons represented 15.3% of total.
 For the year ending 6/30/29 Falls of Persons represented 15.3% of total.
 For the year ending 6/30/30 Falls of Persons represented 16.2% of total.

The statistics for the year 1929 show that falls of persons held second place in causes of accidents, handling objects coming first, representing 32.1 per cent of total accidents.

The statistics for the year 1930 show 9,970 people were injured from falls, with 80 deaths.

Deaths resulting from falls of persons—

For the year ending 6/30/27 represented 21.1% of total.
 For the year ending 6/30/28 represented 17.0% of total.
 For the year ending 6/30/29 represented 17.8% of total.
 For the year ending 6/30/30 represented 23.6% of total.

Of all causes of deaths in 1929, falls were exceeded only by vehicles, 25.8 per cent, and explosions, 20.7 per cent, machinery being responsible for only 14.7 per cent.

In New York State it is reported that falls are responsible for between 15 per cent and 20 per cent of the compensated injuries received in industry.

The National Safety Council is authority for the statement that 4,000 people are killed annually in industry by falls of various kinds and many more injured. Falls from all sources are responsible for about 17,000 deaths.

An analysis of the fatalities due to accidental falls among the industrial policy-holders of the Metropolitan Life Insurance Co., published in the company's Statistical Bulletin, August, 1929, shows that nearly one-half of the 4,343 deaths from this type of accident in the period 1926-28 occurred in the home. Of these, one of every three was due to a fall on stairs, one of every ten to a fall from a window, and one of every eight to slipping or falling on floors. Falls in public places accounted for 19 per cent of the total mortality from this cause, 43 per cent of these accidents occurring in the pedestrian use of streets and sidewalks.

Falls incidental to employment comprised 15 per cent of the total number of fatalities, nearly 10 per cent occurring in building construction, while falls from a scaffold or staging, from ladders, roofs, windows, and into the holds of ships were the cause of a large proportion of the other industrial falls.

From Wisconsin, through the courtesy of the Industrial Commission of Wisconsin, I have the following information: In the list of compensable injuries settled during calendar years 1919-1929, inclusive, a period of 11 years, falls of persons resulted in 28,915 cases. This is over 16 per cent of the total non-machinery accidents.

For the calendar year 1929, 3,445 persons fell and were injured severely enough to become the recipients of workmen's compensation. This was 18 per cent of total non-machinery accidents.

A breakdown of the 3,445 falls is as follows:

From boats, bridges, and dams and docks into water	5
From buildings not in course of construction	20
From gang planks	7
From loading platforms	42
From runways and balconies	22
From stairs	221
From tramways and trestles	14
From windows, not cleaning or repairing	1
From benches, beds, boxes, chairs and tables	58
From machines and boilers	49
From piles	32
With piles	2
From rollways	2
From poles and trees	60
Into bins and pits	35
Into excavations	28
Into vats and tanks	20
Into manholes	6
Jumping	113
Stepping on rolling objects	9
Stumbling	275
Slipping	1446
Falls from scaffold—scaffold breaking	84
Falls from scaffold—support breaking	19
Falls from scaffold—ropes and cables breaking	1
Falls from scaffold—scaffold tilting	2
Falls from scaffold—planks tilting	9
Falls from scaffold, N.O.C. and indefinite	110
Falls from ladder—ladder slipping	121
Falls from ladder—breaking	29
Falls from ladder—tipping over	6
Falls from ladder—loss of balance	99
Falls from ladder—knocked off	2
Falls from ladder—N.O.C.	56
Falls from buildings—in course of construction	119
Falls from windows—cleaning or repairing	3
Into floor openings	21
From structures—N.O.C.	9
Falls of Persons, N.O.C.	288

Another presentation shows 35 per cent fell from high places to the level, 3 per cent from level to points below, and 53 per cent on the level, (9 per cent not classified). Seventy-eight per cent of the 53 per cent were caused by slipping.

Another interesting bit of information has to do with women in Wisconsin industry. In 1929, 902 women suffered from compensable injuries; 220, or 24 per cent, were due to falls. In 1930, 927 women suffered from compensable injuries; 294, or 32 per cent, were due to falls.

Slipping is given as the most frequent cause of falling. Stairs are listed second.

I want to call your attention to the fact that whereas the above data present proof of the seriousness of this subject, in order to intelligently combat this type of accident, we must go further. Slipping may have been the cause of the injury, but preceding the injury was a cause of the accident—it might have been wet floors in a factory, or ice in the yard. It is absolutely necessary to learn the cause of the accident before intelligent preventive steps can be taken.

Some Causes of Falls on the Level

Many industrial falls result from condition of floors. Concrete floors often become very slippery. Wood blocks wear unevenly and the depressions in the floor are directly or indirectly responsible for some falls. Maple flooring becomes splintered or the boards become loosened, presenting a stumbling hazard. Protruding nails also are a tripping hazard. It is quite evident that the management should exercise great care in the installation and upkeep of floors. Housekeeping should be of the highest order to guarantee clean, spacious passageways. If the manufacturing processes or other operations are responsible for accumulations of water, oil, soapstone, or other material which causes a slippery condition, every possible effort should be made to entirely eliminate such condition. If impossible to eliminate, the floor should be cleaned as frequently as possible and at the proper time.

From my limited knowledge of the textile industry, and familiarity with types and causes of accidents which have occurred in our own plants, it is obvious that slippery floors are one of the major causes of accidents. If floors must be scrubbed, and apparently this is a fact, there are ways of handling this job with a minimum of exposure to employees. In all probability it is an individual plant problem. In one plant, it might be advisable to scrub floors during hours when the employees are not at work; in another plant, possibly a small section of flooring could be roped off and scrubbed and not used until thoroughly dry; but in any event it certainly is a hazard that can be eliminated if the determination is strong enough. It may be necessary to have a few severe accidents before corrective steps are taken.

Another common cause of falls in the textile industry is a result of bobbins and spools having been carelessly thrown on the floor and permitted to remain there. This, to my mind, is entirely a matter of supervision. It is up to the overseer to see that the floor is kept free from all objects that do not belong there, and he can do it if he is a good overseer and sold on his responsibility in connection with accident prevention work.

In some plants it is necessary to oil floors to keep down the dust. Wherever this is necessary the slipping hazard can be reduced by the use of ground quartz or other substance which produces an abrasive surface.

From High Places to Level

Falls from ladders cannot be eliminated 100 per cent even though the ladder and the floor, or object against which it is placed, are in A-1 condition, because we are dealing with the human element and some people would fall under almost any conditions. But the first responsibility of management in a program intended to reduce the number of falls is to see that the equipment is safe. In a great many plants ladders are used by so many people that it becomes no one's particular responsibility to see that they are kept in a proper state of repair. A ladder will be used by an electrician and left by him, then next picked up by a production department employee, and so on from one person to another. Unless the responsibility is definitely placed repairs will not be made until the ladder is broken or somebody is hurt. An excellent plan is to designate a place for the ladder to be stored, suitably marked with very definite instructions that the ladder must be returned to its place when not in use, and positive instructions as to responsibility for the maintenance of this particular piece of equipment. Naturally, this person, whoever he may be, the overseer, foreman, or head of the maintenance department, must make inspections frequently enough to guarantee that this ladder is in good condition. It is also the management's responsibility to see that ladders in use are of the proper type to meet the conditions. If they need spike shoes, put them on. If they need abrasive material at the base it is up to the management. It is also up to the management, even after this, to instruct persons using ladders as to the proper manner in which they should be used.

Many people fall while going down stairs and some fall while going up. It is up

to the management to see that the stair treads and risers are uniform and in good repair. Hand rails should be provided, and if there is any question as to whether one is needed to conform to state laws, put it up anyway.

Housekeeping on stairways is important. Refuse should not be allowed to accumulate.

Scaffolds are responsible for many falls. Several general rules should be observed in building and use of them. Only the best materials should be used, plenty of working space provided with protection from objects falling from overhead, with standard railings and toe boards to prevent men or objects from falling to points below. The same facts hold true in connection with the building and use of platforms, overhead bridges, or staging, for temporary or permanent use.

Falls from Level to Points Below

Pits, excavations and all points below level, which present the opportunity for falls, should be given attention and remedial measures taken immediately when hazard is created. Substantial protective railings, top, intermediate and bottom should completely enclose the opening. Make sure of adequate lighting and warning signs. Keep all materials away from opening. Although this type of fall is not as common as others it is apt to produce serious results.

General

Improper apparel on the feet is another cause of falls and other foot injuries in the textile industry; and no small wonder, for in some mills the employees still go barefoot, or wear felt slippers and other apparel, which seems to me bad practice. High heels, badly worn heels, and even rubber heels, on slippery floors, are not conducive to the highest degree of safety.

Crowding and pushing at exit times should not be countenanced under any circumstance even though it might be necessary to place a monitor at each floor landing.

Good lighting is essential, both artificial and natural, to prevent falls. This refers not only to the main operating rooms but to out-of-the-way places, store rooms, passageways, and stair towers. I had an amusing experience in a textile plant about three years ago, while being escorted through a plant by the superintendent. The superintendent of another mill belonging to the same organization and I were following the gentleman into a dark, unlighted corner, and suddenly I noticed that his head seemed to drop a few inches. Not knowing the exact cause, we paused for a moment, and then managed to make out one wooden step to a lower level in the next building. My friend, with whom I had been talking on the subject of accident prevention all day long, and who admittedly was not very much sold on the idea, remarked: "Oh, man, you ought to have a light here." "No," was the reply, "no one ever comes in here." "Well," said my friend, "we are in here." "You have no business in here," said the other fellow. "Well, you brought us here," said my friend. "That's right," said the first man, "I guess we should have a light. I will have one put in." On my next visit to the plant a light had been installed.

Defective vision is undoubtedly responsible for many falls. It is remarkable how many people there are in our factories with poor vision and in need of correction. In my close contact in the past eleven years with physical examinations I have been amazed at the number of persons who neglect their eyes.

Good maintenance and proper disciplining will go a long ways toward the prevention of falls. Running and horse-play should never be permitted in a plant. Control of these two factors is entirely in the hands of supervision. Absent-mindedness, inattention, day-dreaming, call it what you will, is responsible for many serious accidents caused by falls. It is much more difficult to find a cure for this habit than some of those mentioned previously. Example, set by supervision, will help; educational propaganda will help; in fact, anything that can be done to create any safety consciousness in the mind of the individual so afflicted is about the only remedy.

The greatest difficulty is in finding a receptive ear for this kind of instruction. We are all prone to consider ourselves very safe workers and unwilling to admit that the things that are happening every day to others could happen to us. This is illustrated by the story of two French boys who had spent the day hunting in the woods. Came night-fall, they were crossing a small stream, and in telling of the trip one boy said: "We started to cross the bridge over the brook. I come first, and Pierre come next. We got about half way cross. I hear big splash. I look around quick for Pierre, and by gar, it was me."

Degree of Severity

It has been truly said that all accidents are potential fatalities. We have thousands and thousands of accidents without personal injury to anyone, and often what sounds like a terrible accident produces only a minor injury, and what sometimes seems a minor accident results fatally. Here are two cases in point: An elevator in our own plant once fell five stories with three men and considerable equipment aboard. When the elevator struck the bottom with a bang the counterweights let go at the top and piled into the mess of wreckage. All three men lived. During the same year a man reported to our plant hospital with a blemish on one of his fingers which resembled an insect bite. He died.

In the case of falls, the distance apparently has no bearing on the end result. Many years ago Bobby Leach specialized in going over Niagara Falls in a barrel and in his repertoire were many other hair raising, dare devil stunts. But one day he slipped on an orange peel in his own home town, broke his leg, and died as a result of that injury.

Just a few other examples: An employee was standing on the second rung of a stepladder, the rung broke, permitting him to drop less than two feet, but the result was two broken ankles. A girl fell two steps on a stairway, resulting in permanent total disability. In a hat-making establishment, an employee slipped on a wet grating, spraining his neck. A woman, employed as a stamper of brushes, slipped on a piece of oily tin and fractured her wrist.

In a textile mill, a woman, employed as a weaver, slipped on the floor and sustained an injury to the base of her spine.

A machine tender in a paper mill was putting lead on the roll, when he lost his balance and fell against the machine. His arm got twisted around the roll and was fractured in three places.

A woman in a weave room slipped on the floor, which was being washed, spraining her back and bruising her head.

Outdoor Falls

The opportunity for falls is unlimited and entirely beyond control. It therefore behooves each individual to maintain his equilibrium, if he can, under all conditions. We all create conditions which invite falls, almost daily, and of course in the winter months ice and snow greatly increase the possibility of falls. The program of prevention is exactly the same as in a factory, but without control. Individually, we must take the responsibility for making physical conditions safe and then use our heads. Inattention is undoubtedly the major cause for outdoor falls as well as falls in general.

Safety Man's Responsibility

Industry should become interested in accident prevention outside the shop because of the indirect benefit to be derived. Generally speaking, industrial safety men have been responsible for the organization of many local safety councils and are, or have been, the prime movers in their affairs. The trend, however, seems to be largely toward highway safety. This is quite natural as deaths resulting from automobile accidents are steadily increasing in numbers, and public attention is focused upon this class of

accident. I think there is a tendency on the part of industrial safety men to become less active in their community safety councils as they notice the great stress placed upon auto accidents. This is a mistake. Every single phase of accident prevention work is of interest and value to the industrial safety man and his company, and he should particularly assist in the promulgation of home safety programs. The prevention of falls in the home alone is sufficient reason for interest.

Let's go back home and analyze the causes of falls in our own homes, in our factories and in our community. We must go deep enough in our investigations to get the absolute facts as to what caused the fall, and then, without fear or favor, act. Management of industry has a tremendous responsibility in providing safe conditions for its people, made even more difficult today because of curtailment of expenses in all lines, but even greater is the responsibility of the supervisory staff representatives of management who must accept the blame or credit for accident experience. A good boss in any plant has very few accidents to persons in his department. That's why he's good.

CHAIRMAN PLACE: Thank you, Mr. Martin. Has anyone any questions?

DR. R. P. KNAPP (Medical Director, Cheney Brothers, South Manchester, Connecticut): I would like to say that the paper which Mr. Martin read is the most comprehensive of its kind that I have ever heard. I wish we could each get a reprint. I would also like to hear out what he says in regard to eyesight. In the silk industry, the matter of vision is very important. We offer to our employees an examination of their eyes at a low cost.

CHAIRMAN PLACE: In speaking of falls, I know one mill agent who found that most of his falls were traceable to washing of floors, so he decided to change the washing of floors from day to night and got away quite well from that cause. M. L. GARWOOD (Lumbermans Mutual Casualty Co., Chicago): I would like to say that some years ago we made a very extensive investigation in the textile mills in New England and the majority of fatalities were due to falls.

MR. MARTIN: I might go so far as to add something to that paper. Having been in the industry, starting safety work seriously and conscientiously in 1917, and enjoying a continuous reduction in frequency rates, etc., I was amazed at the attitude of textile mill superintendents, in my contact with them. They did not know the first thing about safety. On my first trip through a plant where there were many large belts, entirely unguarded, the superintendent said to me, "What was your impression of the plant?" I said, "I want to be very frank, I think it is terrible." He said, "Why, what is the matter?" and I told him about the belts. He said, "We never have trouble from those," but before he finished he told me about two or three people who had been killed in the plant. And he never had any trouble!

CHAIRMAN PLACE: The second paper on the program is by another man who is well-known in accident prevention work, and in the many years that have gone by I think he probably has been one of the most steadfast men in the work. Ten years ago, the ideas he had might have been termed "revolutionary," but I think he has lived to see many of them come true. I take great pleasure in introducing Dr. R. P. Knapp.

The Medical Department and Reduced Lost Time

By DR. R. P. KNAPP

Medical Director, Cheney Brothers, South Manchester, Conn.

Except the victims, there is probably no one so intimately associated with industrial accidents as the plant physician. He sees them first and last, so to speak. It would, therefore, seem that he might contribute something toward their prevention, in part at least. That he does in many plants is quite true but there is even greater cooperation possible in other plants.

There is a little hesitation in some industries in allowing the physician to collaborate in reducing accidents, as it is thought this is wholly the field of the safety and sanitary engineer, but I believe this is a mistaken idea. In the plant which I represent, I have seen lost-time accidents show a very decided reduction through the co-operation of a committee composed of the industrial relations supervisor, the safety engineer, the supervisor of the benefit and statutory accident department, and myself.

With us each accident is discussed as it arises at a weekly meeting. First the cause of the accident and the manner in which it arose are taken up and it is attempted to determine whether it was purely accidental or whether there was an element of carelessness in it or whether carelessness alone was responsible by the disregarding of rules. Frequently we find this last mentioned as the sole cause and the injured man is informed to that effect. In other cases, we find it was a combination of carelessness and poorly protected machinery or defective operation of this machinery, and in the minority of the cases the latter alone is the cause. Now, of course, this is locking the barn after the horse is stolen, but we feel by such an analysis we can get a more accurate idea of what is causing our accidents and therefore be in a better position to guard against them in the future.

I believe the best manner of attack is first to tell the worker in the medical department, when he is examined for employment, that there are hazards on any job involving machinery, and that he must be careful or he will needlessly lose time which is money to himself and family and may be so disabled as to make further employment impossible. Then tell him that when he goes on the job, his foreman will point out the hazards peculiar to his task, what he should do and what he should not do to avoid accidents. When he goes to work, the foreman should tell him just those things, not abstractly, but in front of his machine with the moving parts clearly visible, so that he could see the actual dangers that lurk in the moving machinery. He should further be told by the foreman to report any injury to him immediately, so that it may properly be taken care of by the first aid worker at once, and, if it requires further attention, by the doctor in the medical department.

Next, when the safety engineer makes his rounds he should see that the machines are properly guarded and if the operator seems to be taking proper precautions to protect himself or if he appears to be needlessly and foolishly exposing himself to the chances of accidental injury. If the guarding of the machine is found to be faulty, immediate attention must be given. The machine must be ordered properly guarded and the operator told of the dangers that exist due to the fact that the machine is not properly guarded; therefore, to be careful until it is, and if the operator is found to be taking undue chances of injury, purely due to the manner in which he is operating his machine, he should be warned with the penalty of a lay-off if he should continue to expose himself to accidents needlessly.

After such precautions have been taken, if an operator is injured one feels that he can with some justice be reprimanded if the accident was clearly the result of carelessness. But unfortunately it is not quite so simple. Certain people will always be injured. The urge for taking chances is frequently difficult to determine. Apparently many times no thought is given to the fact that they are taking a chance, familiarity with the operations has bred contempt and the dangers for the time are disregarded and are only brought back to the individual when he is caught by some moving part and hurt. There is a type of person who is apparently born careless and he is not necessarily a person who has any other vice. He may be perfectly steady in his habits but he is injured not once but several times. He is apparently roughly to be described as a clumsy worker born with very poor judgment and it would seem that such an individual were better out of the employ as he is not only a bad risk but a bad example to the other workers. Illustration.

At the time of the pre-employment examination, I believe it well to ascertain if the applicant has ever had any lost time accidents in his other employments and their nature. If he seems a bad risk in this respect, it may at times be money saved not

to employ him. Also at the time of the pre-employment examination a physical check-up may contribute something that may be of value in appraising an individual's susceptibility to accidents, that is, he may be suffering from some defect or deformity which would render his operation of a machine extremely hazardous. He may be a nervous fidgety type that would make him more liable to be hurt, or he may have a bad heart, or an extremely high blood pressure with the potential dangers which these entail. Therefore, I believe the pre-employment examination should be as thorough as possible, even to the examination of the teeth and a blood Wassermann to determine a man's fitness to the job for which he is applying.

There are types of individuals who do not seem to mind much being injured if the injuries are not too severe, they rather welcome the respite from work which the accident entails. Besides their compensation, they may have one or more types of lodge benefits which are paid them when disabled. These men are difficult to get back to work and certainly do not give a very good impetus to any program of accident prevention. The physician in his work should early try to teach these men the necessity of exercising all precautions and avoiding accidental injury. Frequently discussions between the safety engineer and the plant physician regarding fresh injuries goes a long way toward immediately clearing up the cause, if done at the time the accident happens.

As soon as an injured worker comes to me I try to get in touch at once with our safety man and have him interrogate the injured individual as to the cause of his accident and visit the scene of the accident to get all facts. Another way to quickly settle the cases as to the responsibility is to bring all accidents to the attention of the safety committee by making them reportable within a specified time after they occur and if this is not done they will not be accepted. Of course, this time has to conform to the state compensation law regarding this point, but the reporting time should not be extended or the privilege may be misused.

One of the greatest difficulties frequently is to determine whether a strain or sprain is actually the result of a man's occupation. Here no time must be lost in the investigation for as the days go by the facts become more nebulous and also if the victim of the accident is a malingerer he has more time to work up a case for himself. This is just where the necessity of reporting all accidents within a short specified time shows its value. Then there is little or no chance of malingering. Such reporting time should have teeth and be not just a threat. A warning for the first offense, a lay off for the second and a discharge for the third usually convinces an employee that no delay will be tolerated and the foreman should be held responsible too for such reporting.

I know nothing that will tend to reduce accidents more than making this report an absolute necessity and hold the foreman responsible and in many plants the foreman is not given enough responsibility, and that constitutes the weakest link in the chain. A worker dislikes to have it known that he is frequently being hurt and will do everything to avoid frequent injury. Next to this matter of reporting accidents, shortly after they happen, to the foreman, I believe the competitive plans that are worked out in some plants by the various plant units have a very decided influence in reducing accidents. Posters, talks and movies also are a great help but to whatever length you go, you cannot get away from the importance of the physician in helping to reduce the number and severity of accidents as well as alleviating the suffering of the injury that has already occurred in a manner tending to win the confidence of his patient.

CHAIRMAN PLACE: Thank you very much, Dr. Knapp. Has anyone any questions? W. C. WROE (American Mutual Liability Insurance Co., Atlanta, Georgia): Is there anything in the textile industries that would produce an eye strain or something of that sort on the employee?

DR. KNAPP: No, except to say if a man starts out with defective vision, the daily strain of his work might very well exaggerate that. There is hardly any work that

is any finer than textile work, consequently there is no greater strain. We have recognized this for the past ten years and we have a physician to examine all the eyes and once a year he goes over the plant and that constitutes about 25 per cent that need a refraction. Working distance may be poor and the lighting effect may be very poor. We test these people for near vision. That is, reading distance, which is anywhere from a foot to fourteen inches, and working distance which, in the textile industry, is the greater part of a yard. We have to know not only that, but also what the working distances of some other jobs are. Some of them are about twenty or twenty-one inches. There is an intermediary point we have to know.

M. L. GARWOOD (Lumbermen's Mutual Casualty Co., Chicago): Dr. Knapp has brought out a very important fact that industry as a whole will be very much benefited by if followed, and that is making the medical director more of a part of the safety activities. Another point is in regard to repeaters. That is a problem that we are all up against—just exactly what should you do with them? You cannot tell the employer he should discharge them.

CHAIRMAN PLACE: Sometime I think it is a round peg in a square hole or vice versa. By that I mean that the job analysis has not been made.

The point you bring out about repeaters, Dr. Knapp, is an excellent one, and a great many plants in their first-aid room keep one card for each employee instead of having a card for every accident. In that way they have a good story of how often each man is hurt and what kind of an accident he had and the necessary steps to take.

Mr. GARWOOD: I would like to ask Dr. Knapp what he has found in regard to susceptible hernia.

Dr. KNAPP: The question of hernia is one that has never been settled. When discussing hernia in a medical sense, there is scarcely such a thing as a traumatic hernia. There is the case of a man who is gored by a bull and who did get a hernia. That is the only case I have any recollection of. Of all these hernias, ninety-nine per cent of them are born with a susceptibility to it. The process of closing of the ring does not probably take place in perhaps 40 per cent of all people. Those cases should never truly be assigned to industry. In the cases of hernia in our plant, we never know what part outside strain took in producing that hernia. You have to find a certain incident of lifting that caused the hernia.

In Connecticut we use the waiver which these men sign when they come to work if they have a hernia. That waiver, however, has never been tested. How it would stand in Court, I do not know. That is the only way you can protect yourself against hernia and industry should never be charged because not one per cent of them are traumatic hernias.

CHAIRMAN PLACE: Would it be possible for a man to slip and get a hernia?

Dr. KNAPP: Not unless he had a susceptibility to it before. I find that certain nationalities are susceptible to hernia, Italians especially.

CHAIRMAN PLACE: How about back strain? Are Italians leading in that?

Dr. KNAPP: Not with us. We employ a large percentage of Italians but I would not say they lead in back strain. They may play it up for a longer time but they do not lead.

H. W. PROTZMANN (Chase Bag Co., Milwaukee, Wisconsin): While we are not a mill, we still handle cotton sheetings and such things. I was about 50 years old at the time and I had to help the boys haul a truck-load of bags out of a corner. I grabbed a cord and pulled with all my might and a couple of the fellows crawled in back and pushed. All of a sudden I noticed a pain and that is all that happened. I paid no further attention to it. The next day I got another pain along the abdomen, as though somebody was taking a knife and ripping it open. It only lasted about five minutes. I paid no further attention to it. The same thing happened a week later. One morning I noticed a lump in my abdomen. I went to see a doctor and he

said I had a soft hernia. That is how mine happened. Whether or not I was susceptible, I do not know. That was thirteen years ago.

Dr. KNAPP: Did you know whether you had a susceptibility to hernia before or not?

Mr. PROTZMANN: No sir.

Dr. KNAPP: As you grow older, you are more susceptible to it.

CHAIRMAN PLACE: Has anyone else anything to add? If not, the next thing on the program is the election of officers. Vice-Chairman C. H. Eames and I have been asked to serve again this year. If this is perfectly agreeable to all of you, Mr. Eames and I are willing. Unless we hear from you to the contrary, we will assume that the same officers that are on the program, with the exception of Paul W. Vietz, who is superseded by Mr. McNulty as secretary, will serve this coming year.

These officers have been together and they have had a meeting and have developed one interesting fact that took two outlets. One was that Russell Fisher, secretary of the National Cotton Manufacturers Associates and Walter Humphreys, secretary of the Woolen Manufacturers have agreed to serve as members at large.

Unless someone has any objections, I will suggest that Mr. Wroe act as secretary and cast one ballot in favor of the officers of whom I spoke, as follows:

General Chairman—E. E. PLACE, American Mutual Liability Insurance Company, Boston.

Vice-Chairman—CHARLES H. EAMES, Lowell Textile Institute, Lowell, Mass.

Secretary and Program Committee Chairman—IGNATIUS McNULTY, American Woolen Co., Shawsheen, Mass.

Publicity Committee Chairman and News Letter Editor—MYRON B. JOHNSBERG, H. A. HALE, JR. & Co., Boston.

Membership Committee Chairman—D. FRANK LORD, M. J. Whittall Associates, Ltd., Worcester, Mass.

Poster Committee Chairman—FRED W. SEHL, Aetna Life Insurance Company, Hartford, Conn.

Engineering Committee Chairman—G. W. COOK, Travelers Insurance Co., Hartford, Conn.

Statistics Committee Chairman—F. J. PORTER, The U. S. Finishing Co., Pawtucket, R. I.

Executive Committee—The Officers and the following members at large:

ARTHUR BARLOW, Armstrong Cork Co., Lancaster, Pa.; RUSSELL T. FISHER, The National Association of Cotton Manufacturers, Boston; WALTER HUMPHREYS, National Association of Wool Manufacturers, Boston; JOHN H. SOUTHAM, Sanford Mills, Sanford, Me.; PAUL W. VIETZ, Plymouth Cordage Co., North Plymouth, Mass.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

E. E. PLACE, Chairman

American Mutual Liability Insurance Company, Boston, Mass.

The second session of the Textile Section convened with General Chairman E. E. Place presiding.

CHAIRMAN PLACE: At the meeting this afternoon, we had hoped to have Mr. John P. Meade of the Massachusetts Department of Labor and Industries. Unfortunately he found at the last moment he could not be present and so did not write a paper. Has anyone any questions or suggestions as to how state bureaus could help? Perhaps in the absence of the paper, we ought not throw the subject out entirely.

It is a function of the state to enforce laws and see that plants are in safe working condition. Mr. Meade and Commissioner Beales in the state of Maine have been exceptionally helpful. Mr. Beales has the State Conference, started three years ago, and it is an annual affair. He was successful in getting through the legislature last year an appropriation for a safety engineer for the state of Maine. That engineer is hired by the state and his job principally is to go around to the smaller plants and see that they have safe working conditions. He does everything he can do to help them, but at the same time if they have a condition that should be changed, he is not averse to bearing down and insisting that it be changed. That is a good thing—this safety engineer in traveling around, gets all this information and distributes it where it will do the most good.

Mr. Kearns of the Industrial Commission of Ohio is here this afternoon. If he would tell us what they do in his state to assist the employer and the employees, I think it would be helpful to the gathering.

State Aid in Accident Prevention

By T. P. KEARNS

Industrial Commission of Ohio, Columbus, O.

I did not come here prepared to say anything, but as a visitor to hear what Mr. Meade was doing and what it is possible for the states to do. Of course, I think we do not need a great deal of proof that there is a possibility of the state being very helpful to industry in general in the matter of accident prevention and safety work.

In Ohio, we enjoy unique and advantageous position in that we have two departments striving to promote the safety work and to assist in bringing about proper observance of state safety laws and regulations. We have the State Factory Inspection Department, which has been in existence since 1848, and which, through the exercise of police power in the enforcement of safety regulations, has been the means of preventing innumerable accidents in industry. It follows that a department visiting plants as they do, day after day, having trained men or inspectors visiting these plants, for the purpose of inspection in and about the plant and issuing orders and following up these orders to see that there is proper compliance with the requests, cannot help but do an immense amount of good in the way of removing hazards and thereby preventing industrial accidents and injuries.

In 1925, in Ohio, a new department was organized. The Commission realized that the mere arbitrary enforcement of statutory regulations or exercise of police powers was not the complete solution to the problem. They felt that some educational safety work was needed in order to get the desired results, and at a conference called by the Industrial Commission a number of amendments to the law were agreed upon. Among them were increases in the weekly compensation, the death awards, and re-

removal from the compensation law of the employer's liability clause. In other words, taking from the employer the right of suit in case of injury and in return for that the employers agreed that they would pay a penalty of from 15 to 50 percent for any accident or injury that might occur to an employee by reason of the employer's failure to comply with any specific regulations, either issued by the Industrial Commission as a general order or enacted into law by the State Legislature.

They agreed to the formulation and promulgation of a number of specific codes of safety regulation which had been compiled by the Industrial Commission and which, under the Commission Law, were issued by them as a general order of the same force and effect of law. In addition to that, they agreed to have one per cent of the premiums paid into the compensation fund, set aside for the purpose of investigation and prevention of industrial accidents and diseases; and the Industrial Commission, in carrying out this program, organized what is known now as the "Division of Safety and Hygiene" which I have the honor to represent as its superintendent. Our work is exclusively educational safety work. We are substituting and augmenting the work of the factory inspection department but by no means do we intend to take the place of the factory inspector. We started a statistical department. We have the advantage in Ohio, as nearly all the accidents are reported to our department. Those accidents are all analyzed. Before the inauguration of this department, we had very little statistical information on accidents, but today that record is complete and gives us an opportunity to approach this subject of accident prevention in a constructive, comprehensive way, because we know where these accidents are occurring, the source of the accidents and where to attack the problem to get the best results.

We also have organized a corps of safety engineers. Among them is a mechanical, an electrical, a structural, and a mining engineer who are available for counsel and advice to the employers in the State on all problems connected with accident prevention work. These men do survey work. They will visit a plant, make a complete survey of the operation with a view to determining not only the outstanding or apparent hazards but the potential hazards. They will also submit a report to the employer in which they recommend means and methods of eliminating the hazards that may be responsible for accidents in the plant, pointing out to them wherein they are violating the various specific regulations and safety laws of the state, and advise how they may comply with the requirements of these codes.

We also have a medical director, who is available for advice and counsel on all matters pertaining to industrial health and occupational diseases. We furnish speakers for public meetings throughout the State, and issue monthly bulletins and safety literature of all kinds. These accident reports are compiled monthly and sent out. Yearly reports are also sent out. We are conducting safety campaigns, not only in individual plants but in groups and entire communities, and we have felt after an experience of five years that the solution of the problem is group and community campaigns.

The safety engineers, when they go into the plant, not only suggest the plan of organization that might be set up in the plant, but will help to create and form that organization, and will come back several times to get the organization operating. We prefer to take them by groups. It may be a foundry group, motor group or some other group. In a number of cases, we have made it a county or community campaign.

To give you an idea of what can be accomplished, in Trumbull County we have conducted three campaigns. The accidents have been reduced in that county 64 percent over a period of two years. In that particular campaign, we had every concern in the county employing 25 or more people, participating in that campaign.

Other successful campaigns were in Stuart County and Jefferson County. We have just completed a campaign in Cleveland with more than 425 concerns participating in the campaign. Some of our meetings were in the southern part of the

state where we got into the outside of Cincinnati and the suburbs. We interested the industries in the community and formed an Industrial Safety Council. We had as high as 2200 people in one public assembly in the fair grounds at Carthage last summer.

This department is doing exclusively educational safety work. We have no police power. We can issue no order. Every recommendation that is given to the employee is strictly of an advisory nature. We are out selling the idea of safety to the manufacturer and the employer as well. We do not stop with the employers, because we realize that it is not only the employers who need the education, but the employee needs it just as badly. The sum and substance of the whole thing is that you will never make a success of accident prevention work until you get the people safety-minded and safety-conscious.

I repeat, I think the educational plan is the solution to the problem.

CHAIRMAN PLACE: We are very much indebted to Mr. Kearns for "pinch-hitting" for his friend, John Meade. It is certainly interesting to note that in Ohio they are using the grouping of industries in campaigns. That is an idea of combating highway accidents, and to think of it being applied to industrial accidents is a new thought, at least to me.

Is there any discussion or anything anyone wants to add?

M. L. GARWOOD (Lumbermans Mutual Casualty Co., Chicago): It would seem to me that it is a travesty on our present day civilization, when it is necessary for us to use police powers to enforce safety measures in the different plants. We have been educating employers for a number of years and it is surprising the relatively small number that have really accepted the safety measures, and that police powers are necessary in some of the State Departments to enforce safety measures.

CHAIRMAN PLACE: It may be a travesty, but until everyone is fully cognizant of the value of accident prevention and what should be done, it seems to be the best way of having them learn that fact.

F. A. POLLOCK (Safety Engineer, Lumbermans Mutual Casualty Co., Chicago): I had the privilege in the last few years of visiting a number of plants. I have some 50 or more safety committees working under my supervision, and I do not believe that after the management of any of the plants have once been sold that police power is necessary. I believe the management of all plants in this day and age realizes that it is cheaper for them to have their men working safely than to have accidents.

CHAIRMAN PLACE: I think perhaps you are right as far as you are concerned out here, but back east where I come from, if you are going to sell a fellow who runs a plant anything, you have to be an A No. 1 salesman and then something else to get it over. Plant managers and owners vary from one part of the country to another.

The next paper is by Mr. M. B. Dalton, Vice-President, Liberty Mutual Insurance Co., Boston. Because of sickness he found it impossible to come. He has sent, in his stead, a man who is known as "an old war horse" of safety work. It is a pleasure to introduce to you Mr. S. E. Whiting, of Liberty Mutual Insurance Co., Boston.

The Human Side of Industrial Accidents

By M. B. DALTON

Vice President, Liberty Mutual Insurance Company, Boston.

I appreciate very much the opportunity which has been given me of discussing the human side of industrial accidents with you. What will be said, however, does not come from an expert in textile hazards or in the hazards of any other particular

industry, but from an observer who has been impressed with the fact that the problem of industrial accidents is primarily a human problem.

It needs no word of mine to establish the tremendous good which has been done by the National Safety Council through these annual conventions and all its other activities, in coordinating the knowledge of, and leading the forces which are trying to eliminate, so far as possible, the needless waste and suffering resulting from accidents in industry. Neither is it necessary to repeat in detail the statistics with which you are all so familiar. The personal suffering of injured workers, the depriving of their dependents of their maximum earnings, the millions of dollars of cost to industry annually, and all the other uneconomic results are too well known.

Speakers seldom say anything new but frequently they say the same old things in a little different way or with a little different emphasis which makes their repetition worth while. In going over the proceedings of National Safety Council conventions for several years back, I found that very few speakers had dealt wholly with the purely human side of industrial accidents. Papers have been presented on every conceivable hazard, on all kinds and types of safety organization and of course in many of these the human element was referred to, but very few were devoted entirely to methods of detecting and eliminating human weakness which makes employees prone to accidents.

Everything in this world has but one purpose essentially, the service of human beings. It therefore follows that nothing is so important as man, and that civilization advances only as man learns to control himself and the forces with which he has to deal and in cooperation with those forces raises himself to a higher plane of living.

This statement has a very direct bearing on the solution of the problem under discussion. Barring those few cases which might be said to be the result of "acts of God", some human being is either the cause or the victim of each accident and accidents happen or do not happen depending upon whether or not the human element weakens or fails. If you will consider the matter it will be apparent that even so-called mechanical accidents are primarily the result of human failure.

Our problem, then, is to find out why the human element fails and to apply that knowledge to eliminating the causes of failure.

We all know that there are differences in susceptibility of individuals to accidents, some of which are dependent upon individual characteristics and others of which are dependent upon both individual characteristics and the characteristics of associates, whether fellow employees or supervisors and managers. And this individual susceptibility frequently is independent of the physical plant conditions under which the individual works.

There are some shops where physical conditions are deplorable, to say the least, with poor housekeeping and unguarded machinery, and yet with a group of employees who have been working anywhere from ten to fifty years with an excellent accident record. In others everything is of the latest mechanical development, the plant is clean, up-to-date, well guarded, but the accident record is terrible. Some people are always getting hurt even under the best operating conditions, while others may go for years or perhaps permanently without an injury of any kind, even under adverse operating conditions.

It should be stated here that this is no attempt to minimize the importance of proper housing and equipment, mechanical safe guarding and good housekeeping. It is essential that all these be carried to the greatest extent possible as visible evidence that the plant management means business when it asks for safe practices and that it has a right to expect the workers to do their part. But even with the best plant conditions only the first step has been taken.

Several things are apparent from a psychological approach to this question of industrial accidents, the approach which places special emphasis on human behavior.

Individual temperament, muscular coordination, eyesight, hearing, quickness of perception, emotional stability; all of these and many more characteristics determine the susceptibility of an individual to accidents. Some of the defects are temporary, others are constitutional and permanent.

Some employees are simply thoughtless. I well remember something which occurred during one of my early plant inspections when I came upon a man with a hammer and cold chisel drilling a hole in a cement floor. The head of the chisel was badly burred over and the chance of a piece coming off and causing an eye injury was apparent. I spoke to the man, suggesting that he have the head of the chisel trimmed, and remarked that the use of it in such a condition might cause him to lose an eye. You may imagine my surprise when it developed that he had only one eye, and upon inquiry as to what happened to the other, he told me that some years before a piece had come off the head of a chisel and put the eye out. It would have been bad enough for that man to use the burred chisel if he had both eyes, but it seems almost incredible that a man who had lost one eye from a particular cause should so thoughtlessly risk permanent total disability by exposing the other eye to a similar fate.

A recent study of thousands of cases of accident by one investigator indicated that, strangely enough, accidents do not follow the usual laws of chance, but that a much larger proportion of people than would be expected have no accidents at all, and a much smaller proportion of people than would be expected have more than the usual number of accidents. This study further brought out the fact that the group of people who were having most of the accidents were also the people who were most often disabled as a result of minor illness. This simply bears out what most of us realize, namely that susceptibility to accidents does vary with the individual, with his characteristics, his general health (mental as well as physical) and his general attitude toward his work, wholly independent of the conditions under which he works.

In recent years much has been said and written about so-called "no-accident records." Remarkable instances are brought to our attention continually. We have heard of records as high as several million man-hours operation without a lost-time accident. Even allowing for the cases where, to maintain the no-lost-time record, injured employees are brought to plants and put on some kind of work, though obviously disabled, the records which have been made are little short of unbelievable.

What happens when such a no-accident result is accomplished? Many things. First, lost time accidents are stopped; second, there is a realization that accidents are not wholly due to chance; third, there is a recognition of the fact that accidents are humanly controllable; fourth comes the realization that an accident is, after all, an excuse and an excuse is an admission of weakness or failure.

These no-accident and other fine safety records which have been made in a wide variety of industry from the least to the most hazardous, are the result of human endeavor. Bear in mind that in these periods not only are avoidable accidents eliminated but also those considered unavoidable. Individual susceptibility disappears in these no-accident periods and control is a fact. The problem then seems to be one of individual education. To accomplish the ultimate a way must be found to reduce individual proneness to accident to zero. This is quite an order.

Most of industry today is carried on in small units in spite of the large number of gigantic corporations in existence. Practically all of these small plants are insured. To any of you who may be insurance engineers, it is unnecessary to indicate how difficult it is to interest these small plants in accident prevention. There are so few accidents and they are so spread out in time that the problem does not appear to be one of any consequence. How much more difficult is it then to interest the individual who may go for years and perhaps permanently without an injury of any kind?

It would seem that the way toward a solution of this problem may be found in two things: first organization, and second discipline.

In organization there must be more than form, there must be personality and leadership. Every supervising individual, be he chairman of the Board or straw boss, must reflect the human interest in those associating together in a given enterprise. More care must be given to the selection of individual employees, more effort to detect those workers who by temperament, health, or other weakness, are prone to accidents. More effort must be put into training new employees, to finding out the weaknesses of the individual and correcting them or failing in correction, changing his job to one for which his capabilities and characteristics fit him.

This question of organization goes far beyond a consideration of industrial accidents. Obviously it affects the operating efficiency of the whole establishment. In an organization the questions of personnel and its control are all-important, not only from the standpoint of accidents but from that of all other operating problems. Too many concerns have felt that the hiring could be done by anybody, but if we accept the premises of this discussion as sound, then the personnel department becomes one of the most important links in the organization chain, and one which should receive major consideration from the executive management of the business.

Uncontrolled forces, whether they be human, natural, or mechanical, create disastrously destructive results. Therefore, along with proper organization should go discipline, intelligent discipline. Industry generally is careful of its mechanical equipment, machines and the output of machines are carefully watched and the result of breakage of mechanical equipment or spoilage of product is treated with disciplinary action.

Frequently, however, industry does not take the same attitude in handling its human equipment, even though obviously it should receive far greater consideration. If spoilage of material or breakage of mechanical equipment is a mark of inefficiency, how much more so is the unnecessary injury to the all-important human equipment! Intelligent discipline will place responsibility on all supervisors for proper instruction and training and the necessary rules and regulations for operating efficiently with a minimum of interruption from accidental injury. And this discipline must, to be effective, be enforced in a kindly and cooperative spirit.

One of this country's foremost safety engineers once made the statement that in his opinion effective safety work was 90 per cent discipline and 10 per cent other things. You may or may not agree with that specific division, but you will agree that the plant without intelligent discipline is disorganized and will produce an inordinate number of accidents, even though on the surface it may appear that its product is right and that it is successful.

Organization which gives due regard to individual capabilities and characteristics, backed up by intelligent discipline will create a well-ordered, efficient, cooperating whole and will result in the elimination of unnecessary and, for the most part, inexcusable accidents.

CHAIRMAN PLACE: Any questions?

M. L. GARWOOD (Lumbermans Mutual Casualty Co., Chicago): Hasn't he found over a period of time that the plant which has poor housekeeping usually develops bad experience?

MR. WHITING: I don't want to intimate that it is true that all plants, regardless of housekeeping, would have good experience. Mr. Dalton brought out the fact that some plants, in spite of bad housekeeping, do have good experience. I think he wanted to bring out the dominating influence of the human equation rather than the mechanical condition in accident prevention, as a whole.

CHAIRMAN PLACE: I know from actual experience that an old plant in Fall River that looked about ready to fall down had a wonderful accident record. Across the street there was a new plant and its accident record was terrible. The thing to me that appeared to make up for the difference was the feeling between the overseers and superintendent and the employees. You could go into the old plant and you immediately, in spite of conditions, felt a sense of cooperation, a sense

of team work, a desire to produce a product and thus keep their job and the plant running, while in the new plant, they must have thought that here was a concern that had lots of money and it didn't make much difference. I know that an employee's moral support has a lot to do with the accident record.

F. A. FREDRICKSON (Deputy of the Industrial Commission of Wisconsin, Madison, Wisconsin): I would like to ask what is the experience in regard to the number of injuries that are caused, due directly to poor housekeeping? Does that include accidents due to machinery unprotected, unguarded, or is it due entirely to the housekeeping? I do not know of a case that I have stressed that was due to any fault of poor housekeeping. It was more due to the man himself, either removing protective devices or of an unguarded machine.

MR. GARWOOD: I think Mr. Place ought to be in a better position to answer that than anybody else. You probably found that most of the severe accidents in textile plants have been due to physical conditions of the plant, including the floors and such conditions.

CHAIRMAN PLACE: I do not know that you could call it poor housekeeping. Perhaps you might call it "plant maintenance," but it is true that in textile plants the floors do get very oily and greasy and unless a great deal of care is taken in the washing of these floors and seeing that it is done at a proper time or a space sufficiently small at a time so that it is mopped up quickly, it does present a very bad hazard for slipping and falling. Then in a lot of textile plants, we have the question of bobbins on the floor. That may not seem to be a very fruitful cause of accidents, but it is. It is just like stepping on a roller skate. Good housekeeping, I think, should also include the piling of material, the leaving of beam ends exposed in aisles and all things that might have to do with cleanliness. It is true, however, that the more severe accidents are due to machinery.

MR. WHITING: I would like to again point out that Mr. Dalton was not pressing the housekeeping side of it as a factor of importance and Mr. Place has indicated where, in textile plants, poor housekeeping can be an accident hazard and will produce perhaps a good many minor accidents by having aisles clogged with various textile equipment. Mr. Dalton was trying to stress that the human side of it is the dominating one.

The Du Pont organization, an entirely different industry, made a very striking example of that human element in a plant in Massachusetts which was formerly under separate ownership and then absorbed by Du Pont. They were making celluloid and for years they had from \$5,000 to \$8,000 worth of losses every year under the existing management. They merged with the Du Pont organization which had been going into management control of accidents very intensively and in the next year, they reduced their accidents to a ridiculously low amount. There was no change in equipment, there was simply the re-enforcement from the management down, of an intensive drive to cut out accidents. Every foreman knew if he had an accident in his department, he would be on the "carpet" and possibly get fired. Every employee under that foreman naturally was given a "ride" on the idea and his mind was worked upon and in that way, purely through the human equation the plant made that astonishing change in records.

T. P. KEARNS (Industrial Commission of Ohio, Columbus, Ohio): My experience has been that a great many of these accidents that are occurring in industries generally are due to poor housekeeping. Regardless of how well you guard machines, if the plant is not kept in a good, clean condition, is not properly and adequately lighted, if aisles and passageways are littered up with obstructions of all kinds, causing men to stumble and to trip and fall, and where poor lighting conditions prevail, where they walk into projections along the aisles, where material is improperly piled, or where it falls over, you will have accidents. Our records in Ohio, and I think in other states as well, show that the most prolific causes of

accidents are stepping and striking against objects, and I should say that 50 percent of those accidents are due to poor housekeeping.

CHAIRMAN PLACE: Has anyone a question he would like to have up for discussion, not only on this phase of the problem, but on any others?

F. A. POLLOCK (Safety Engineer, Liberty Mutual Casualty Co., Chicago): I would like to know if anyone here knows of any way to prevent shuttles in machines in woolen manufacturing plants from flying out? What kind of a guard could be put on?

MR. WHITING: One of our engineers mentioned the matter to me but I did not go into any technical details. He was working on the problem of flying shuttles. He found, as I recall it, that there was a lack of alignment in the machines that were throwing shuttles and he got some truth of that from the manufacturers of the machines. I am sorry I cannot give you any detailed information on that, but the way he "got wise to it" and apparently made an improved record was by discussing the problem with the manufacturer.

E. A. ROBERTS (District Engineering Manager, American Mutual Liability Insurance Co., Chicago): I can only describe two types of guards which I have seen in plants. In one instance, a rod of about $\frac{1}{8}$ inch or $\frac{3}{16}$ inch iron was placed on the back side of the beam that comes back and forth in such a position that when the shuttle leaps out, the rod knocks it down again. In another instance, I have seen where the operator is not working on the loom which throws the shuttle but on an adjacent loom, and in one plant that I was in, they had put up a galvanized metal shield at each end of the loom which travelled with the beam back and forth, so if the shuttle would be thrown out, it would hit that.

CHAIRMAN PLACE: Another plant, instead of using the galvanized iron or sheet metal shield, made a wooden frame with a heavy wire mesh and then suspended this from the frame overhead, and then had springs on the bottom of it. If the shuttle were thrown, it would deflect a little and then come back. They found that in some instances the shuttle had hit the sheet metal and then scooted off some other way, but by using the wire mesh that caused it to stop.

Someone has raised a question concerning accidents from slivers on spools, bobbins, etc. I may, perhaps, be able to shed a little light on these hazards.

Suppose we take, for example, slivers on bobbin boxes or spool boxes. In lots of textile plants, they make these boxes out of pine and after they have been in use a while, they start to splinter and the operator going down in the box to get some bobbins drives the splinters from the box under the finger nail. It may not seem dangerous, although any splinter or anything that causes a puncture wound is dangerous, because blood poisoning may set in. Some mills use a fiber box, which is perhaps better than the wooden boxes. I should think that would be a most excellent way of getting around that kind of a splinter from a box.

Now as to the question of slivers on bobbins, that comes from cutting the yarn off. Incidentally, there are two ways of cutting the yarn. Sometimes a knife is used or a razor blade which is so sharp that it does not go straight. It is placed against the bobbin at an angle so that it makes a splinter. In the question of spools, you have your two round heads at both ends, which should eliminate any splinters.

On the large bobbin, I think it is a question of supervision on the part of the overseer. The bad ones should be thrown out. There ought to be a certain length of life to a bobbin or spool, and after that it ought to be discarded.

After we have these splinters, another thing we should absolutely insist upon is the prompt and proper treatment of these accidents. They should be treated at once. If some of you were hurt, especially if it is a small abrasion on your hand, you do not think much about it. You pull the sliver out and go about your business. You need not look very far in the newspapers to find that many times small injuries like that result in very painful blood poisoning cases, and sometimes in the loss of a finger or arm.

MR. POLLAK: In the mills with which you come in contact, do they use a hospital or a foreman?

CHAIRMAN PLATT: It all depends upon the size of the plant. In a plant that has 1,500 to 2,500 employees, the nurse is generally placed in a most central location. Suppose this plant covers a couple of acres in ground area, and I am working out in the bleach house, and I get an injury. If it is in winter, it is rather hot in the bleach house, and I haven't much clothing on. In order for me to go to the nurse, I have to get dressed. The chances are that I won't go.

In a large plant where you only have one first-aid room, here is a scheme that the General Electric Company tried out in one of their plants. They had certain stations located in the outskirts of the plant. In textile plants, you can have these located in every overseer's office, and can have two persons instructed in the proper way to give first-aid treatment. You can have them keep a record on a small card of what happened, the name and date it happened, and what they did. The next thing to do is to have someone see the injury who knows something about it. Have the nurse start out at, say 10 o'clock, and go around to every overseer's office. Every overseer has a schedule and he knows just where the nurse is. In case of a serious accident, he can call her at any time. She sees every case by going to the injured employee having minor injuries, and she can tell the employee to stop in her office when he goes home at night, so she can put a fresh bandage on. You can also train these first-aid workers so they know where to put their thumb in case of a bad accident, where there is a chance of a person bleeding to death, for instance. You have built up a first-aid scheme around the nurse. Where the plant is in one building, of course it would be useless to have such a scheme. In any case, if the overseer or the clerks in the offices give treatment, a card of record should be kept of it, and the proper follow-up made so that an infection will not develop.

CHAS. G. SMITH (Lever Bros. Co. Ltd., Cambridge, Massachusetts): Up to within three years ago, I was at the Arlington Mills at Lawrence, a plant with 54 acres of floor space. They have a full time doctor and three nurses, and the doctor trained first-aid men and women. They had a meeting one afternoon a week which lasted about an hour. They trained several young fellows and girls, who received Red Cross certificates, and these people were appointed as first-aid girls and men throughout the plant. I believe they have seven first-aid stations other than the main clinic at that plant. Whether it is an established first-aid station or an overseer's desk in a room where the first-aid men or girls have their headquarters, there is a buzzer and wherever they are working, they come down to the desk. They open the first-aid cabinet and dress the wound, but if it is a case where they feel it is too severe to handle themselves, they immediately send them to the main clinic which is at the main gate. It worked out very well. One nurse made her rounds every morning to see that the first-aid equipment was brought up to the minute and that everything was in good shape and in that way they were well kept.

CHAIRMAN PLATT: Mr. Arthur Barlow of the Armstrong Cork Company, Lancaster, Pa., was to talk on "Accident Statistics." He was unable to attend the Congress this year but I will now read his paper to you.

Textile Section Statistics

By ARTHUR BARLOW

Armstrong Cork Company, Lancaster, Pa.

The National Safety Council's 1931 report of industrial accidents credits the Textile Section's membership with third place in low accident frequency and severity among the 28 sectional groups. Its average frequency was 9.25 accident/million man hours, and its severity was 46 days lost/thousand man hours. They compare with

the average of all by being one-half the average frequency and one-third the average severity. In spite of that relative safety, the section lost second place to laundries.

Let us take the textile section's own records apart and compare them individually with the textile average and with last year. Perhaps we can conclude something.

One hundred fifty-three members reported for 1929 and 197 for 1930 and 132 reported for both years. That is indicative of the increasing interest in the section's activities. It is very creditable. Of 1930's 197 plants, how many were above and below average on frequency? 103 were below average and 94 above. How about size of mills in relation to the average?

From	1-100	employees—14	below—15	above
	100-550	employees—57	below—57	above
	550-1000	employees—11	below—16	above
	1000-up	employees—21	below—6	above

It appears that above 550 employees, 32 plants did better safety work than 22 other plants. Below 550 employees, it is a 50-50 proposition. How much did these 54 large plants affect the frequency rate for the whole?

The 54 plants above 550 employees worked 144,500 thousand man hours with 1221 accidents or a frequency rate of 8.4.

The remaining 143 plants below 550 employees worked 71,800 thousand man hours with 775 accidents or a frequency of 10.8.

The 32 large plants below average had a frequency of 5.1 and the 22 above average had a frequency of 14.8.

Evidently the good large plants are very good and the bad large plants are terrible. When 12 per cent of the members reporting employ 23 per cent of the labor and have an accident frequency 60 per cent above the average of the whole group, there is certainly opportunity for them to improve. It can be done too, for 16 per cent of the members employed 43 per cent of the labor and stood 44 per cent below the average. Have these large mills above average shown improvement since last year? Of the 22, 17 reported last year also. Of the 17 reporting, 11 improved their record over 1929 and 6 failed to do so. Of the 6 who failed to do so, their frequency rates are as follows:

Rug	Tr	7-11.3	to 12.2
Cotton	Tcm	34-8.6	to 14.2
Cotton	Tcm	14-12.6	to 25.2
Silk	Ts	10-5.8	to 11.1
Woolen	Tw	4-20.8	to 21.6
Woolen	Tw	6-14.9	to 25.1

It is suggested that these mills recognize their identity and exert themselves to overcome their accident regression.

I think also that every member whose present record is above 14, the rate for the large mills above average, might well consider himself a candidate for intensive safety work. There are 57 such members of large and small sizes, in fact those with frequency rates from 14 to 20 comprise 15 plants; 20 to 30 comprise 31 plants; 30 to 40 comprise 6 plants. 40 up comprise 4 plants.

The severity rate question can not be overlooked for it has gone up to .66 from .58. Deaths and permanent totals increased from 7 to 11; and for the mills reporting 2 years, deaths and permanent totals went from 5 to 8.

For 66 members reporting 3 years, the severity has gone up .58-.61-.98.

The accidents are obviously more severe. In spite of 366 fewer accidents in the total count of 1930 under 1929, due largely to the death penalties, the total days lost increased 27,000. This is about 218 thousand man hours, or more than the entire year's work of any one of 34 smaller members. This increase in accident disability represents the year's work of a plant employing about 100 people. This is bad, for in years of retrenchment, which for textiles were all three of these years, the accident prone could have been weeded out. I would suggest that there is a warning in

these records, in that industrial recovery in the textile industry, with an increase in employment, will test the metal of safety work to overcome a rising severity of accidents.

CHAIRMAN PLACE: There is certainly food for thought in those figures. If any of you represent large plants and your record has gone up, do not feel that we, in the Textile Section, are not concerned over your individual record.

W. C. WROE (American Mutual Liability Insurance Co., Atlanta, Georgia): I want to ask a question of some plant representative here. What should the members of this section do in the way of approach to the textile people who are interested in accident prevention. It seems to me that the textile industry probably has a large employee exposure as compared to other industries. It must be up in the industries of the country and they are usually the poorest represented at safety meetings. If any of the mill representatives know how they can approach them, to get them interested, I surely would like to know about it.

CHAIRMAN PLACE: Last year at Pittsburgh, we did not have more than about 30 in the two sessions. This year, we had a big increase over the 30. If anyone has any thoughts as to how Mr. Wroe can get the textile mill plants in Georgia interested in the Textile Section of the National Safety Council, let's have them.

F. A. POLLOCK (Safety Engineer, Lumbermans Mutual Casualty Co., Chicago): Has there been any work done through the south? I made a trip through Alabama and Georgia last year and after I came back, three of those firms became members of your section. That was my first trip through Alabama and Georgia. One of those firms has over 3,000 employees working steadily. I know the manager of that plant would be glad to serve you.

Mr. WROE: There are quite a few of them who do belong, but there is nothing of the proper proportion here today.

CHAIRMAN PLACE: We have lots of members down through the south. You said you know of a man who would be willing to serve. Maybe we could get him started and through him, get a couple of others. What is his name?

Mr. POLLOCK: Mr. Peeler, Lincoln Mills, Huntsville, Alabama.

CHAIRMAN PLACE: We might go through the list of membership cards and find out how many southern members we have and write and ask how many would be interested in seeing if they could interest some of their neighboring concerns down there in becoming members.

Mr. POLLOCK: There is an Engineer's Association, with headquarters at Atlanta.

Mr. WROE: Sure, that would work. I was in the mining game in Minnesota for some time and, being situated there, got every mining concern interested in the National Safety Council, and I do not see why the same thing could not be worked in the South. It is the local Association that boosts your National Safety Council.

CHAIRMAN PLACE: You have given us a thought, Mr. Wroe.

Mr. WROE: I would suggest that if you have any recent members in the Textile Section or where they are coming in now, ask them what this Section could have done to have gotten them interested sooner.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Woodworking and Lumber Manufacturing Section

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Tuesday Afternoon Session

October 13, 1931

J. W. SMITH, Chairman

Employers Reinsurance Corporation, Kansas City, Mo.

The first session of the Woodworking and Lumber Manufacturing Section convened with Vice-Chairman J. W. Smith presiding.

CHAIRMAN SMITH: Folks, we will call the meeting to order. I want to offer the apologies of your general chairman, Mr. W. H. Greenwalt, who is unable to attend.

Mr. Greenwalt was unable to send in a report of the activities of this section for the year. However, there are several here who have contributed largely to the advancements made by the section and I am going to ask them to report on their special duties. Mr. Braun had charge of the posters and slides and we would like to hear from him as to just what was done during the past year.

F. W. BRAUN (Employers Mutual Liability Insurance Co., Wausau, Wisconsin): Mr. Chairman, we held a meeting at the offices of the Council early this fall to analyze the posters and to first of all determine causes of accidents in the wood-working industry so we could get poster subjects of the right sort. Early in the year we sent a letter to all members and as usual, we had no replies. Later on we received criticisms on some of the posters, but of course they were the ones who had not sent in any suggestions previously. Criticisms are always welcome and we want to know the kind of posters that are needed, but we hope with this arrangement we now have, that the ones for the Woodworking and Lumber Manufacturing Section next year will show a big improvement.

The photographer of the National Council, and we, have made arrangements in plants and immediate vicinities so that we will not have to travel too far to have pictures taken of the material we want to show for safety posters.

CHAIRMAN SMITH: I think you all will agree with me that the poster end of our work is very important. In fact, I sometimes think that all mechanical hazards have been eliminated to a large degree and it is now more or less a matter of education. So, if you have any suggestions or have any good photographs for posters, they will be appreciated.

Mr. Murray, who is chairman of the Engineering Committee, is not able to be present, but I understand that he has started several pamphlets, among them—the first—is "Lumber Yards."

R. C. HARR (Lumbermens Mutual Casualty Co., Chicago): The pamphlet on "Lumber Yards" has been sent out to the various persons interested and is ready for publication. There is also one on "Safety in Furniture Manufacture."

CHAIRMAN SMITH: There has been one meeting of your Executive Committee this past year and before going on I would like Mr. Pollock report to us on the work of the Membership Committee. I think he is familiar with it.

F. A. POLLOCK (Lumbermens Mutual Casualty Co., Chicago, Ill.): Just before coming up to this meeting, I talked to the membership executive of the Council and he said that our membership had dropped to 325. A year ago, I was chairman of this section and we went to a peak of 397. I believe that this year we should make an extra drive for memberships. There is one way and that is to boost it among our friends. Of course, I have a special advantage of traveling through the country and meetings a lot of lumber dealers and everywhere I go, I say a good word for the Council and afterward come back and tell the Council about each dealer prospect. From that contact we have always been able to gather a few new members. A year ago, we had fifty new members. I hope we can do the same this year.

CHAIRMAN SMITH: Mr. John Grier and his assistant, Major H. Steere-Clark, who had charge of the News Letter this year, are unable to attend this meeting. However, I understand very good work was accomplished.

CHAIRMAN SMITH: Gentlemen, the first formal talk or picture, we might say, was made by the Employers Mutual Liability Insurance Company of Wausau and Mr. F. W. Braun from that office will comment on it as the picture is shown.

Progress in the Woods—A Bird's Eye View

By F. W. BRAUN

Manager, Safety Engineering Department, Employers Mutual Liability Insurance Company, Wausau, Wis.

This picture was taken in Northern Wisconsin. The first scene is a panorama of the logging camp. This camp sets about four or five miles off of the main road.

We have tried in this picture to show some of the progress made in logging camps. We put in a little camp life as we came across it during the taking of the picture.

Woodworking and Lumber Manufacturing Section

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Here is some standing timber in the section of northern Wisconsin and upper Michigan showing the growth of hemlock and white pine. Some of this had been cut for wood and a few small trees had been taken out of here, but thus far, this section had not been logged. This is not anywhere near the size of the timber that the British Columbia people handle, but it shows the kind of wood that is cut here and used in a good many of the furniture plants in Michigan and in this section of the country.

A large white pine. To give you an idea of the size of it the photographer is standing against it.

You get more light as we hit the hard wood timber. This is the section in which the logging operations are conducted. It is almost all hard wood although there is a sprinkling of hemlock and pine there also.

You can see the logging operations are particular because the hazards and conditions change as the rains change the condition of the ground and they are faced with something new all the time.

Here are two sawyers we picked out to show the proper method of carrying saws and axes. They have to stop and study each tree because no two trees will fall alike. It is important to brush out before swinging an axe as you see them doing here.

In spite of a year of little snow, you will find a lot of snow in the woods because it takes a long time for it to leave. This is a birch tree that they are about to cut. They are getting their cut ready and in a few minutes you will see them notching it. I want to explain that the tree in the background is a hemlock and after they had cut through this birch, they found that it was hung up in the hemlock. It was necessary to fell the hemlock to get the birch down. You will notice how they cut the notches on the side so the tree will not kick back. So many accidents have happened from that cause. The sawyer is showing here just where the cut is going to be made and where it will come through. Later you will see that he is quite accurate. They are using hard maple wedges because they are tough. The purpose of notching and taking the bark off on the side is to keep the bark from running into the cut and stopping the progress of the saw.

The trees fall; you will notice that the sawyers are well out of the way.

The next operation is cutting off the limbs. This is a very important part of the work. Many accidents happen from men hitting each other with the axes. The tree is measured in the proper lengths and then cut.

Here are the two sawyers lining up another tree. This happens to be a hemlock. They are lining it up to get the right fall. Loggers in many instances now are very careful how they drop their trees and preserve as much of the timber as possible and they do not like to have three or four hung up because it is always a nasty operation to get them off. They want them to fall clean.

Here is the notching operation again. You will see them notching it on the sides.

I believe they will show you here also how the tree falls. Notice how the sawyers leave the scene as soon as the tree gives. The fellow to the left was an elderly man but he was tough. Notice this tree fall clean. A clean break. It must fall that way if it is notched properly. See how the man is up ahead, limbing the tree. He gets as much off of the tree now as he possibly can. Notice that there is plenty of room between them so there is no danger of hitting each other with the axe.

This is the skidding operation; taking out these logs that have been cut with the skidding trail where they are hauled to the landing to be loaded on sleighs. It is very important that the man skidding a log never stands between the log and the team because teams oftentimes move in such a way to catch and break his leg as a result. There is an operation following this that I want you men to be careful to see. This lumberjack did the wrong thing but he had been doing it so often, he said, that he kept on doing it. We tried to tell him what would happen. He said he realized the danger, but had never been taught differently. See how he has to step

out of position. He is right in between the logs. He takes two logs at a time. Watch him step out of there. The wrong place for him to be; he should be out of there in the first place. We put that in to show how these accidents happen.

These logs are now being brought up to the skidding deck to be loaded on the sleighs. It is very important in the loading to be sure that the loads on the sleighs are properly placed; that they lock properly so that there will be no give to it later on and break the load which often happens because of improper loading. The man on the load and everyone else is in danger.

In this operation notice how carefully they place the logs so they will hold. You will see them presently put on the chain and then load on top of that.

This is a continuation of the sleigh loading. You see, as I mentioned before, he is very careful to place his logs. You see him there putting the binder chain over. In hauling this sleigh out another common practice of the lumberjack is shown and is dangerous. You see this man standing right in front of the sleigh. Lumberjacks are peculiar people. They are very superstitious also. Some operations must be conducted with a certain amount of chance they feel. Here are the rollways where these sleighs are brought in at the landing, ready for loading onto freight cars for shipment to the saw mills. In this operation the top loader, of course, is the most important cog in the machine and it is his job to see that the rollways are properly spaced, not too steep and not too high. They like to make it just as high as they possibly can. It conserves space and is easy to load. Here is the top loader. You cannot see him very well.

This operation was taken quite a distance away from the scene that we just left of the cutting operations.

You notice here the proper spacing between the rollways. We will come back to that again to show you the closeup. It is very important that you have at least four feet clearance between these piles because in the event they should break down and you hadn't the clearance, it may take two or three rollways with it and whoever is in the way is killed. This shows the proper spacing; a closeup of the distance between the rollways. You see there that each rollway is easily unloaded on the railroad cars without interfering with the rollway next to it. This lumber or timber is a mixture of hardwood and hemlock. They make use of everything now.

This shows the lunch hour in the woods. At this particular camp they were so far removed from headquarters that the food was brought out to the men at the lunch hour. This shows the boys lining up to get their hot beans, green tea and pork, etc. The lean-to is built in the back as you see to cut off the cold wind which serves as a temporary housing. This is a scene in the State Park. We were through with the logging operations and as I had some footage left we took this trip to the State Park.

CHAIRMAN SMITH: Mr. Braun, we want to thank you and your company for presenting this picture to us. It has been very interesting, especially to those men who are in woodworking plants and do not have the opportunity to get out in the woods. It so happens that some years ago I used to inspect logging operations in the south. Of course, we had no snow and I always had heard that the operations were different up north, but it seems to me that they are a great deal alike. In the south we use steam engines; up north you use sleighs and tractors. The hazards are the same.

Is there any discussion on Mr. Braun's picture; any questions you would like to ask him?

M. C. GOODSPEED (General Electric Co., Erie, Pa.): I would like to ask Mr. Braun about that fellow that was between those logs. What did you do about him? Let him keep on doing as he had been for the past years, or did you persuade him to change his practice?

MR. BRAUN: Mr. Goodspeed, if you ever talked to a lumberjack you would realize the difficulty in making him do the thing right. We talked to him about it and the

manager or superintendent of the camp ordered him never to do it again because of the danger involved. Now, whether or not he is going to follow those instructions, I cannot tell, but he was ordered not to do it.

R. C. BARR (James S. Kemper & Co., Chicago): I think we have had similar experiences in the woods trying to promote safety work among the loggers and the lumberjacks. There are a couple of thoughts that I might add to the splendid picture that Mr. Braun has shown. One is the hauling by truck which he has mentioned. This involves considerable hazard that we in our safety work overlook. Of course, a good number of them can be prevented by proper care, but if you have ever watched a lumber truck with a trailer going up what is considered to be a slight grade, you would see what difficulties they have in the woods. Ordinarily the fellows that haul the logs are on contract and they provide their own equipment and it is not always of the best. I have seen them operate trucks without any brakes. They take chances on brakes. If they can get up enough speed to make the grade, they are all right. If they do not, they come to a stop and start sliding backwards and have no control of direction. I have seen some very narrow escapes when the trailer went into the ditch and it was a miracle that the driver was not fatally injured.

Another thing that came to my mind as I watched the progress of the picture was the use of a man in the docking operations and at the dock. Ordinarily a woods boss will collect two men for such operations; one right-handed and one left-handed, so that the right-handed man would not be at a loss. I think that is a very good point to have in mind and I think that any of us who are engaged in the logging industry see a great deal of need for more safety in the woods. Looking at it from a purely compensation insurance point of view, we find the rate for logging goes up quite steadily and, of course, the rates are adjusted according to experience.

F. A. POLLOCK (Lumbermens Mutual Casualty Co., Chicago): I would like to ask Mr. Braun what he is doing to prevent slipping in the woods in the winter. I find that that is an important hazard and we have not found any way to overcome it.

MR. BRAUN: The icy roads are sanded and as far as the slipping of the men is concerned, some of the camps have provided cleats for the lumberjacks that they can put on the bottoms of their rubber boots. Shoes are a mistake. Rubber is the only solution.

CHAIRMAN SMITH: About sanding roads, Mr. Braun, I wonder if sleighs are of standard tread? Would a truck and a sleigh run on the same iced road?

MR. BRAUN: In the picture you saw the kind of truck used. It is a very wide truck but that is not, of course, the kind of truck they use when hauling for team.

CHAIRMAN SMITH: Did you have motor trucking in mind?

MR. BRAUN: Motor trucking is entirely separate. They harden the road early in the season; they have footage but it is not iced.

CHAIRMAN SMITH: The next item on our program was to have been a talk by Mr. Pierson Kneeland. It was necessary that he attend a meeting in Washington, and, therefore, could not come. He did not want to send anyone to take his place so our good friend, J. H. Lee, has consented to show a picture that he has, reproducing accidents that have actually happened, as I understand it, in the woodworking plant.

J. H. LEE (Rockford Industrial Safety Council, Rockford, Ill.): How many of you fellows are more interested in the furniture end of it? Let me put it this way. How many of you are from woodworking plants where they use the lumber derived from the lumber process just shown us? Five, and the rest of you are all insurance inspectors who go out in the woods and look at these things that Mr. Braun has been showing us?

Some weeks ago up at Milwaukee I gave just a short talk on "Getting Cooperation in the Factory." You can either have that or you can have the movie that I have taken in the furniture factories of Rockford wherein we show accidents that have happened.

CHAIRMAN SMITH: Mr. Lee, may I suggest that your talk would be very appropriate and later on in the program we could show your picture? I am sure we would be interested in the picture.

Getting Cooperation in the Factory

By J. H. LEE

Rockford Industrial Safety Council, Rockford, Ill.

One day in one of the metal plants a fellow was assigned to duty in the experimental department. He was a metal worker and one of the men said to him, "George, take that board over to the furniture factory across the road and have them sand it and make it nice and smooth as I want to draw some sketches on it."

George took it over but he could not find the boss or anybody to smooth that board up for him, so he brought it back. It was quitting time so he threw it on the bench. The next morning he returned to work and thought, "Let's see, what was I doing yesterday? Oh yes, I was going to get that board smoothed up. I know how to do that, I saw them working a machine in the woodshop." So he went out and found an old rusted square head jointer. Goodness only knows how deep a cut it was set to take, but anyway, George took this thin board, it was less than a quarter of an inch thick, and he flopped her down on that jointer and he started to run it across to smooth it off himself. When he got just a little way, the knives cut through the board and, bingo! away went two perfectly good fingers. In the picture which I will show later, George was kind enough to reenact the accident.

Not so very long ago, a fellow in New York who was a very high public official was talking on cooperation and this is what he said: "Whether or not the employees choose to cooperate voluntarily is not of paramount importance. A strong executive can induce the men in his employ to do as he wishes regardless of their private opinion of the work he is carrying on. These strong executives can so entrench themselves that they can completely change the morale of the organization of men and workmen."

He is all wet. He is sopping, dripping wet; you can wring him out. Did you hear what he said? "Regardless of their private opinion." Is there anyone here who tried to put anything over regardless of the person's opinion and regardless of whether or not he chose to or not? That fellow is bearing down on an exceedingly thin board. It is only a question of time before the knives will bite through and where will his authority be? Men cannot be strong armed in cooperating; I do not care what the program is. Things have changed in the last ten or fifteen years. The industrial relation is no longer a matter of master and servants as it used to be. Man is providing more safety than ever before and men are cooperating.

I think some insurance man said, any man will tell you that 80 per cent (some make it 85 per cent) of the accidents that happen are not due to the lack of mechanical guards. In other words, they are accidents that could not have been prevented by guarding, they are mental. In other words, the management provides guards to take care of fifteen or twenty per cent of the accidents that happen.

There is a proverb, "A willing bird flies farther than a thrown stone." This fellow in New York should have looked up this proverb. Cooperation is, I think, necessary and we are getting it. Fellows, we are getting it, let me tell you.

In one Rockford plant they planned for weeks ahead and they pulled what they called a "safety meeting" and it was my pleasure to attend that meeting. They had this meeting in the basement of Al's home and they had a real honest-to-goodness safety meeting. They had twenty-five foremen and sub-foremen. They took the accident records right down there and went down the line. There was no "passing the buck", no "dropping the handkerchief." They got down to business

and the fellow that was responsible for the accident was right there to explain all about it. Then they had some refreshments and went home.

You know, as I drove the little old "Chevy" home, I thought how times had changed. Thirty years ago you could not imagine anything like that happening. Not on your tintype. Fifteen or twenty years ago, in those days of fights, they didn't have anything of that kind. I think it was a man by the name of Ross Bush who remarked in a speech that the old grievance committee of their plant had long since disbanded because of lack of function. They didn't have anything to talk about. So I say, in these later happier years, we are getting more cooperation in the plant because the management is going more than half way.

After all, safety is not primarily, as it used to be, a matter of reducing the experience in order to get cheaper compensation rates. That is where it started. If it had not been for the Workmen's Compensation Laws, I doubt if there would have been much done in the way of accident prevention. When the states began to pass these Workmen's Compensation Acts and the employers became liable for accidents, and the insurance company came to pay the bill, the management came along and stopped the accidents. That is what is going on now, but the spirit has changed. You will never get to first base if you talk in dollars and cents alone.

CHAIRMAN SMITH: We appreciate your talk very much, Mr. Lee, and I know that the folks here agree with you that cooperation is very essential in the reduction of accidents.

Is there any discussion?

G. H. CAIN (Fidelity & Casualty Company, Chicago): The last speaker said that you had to get the cooperation of the man. That is all right; there's no question about it, but I do say that unfortunately too few employees nowadays drive the employee in some respects. As an insurance man I can ask at a plant, "Why isn't that fellow wearing goggles?"

"Well, I just couldn't make him wear them."

That is a fine thing for an employer to say, and I ask, "Who is running this plant? You or that man?" Now there is cooperation probably. The employer is cooperating too far so that eventually a man loses an eye. That is not only with goggles, but with guards all the way through. You have got to drive them to a certain extent to cooperate with you. When you get that cooperation, everything is lovely.

CHAIRMAN SMITH: I think we are all inclined to agree with you and I think the quickest way to get cooperation in safety is by being able to show the management of a plant that the cost of the eye or the cost of a finger or a hand, or whatever it might be, is a small part of the actual cost. We have never really effectively put across the idea that the slowing down in production and the breaking in of a new man is the biggest part of the cost. I have seen where a man with a broken leg will shut down the whole plant for an hour before you can get the men all back to work. That is part of the cost of the accident and I know that most men will agree that foremen are very dumb sometimes.

H. J. KELLY (American Seating Co., Grand Rapids, Mich.): I got this grey hair from the days that Mr. Lee spoke about. I have known of those plants where a man would be able to work on a jointer without any instructions. That is lack of safety supervision in the plant. Where you have safety supervision in the plant you are going to cut down the accidents.

CHAIRMAN SMITH: I would like to tell you about one job I happen to be familiar with. Down in Kansas City, the Telephone Company decided to put a fourteen-story addition on an existing fifteen-story building. The building originally was designed for twenty-nine or thirty stories. It was necessary to practically wreck the two top stories of the existing building, the pent house and all of that, and it was quite a hazardous job. The contractor who took the job was a very reliable fellow, a very fine fellow, but the Telephone Company called us in

and they said, "See here, we do not want to build this building if we are going to kill anybody; we would rather not do it."

"We will see that you get the insurance", we answered, "but you must put an engineer on this." We went to a contractor friend of ours and he said that he had the man. This man used to be a steel worker and a concrete worker. The contractor loaned us this man. We brought him to Kansas City and the job went up. We didn't keep track of the hours of work etc., but in dollars and cents this was the answer. We collected \$47,000 in premium compensation and we spent \$2,500 in medical fees. That is just the answer to the whole thing. We did not have accidents; we just refused to have them. We had some near accidents; we had some that scared us to death, but we didn't have any really serious accidents. Perhaps it was a lot of luck. It may interest you to know that all around that building they had what I would call expansion cracks. They had a young man on the job, his name was George something, and he did this whole job of filling in these cracks; going up and down the building. One day he was within only twelve feet of the ground and was putting in a piece of terra cotta and didn't take time to tie the scaffold and it went down and he with it. Fortunately we had a good doctor and he was out of the hospital in six weeks time. That shows what can happen.

I was standing there one day and they were hoisting some reinforcing material. Short ends were left on the load and some dropped and went through the hood of a Dodge automobile. That could have been prevented at the steel plant.

We had perfect cooperation on the job. The Telephone Company was not satisfied with one man, and so they said, "We are going to hire your engineer and an assistant to stand on the street, that is all."

This job was especially interesting because everything had to be hoisted immediately when delivered because the building was on a busy corner. The job went right along. It was completed in about twelve or fourteen months. The contractor had a personal debt when he came on the job and he came out in perfect shape as far as compensation is concerned.

Now if there are no further comments, we will go along to our next paper. Mr. John Suleski, Safety Leader, Erie Works, General Electric Co., Erie, Pa., was to read this paper but unfortunately he has been unable to attend and Mr. M. C. Goodspeed, the safety engineer from that plant, will read Mr. Suleski's paper.

How to Get Group Safety Consciousness

By JOHN SULESKI

Safety Leader, Erie Works, General Electric Company, Erie, Pa.

The Motor Department of the Erie Works of the General Electric Company, which I have the pleasure of representing, has for a period of several years worked diligently that we might make Building No. 6 a safe place to work.

Our record of lost time accident cases of eight years ago, while comparable with or better than the average industrial centers, was one which I now hesitate to give. However, I might state that during the years preceding the organization of the committees, as mentioned later, a total of 87 lost-time accidents occurred. A study of these cases aroused the safety leaders into greater action, with the result that gratifying accomplishments were secured. The new step in employee education was the effort which was made to do something about lost-time accidents.

First a "Building Safety Committee" was organized, consisting of the foreman and three safety committee-men. They met monthly for the purpose of discussing the prevention of injuries and reducing lost-time cases. These conferences are very educational in that many viewpoints on safety work are obtained. The foreman's slant on this subject was obtained and his cooperation assured. This, I believe, is

of vital importance, as I know that, just like the coach of a football team, if the safety engineer doesn't get the cooperation of his men on the field, he won't bring home the pennant.

In connection with this, one of the foreman's duties is to make periodic inspection trips through the several departments. Each month a committee of four is appointed. A report is made of such items as poor housekeeping, improper piling of castings, the use of tools without handles and numerous other things. Though they may seem trivial, those which we consider a violation of safety rules are reported to the interested people, namely, the department foreman and safety leader.

Eternal vigilance is the price of safety. Enforcement of rules and orders on safety should be uppermost in the minds of all foremen. To violate orders of this nature is the same as violating any other order, which, of course, is not tolerated.

As the next step in the program, departmental safety committees were organized by the foreman in each of the several departments. These consist of workmen who are responsible for safety in their respective sections. Their enthusiasm and energy have permeated the entire shop.

The functions of this committee are on the whole similar to those of safety committees in other plants, but unlike the usual plan does not have permanent members. These members hold this appointment for a period of three months, when a new committee is formed. The object is to rotate committeemen and thereby eventually educate to safety-consciousness a relatively large group of employees.

Directed group discussions, the so-called conference method of getting group consciousness, is one of the most effective methods of training employees in the science of accident prevention.

Gratifying Results

The results obtained through these organizations has been most gratifying. However, the peak of that which might be realized from these efforts to reduce accidents seemed to have been reached in 1923, when our department record of only 18 lost-time accident cases, or 1.92 accidents per 100 employees, was established. A study of conditions clearly pointed out that to improve on our performance something more was necessary.

It was decided to re-awaken and promote greater enthusiasm by a contest organized between the employees having "odd" check numbers and those having "even" check numbers. Each team consisted of a captain and approximately fifteen picked men from the several departments, who made a special endeavor to preach and teach safety 24 hours a day. Joint meetings were held monthly at the call of team captains. This arrangement did not in any way take the place of other safety plans then in vogue.

This novel contest did create those conditions that had been looked for at the outset. Now, I do not say this in a spirit of braggadocio, but this was the exact result that we expected from the effort that was put forth.

The interest instilled was similar to the spirit of friendly rivalry which existed in intercollegiate sports of the good old Rah, Rah days when a contest was a signal to fight for.

The first contest was for a period of six months. The "Even" team won, having been charged with two lost-time cases, compared with nine for the "Odd" side.

The spirit of contest was evidenced by an immediate re-challenge for another six months. This time the victory changed hands; in other words, the "Odd" team got even, totalling one case against four for the "Even" team.

The year's result, 16 cases, or 1.37 per 100 employees, bettered by 11 per cent that of the previous year. Safety award plaques were presented to the winning team captains at the expiration of each competitive period. An extract from one of the awards reads as follows:

"In appreciation of the fine record made by the 'Odd Team' in Building No. 6 Safety Contest, who have improved their excellent safety performance of the previous year. Because of their keen sense of responsibility, their constant vigilance, and their ceaseless care, many homes are brighter; many men, women and children enjoy a full measure of health and happiness. Thus have the members of the 'Odd Team' proved themselves worthy of the highest praise and may it be an inspiration to the balance of the workers in Building No. 6."

A few years ago we thought that accident frequency was pretty close to rock bottom but a period of advanced achievement has just begun as evidenced by the above figures.

As a result of the 1929 half-year contests, the two team leaders were reappointed for a 1930 year contest and the same group and departmental set-up used. The year's record was only six lost-time accidents, or .39 per cent per 100 employees. The "Even" team lost again to the "Odd" with a 5-to-1 score.

Such an achievement, it would seem, left little opportunity for spectacular reductions in the future. But irreducible minimums invariably recede when skilled effort is applied.

While nothing has been said about it, the medical department, under the direction of Dr. T. A. Little, has played an important part in keeping down the accident rates. The Works first-aid hospital is the first line against infection and being within easy reach of every department there was no excuse for amateur dressing of wounds.

To facilitate the above program the dispensary case and follow-up record system was changed. A closer check-up meant better control of cases. Many more minor cases were treated. Infections and bad after-effects were minimized.

Three Advantages

This system gave us direct advantages:

1. Foreman will have immediate knowledge that worker had received an injury.
2. Avoid "no record cases" when employee applies for compensation or relief benefits.
3. Reporting for redressings more promptly.

Our employees are impressed with the importance of prompt treatment regardless of how trivial injury is. This is necessary because of the danger of infection. It also gives a chance to check the real cause of the accident.

These repeated "follow-ups" instill into the minds of those charged with this responsibility a keener appreciation of those in their charge. In the minds of the men a consciousness of safety is implanted whereby they are ever alert to the hazards attending their work.

When men among themselves say, "Buddy don't do that", it is ample evidence that the efforts have not been in vain. Moreover, the men were so encouraged that, where previously, when slightly injured, they offered this as an excuse to be relieved from work, they now keep on working in order to maintain the good record of their department and team.

Admitting that conditions were never more favorable than now for substantial accident reductions, this alone does not account for the present results.

In our 1931 endeavor to further reduce accidents, there was put into effect throughout the Erie Works the same safety plans which after the actual trial of several years had proven effective in our Building No. 6.

In our building we have added a committee which is to study accidents to equipment which do not result in injuries. You know that every equipment accident is potentially an accident to an individual. By the law of averages if we can eliminate equipment accidents we will also reduce accidents to individuals. Our experience in this will later be used to determine what plan will be most effective for the worker.

A concentrated attack from this angle should considerably promote the prevention of hazards. A few months trial has already shown some benefits. The sources of all accidents are better uncovered by this method of approach.

MR. GOODSPEED: I want to take this opportunity to just comment for a minute on two or three points in this paper. Some of you, I know, do not have shops but some of you do and I want to point out to you that the points made in this paper are applicable whether you have a force of 10,000 or 5,000 as we have in Erie, or fifty or five. Exactly the same set-up can be used and used effectively. It is simply a matter of starting with the small group and working up through to take care of the number of people you have or, reversing it, you take the big group and you divide it right straight down to the relatively small departmental group. Our small departments correspond with the small individual shop.

CHAIRMAN SMITH: If I may be allowed to comment a little further, I have gone into small plants to inspect them to see how things are going, and I have asked, "Had any accidents?"

"No, haven't had an accident for three or four years."

"How about John Jones, his leg was taken off."

"Oh, forgot all about it. You know, that is the first bad accident we have had in seven years."

If you stop and put that small plant on the same basis of rating as a big plant they probably shouldn't cut off a leg in fifty years. It is very hard to make them see that.

E. ROSS FARRA (Grand Rapids Safety Council, Grand Rapids, Michigan): I would like to ask your opinion. As chairman of the Nominating Committee, I am wondering if it would not be better for us to read our nominations this afternoon (you know in past years we have sometimes done it) so that everybody will feel that the Nominating Committee is not trying to use any steam roller tactics.

CHAIRMAN SMITH: I think it is perfectly in order, even though the election takes place tomorrow. If any one wants to put any independent in the field, it is all right.

Report of the Nominating Committee

E. ROSS FARRA (Chairman, Nominating Committee): The list of officers selected for your consideration is as follows:

General Chairman—R. C. BARR, James S. Keniper & Co., Chicago.

Vice-Chairman—J. W. SMITH, Employers Reinsurance Corp., Kansas City.

Vice-Chairman—LEWIS W. KEBBERG, Mengel Body Corporation, Louisville, Ky.

Secretary—W. A. WILSON, Frank Graves Sash Door & Mill Co., Los Angeles, Calif.

Chairmen of Committees

Membership—M. C. GOODSPEED, General Electric Co., Erie, Pa.

Poster—E. ROSS FARRA, Grand Rapids Safety Council, Grand Rapids, Mich.

Statistics—JOHN H. LEE, Rockford Ind. Saf. Council, Rockford, Ill.

Programs—F. A. POLLOCK, Lumbermens Mutual Casualty Company, Chicago.

Slides & Safety Kinks—F. W. BRAUN, Employers Mutual Liability Ins. Co., Wausau, Wis.

Engineering—ARTHUR MURRAY, Container Corporation of America, Chicago.

Health—GLENN F. GRIFFIN, American Seating Co., Grand Rapids.

News-Letter Editor—ROLAND JONES, Sarty Manufacturing Co., Chicago.

Associate News-Letter Editor—MAJOR H. STEERE-CLARK, British Columbia Loggers Assn., Vancouver, B. C., Canada.

Additional Members of Executive Committee at Large:

HARRY GUILBERT, The Pullman Company, Chicago.

A. O. JACKSON, Actua Life Insurance Co., New York City.

HERBERT WEISBERG, Lumber Mutual Casualty Co., New York City.

CHAIRMAN SMITH: Most of you will agree with me that that is a very good slate. We will have the election in the morning. However, if there are any comments or suggestions any of you have, the Nominating Committee will be glad to receive them.

We will next have Mr. Lee's moving picture.

(J. H. Lee, Rockford Industrial Safety Council, showed moving picture of actual accidents as they happened in woodworking shops in Rockford.)

ADJOURNMENT

Wednesday Morning Session

October 14, 1931

J. W. SMITH, Chairman

Employers Reinsurance Corporation, Kansas City, Mo.

The second session of the Woodworking and Lumber Manufacturing section convened with Vice-Chairman Smith presiding.

CHAIRMAN SMITH: The first thing on our program is election of officers. We will hear from the chairman of the Nominating Committee.

(Mr. E. Ross Farra read the nominees for the coming year.)

MR. FARRA: I submit to you the report and move that it be accepted.

CHAIRMAN SMITH: You have all heard the nominations as read by the chairman of the Nominating Committee. Has anyone any other nominations?

(The motion was seconded and carried.)

CHAIRMAN SMITH: The first paper on the program this morning is by Mr. R. C. Barr, of the Lumbermens Mutual Casualty Co.

Why Are We Not Making Greater Progress in Lumbering and Woodworking Safety?

By R. C. BARR

Chief Safety Engineer, Lumbermens Mutual Casualty Co., Chicago

When we wish to determine whether or not a definite improvement is being made in the organized attempt of industry to reduce preventable accidents, we naturally look for our answer to some agency that collects such information.

But the information we obtain is either inadequate for proper determination or embraces so many industries with varying hazards that it is rather meaningless for those concerned with accident prevention.

If we take our figures from the Bureau of the Census we find that the mortality rates cannot be used for comparison in our own industry. The hazard in our industry is not comparable to the hazards of another, and accidents to persons of all ages, and to persons in all lines of commerce including transportation, are used in computing the mortality rate.

Our industrial fatality frequency rates are more uniform for they are based on hours worked in the various plants engaged in the production of a certain product or group of products of a like nature.

Many of you have read the information contained in booklets published by the National Safety Council each year entitled "Industrial Accident Statistics." Some of you have seen the experience of reporting members in the Woodworking trade during the year 1930, given in the Council report.

What do you think of it? Not a great deal of advancement, is there?

And here's a message for you men who might be engaged in the logging business. The frequency and severity rates for your industry were higher than for any branch of the mining industry except bituminous coal mining which had lower frequency but higher severity. Think of it! Men working underground in relatively cramped quarters with subdued light and in frequent contact with many hazards are hurt less frequently than men in the woods where light is good and working conditions in general are more conducive to a favorable accident record.

The woods boss and the mine boss seem to be confronted with the same problem when it comes to direct supervision of the workmen for their crews in each industry are sometimes widely scattered.

Twenty-two companies engaged in logging reported to the Council. Nine of them

reported more than 80 accidents per million hours worked. Thirteen accidents resulted fatally.

If you have not studied the statistics published by the Council, secure a copy and study it carefully. You will find that saw mills and planing mills have a frequency rate next to logging in this section.

With the exception of furniture factories, our woodworking divisions have about eight more lost-time injuries per million hours worked than occur, on an average, in all industries. Severity, however, is distinctly lower.

Some members of the section have made some remarkably good records and are deserving of commendation in their accomplishment. It is not just luck or good fortune that accomplishes these results. It is the result of determination, first on the part of executives in the individual enterprise and next on the part of the men who actually supervise the work.

Perhaps you have heard of the farmer who crossed his hens with his pet parrot. Formerly he had spent considerable time looking for eggs. Now a hen walks up to him and says, "Hank, I have just laid an egg. Go out and get it."

So it is with the safety records established by certain members of our section. They have demonstrated that better records can be made—go thou and do likewise.

What is the answer to the problem? How are we going to reduce the accident frequency and severity rates in the logging and lumbering and woodworking trade in general? Executive interest and participation in organized safety work is paramount. We all agree on that point. Without it there is some doubt as to the sincerity of the effort. Orderliness or "good housekeeping" is another important factor. Men working in a clean orderly establishment have less accident exposure to contend with.

When they notice that appearances in general are improving it creates a desire among individuals to "dress up" their own working place and very often their own personal appearance is improved as a direct result of the "general clean up campaign."

Council records show that in 99 Woodworking and Lumbering organizations reporting during the past three years, a 17 per cent reduction in frequency has been accomplished. This sounds real good, but when compared with an average reduction of 28 per cent recorded by 1500 identical plants in all industries it is not so good. The one bright star on the horizon is the 7 per cent decrease in severity as compared with 8 per cent for industry as a whole.

There never was a time in the history of our country when organized safety work was weighted with more importance than it is today, even if for nothing more than the economic value of the undertaking. When Compensation laws were drafted, the conditions existing today could not be readily foreseen.

Substantially, the law in a number of states indicates that two thirds of the average weekly wages of the wage earner shall be paid during the period of disability beyond the legal waiting period. With some manufacturing plants curtailing their operations to a three day week, you can readily see what influence the law has on the present situation. The insurance carrier collects a premium computed on the actual payroll, but compensation is paid representing two thirds of the average weekly wage. Can you imagine what this condition will do to the individual loss ratio on risks unfortunate enough to have a few serious or semi-serious accidents?

Wisconsin law specifies that the formula for computing compensation shall be 300 times the daily wage divided by 50. In Michigan the law requires that 6 times the daily wage shall be the compensation due the injured employee. If he only works three days per week his compensation actually exceeds his actual earnings. How many of these workmen will be glad to return to work when actually able to do so? This condition will correct itself when normalcy returns but experience rates are established as time advances.

The manufacturer who recognizes this condition and properly controls accident frequency and severity among his employees now will more effectively control his accident cost in the future.

"Safety is immunity from danger to human pursuits, pleasures and relationships," says Lewis DeBlois. Success in safety work, then, depends to a considerable extent on the ability of the leaders in a certain industry to build up a sense of safety consciousness to the end that orderly work places will be maintained and orderly procedure followed in the mode of operation.

A low frequency and severity rate for a single year should be the stepping stone for further accomplishment, but should not be taken as evidence that the accident problem has been solved.

"No accident" records have a positive significance for definite periods because the frequency and severity rates are zero and the more plants who strive for extended accident free periods, the more certain we are for a Nation wide improvement in both loss and frequency rates in the trade.

We should not be satisfied with keeping our trend line horizontal, but should endeavor by all means possible to broaden the radius and scope of individual activities.

The railroads, the steel and oil industry, the automobile industry and many other of the principal industries of our country are highly organized in the work of accident prevention and the frequency and severity rates show permanently satisfactory improvement.

The woodworking and lumbering industries as a class are not getting the results which might be obtained if more of the individual plants would show greater concentration on this important work.

It is true that some of our members have made some really remarkable records and in so doing have eased the burden on other plants not yet members of the Council through lower insurance cost. What can be done by a few can be done by many if determination predominates.

All over the United States various conventions of men interested in lumbering and the woodworking trades, are being held each year. All phases of their business are discussed at these meetings. Safety and concerted action in accident prevention in the trade should hold an important place at these meetings for accident cost is surely an item of overhead which can not be safely overlooked in any program of economy in operation.

Industries have not been generally successful in reducing serious injuries to the same extent as temporary disabilities. This is undoubtedly explained, in part, by the rapid increase in the use of mechanical equipment which has probably introduced new hazards resulting in more serious injuries than previously.

Frequency and severity rates may be artificially raised by more accurate reporting. Companies appear to be more willing to furnish information on their serious injuries. Every company should arrange to keep an accurate record of their accidents and the cost of settlement on individual claims if possible to obtain.

A more liberal interpretation of Compensation Laws by arbitration and similar bodies may increase the percentage of disability over former estimates.

A careful investigation of all injuries and near accidents has been emphasized in accident prevention work. The value of such work is becoming increasingly more evident to the manufacturer. Many companies have decided to make effective use of such information by making the facts generally known to other companies in the group so that each may profit by the experience. In this way accidents of an unusual nature may be avoided. Insurance engineers are constantly using information of this nature to the advantage of the company he represents as well as to the insured company.

The officers of this section appreciate the interest members are taking in the statistical service of the section by sending their annual reports to headquarters. The value of this service is demonstrated by steady increases in the number reporting from year to year: 1929 reports were received from 222 establishments, but in spite of the depression, we received 1930 reports from 233 organizations.

Naturally, the increasing number of reports received make our statistics more reliable. We would be grateful indeed, if that half of our section not reporting would send in their figures for 1931.

Sometimes excuses are given in wood operations by the woods boss and crew boss, saying that they can't watch these fellows all the time; that they have crews stationed at different parts and therefore do not have direct supervision over all the men. If they were assembled in one group it would be possible to have them under supervision all the time.

How many of you have gone into the woodworking plants and found conditions in a chaos? Underneath the benches you have found collections of dust perhaps of two or three years' standing. Men stumble over the rubbish. They are never asked to pick up things, but just the minute somebody steps in that organization and starts to clean it up, washes the windows so as to give better light, cleans down the webs and gives the walls a coat of white paint or some other light reflecting agency, the men commence to raise their heads a little higher and they finally begin to dress up their own persons to make a better appearance, and it makes it a better place to work in.

There are too many of us who are inclined to rest on our laurels. If we have had four years of good experience, we think we have the problem solved and kicked, only to find out at the end or the middle of the fifth year that there is something to pay and we become impressed with the idea to tighten down the clamps and be on the alert all the time.

I do not think, gentlemen, that we go quite deep enough in reporting an accident to our Insurance Company or our organization. We do not get at the basic causes. Some of you have read Mr. Heinrich's article on the basic causes of accidents. When you get down to the basic cause, I think you will find the solution; the problem will no longer be a real problem. We are inclined to say a man fell down stairs. There may be several reasons for that man falling down stairs. It is our duty to get at the primary reason for it.

In conclusion I would like to say that we are going to try and build up the Woodworking Section this coming year and as a newly elected officer I am going to count on every one of you for support in this undertaking.

F. A. POLLOCK (Lumbermens Mutual Casualty Co., Chicago): I know from my experience, in logging wood, that when a man is hurt in an accident, the reason for that accident is not gone into as thoroughly as it might. On all our reports we require the superintendent or foreman to suggest what can be done to prevent another accident of the same kind. Any logging operations that I work in, the foreman is required to do that. I think it starts them thinking along the right lines.

CHAIRMAN SMITH: I recall an instance one time when we were getting ready to take photographs of some accidents, reproducing them. We were going through the files and came along to a case of a man who was a brakeman on a log train. Because of a slight grade and a small locomotive they had to make a flying switch going up the grade (the train never ran over four or five miles an hour). For a year and a half this fellow had been going over the head end of the locomotive, running ahead and throwing the switch. One morning he stepped off in the middle of the track and the train killed him. When we went down to this place to make the picture, I found the engineer who had been on the job at that time, and asked him about it. It turned out that this chap was having trouble with his wife and she had sued him for divorce and he was standing in the cab telling the engineer about it at this particular point. His mind was not on his work at all. It was off in a court house or wherever his wife might have been at that time, and it is the first time, the engineer said, that this man got off in the center of the track. Just how that accident could be prevented, I do not know, but it is something to think about.

M. C. GOOSEFORD (General Electric Co., Erie, Pa.): I would like to ask Mr. Pollock what results he is getting from that questionnaire that the foremen are required to fill out. Do they give you real constructive answers or do they just tend to gloss them over?

MR. POLLOCK: I have the privilege of visiting once a month a large logging operation in northern Wisconsin. We have our foremen's meetings in the woods on my visits. At this meeting these questions are thrashed out and the boys know if they do not answer the question in a constructive manner, that their general manager will call them on it. He attends those meetings with me.

MR. GOOSEFORD: I would further like to ask whether they have made any attempt to analyze the accidents to equipment that did not cause personal injuries? Suppose that you have a drag line that breaks and wraps things up but does not happen to catch a person. Do you analyze that accident to find out whose fault it is or find what caused it to break so that better supervision and better inspection will be exercised and thus prevent a like accident that would probably result in an injury?

MR. POLLOCK: That is taken care of by the foreman and when I am on the job I go over all the machines with him and see whether or not there is anything wrong. Most of that work is done in the monthly inspection. The foreman is supposed to look after the equipment. But he does not report on those cases.

MR. FARRA: I had the extreme pleasure of being chairman of this section twice, in 1925 and 1926, and my humble opinion is that the reason we do not get our section built up is because we are largely a group of men who are interested in woodworking only as a minor part of our major operation. That is the argument I have found in so many cases where I have personally tried to get companies into this section, and I am just wondering if the fellows who are here today won't go out and give Ray Barr their support this coming year to the extent that you will interest woodworking superintendents or general foremen of industries in your neighborhood, and get them definitely into this Woodworking Section because it has much to offer everybody. Three or four years ago this section had 250 in the morning session. We had a good attendance yesterday afternoon and pretty good this morning, but it should be larger.

One Wide Stair Tread Caused the Accidents

One more observation, Mr. Barr was talking about fundamental causes of accidents. It reminds me of a case where we had a lot of girls working. They worked on the second floor and had to come down two half flights of stairs to get down to the first floor to get out of the plant. Every day we had some girl fall down the stairs and injure herself. We had one who broke her limb. We did everything. We thought at first that they were wearing high heeled shoes, and went so far as to forbid them to wear them, but they continued to fall down the stairs, and I want to tell you right now, it had us all puzzled. You know we actually found a tread on one of those steps that was seven eighths of an inch wider than the others. I measured every step. They all measured alike except that one where the tread was seven eighths of an inch wider. It was always on that step that the girls fell. The men fell down occasionally but most of the time it was the women. The minute we changed that tread, we stopped all our falling accidents on those stairs. You have got to dig deep to find a cause, but when you once find it, it is worth it.

MR. BARR: I want to thank Mr. Ross Farra for his thoughtfulness in asking for the support of all these present for this coming year.

CHAIRMAN SMITH: Mr. Murray, chairman of the Engineering Committee is here today and as we missed his report, I would like to have him tell us just what that committee did last year.

ARTHUR MURRAY (Container Corp. of America, Chicago, Ill.): Chairman and fellow members. Starting my term of office last year we had no unfinished business left over from the previous administration so we held an early committee meeting in Chicago with Frank Pollock, our present secretary, and Ray Barr and Mr. Ferguson of the Council's staff sitting in. We proposed then a series of pamphlets not only for the year which has just come to a close, but for succeeding years on woodworking risks, such as an Insurance Company would rate on separate classifications. We started in successfully with one. Mr. Barr was in back of this and it was largely due

to his personal efforts and his association that we have been able to have that finally passed by the Council and it is now in process of publication. I imagine it will be released to all members during the next few days.

In addition, we have proposed a safe practices pamphlet on wood preserving. We started nicely and thought we were going to make good headway until the business depression scared our sponsors away from handling the job, but I think we are going to see immediate progress.

In addition to that we have approached the excelsior industry on preparing safe practices pamphlets. That should proceed at least in part, during the next twelve months. In addition, we have suggested a pamphlet on "Safe Practices for Plant Lumber Yards and Kilns." We felt that we should have a separate pamphlet for that subject rather than just tagging it onto every other safety practice pamphlet. We have further suggested amending or suggesting amendments to the existing codes on sawmills and veneer mills. We feel that there have been many improvements since the last codes have been issued. They have been in existence for about ten years I believe.

MR. BARR: We would, of course, have to deal with the original sponsors of the Codes before any changes could be made.

We made approaches to the woodenware manufacturing industry to develop a safe practices pamphlet on their industry and it will probably include, either in a joint form or a supplementary form, safe practices on coopers stock and coopers manufacturing.

Another safe practices pamphlet which we are considering and which we should be able to produce during the next two years at least, is one covering miscellaneous industries such as wood flooring manufacturing and wood boxing manufacturing, which are really in the rough lumber manufacturing class.

Suggestions Requested

CHAIRMAN SMITH: I think the work of the Engineering Committee of this section is of extreme importance and I want to ask that all of you offer freely any suggestions you have for any of these pamphlets. There are so many things that are different in different plants, in different industries. Manufacturing in the south is not the same as in the north. Your principles are the same but you run into different hazards in various sections. You come from all corners of the country and you should offer suggestions freely.

ROLAND JONES (Surtz Mfg. Co., Chicago): I believe it would be a good thing for this section, say for this next year, to devote a little more time and try and get some real live speakers on the remanufacturing of lumber. Now I am down on the lower floor and I get the comments of a good many. As Mr. Barr said, this used to be a real section and I believe there are a great many who do not come to this section because of the fact that for the past year or two years it has been devoted largely to the woods and sawmills. What majority or what percentage of people here are interested in the sawmills or the woods as compared with the remanufacturing or furniture factories and, I would say, more than anything else, our small planing mills. I have hammered on that to a great extent in other conventions, state conventions. It is a problem to take care of the small plant such as the small planing mill that does not know how to spell the word "safety". I believe we could build up this section and do probably more good if we would try and get hold of one or two good men to discuss or read papers pertaining to remanufacturing of lumber. This is merely a suggestion.

CHAIRMAN SMITH: Your suggestion is a good one, Mr. Jones, and I am sure Mr. Barr will bear it in mind in preparing the program for the next year. My suggestion would be that we have a session for sawmills and logging, and another for the remanufacturing men.

CHAIRMAN SMITH: Now for our next paper by Mr. G. F. Meyne.

Handling Men and Materials

By GERHARDT F. MEYNE

President, Gerhardt F. Meyne Company, Chicago

I have just made a few notes on thoughts I had that I would like to give this meeting the benefit of. Whoever it was that asked me to speak, asked me to prepare a paper, but I told him I would not do it.

I approached this thing probably a little bit differently because I approached it from two sides. One is the human side and the other is the viewpoint of economy to the employer as well as the economy of insurance. The three of them cannot be very well separated.

By the way, how many employers are there here? By that I mean heads of their own concerns or presidents of their own companies or somebody who is, what I would say, the main stem of their company. I ask this because I want to direct myself chiefly to the employer and I hope you take the word back to your employer because after all, a man's business reflects himself. I want to repeat, a man's business reflects himself. If he is not interested in safety, there won't be any safety practiced in his business and if he is very much interested in the small planing mill that the gentleman referred to, his interests will be well protected, and as I see it, the question of safety and safe practice is chiefly educational and not legislative. I suppose I differ sharply with a good many of the officers of the Safety Council in that remark.

I do not believe that you can legislate safety into any employer or superintendent or into any manufacturer. You have to educate it into him and by educating it into him, he in turn educates the workman on the job. I am against a fixed code, that is, a fixed code to be established in all places. We have had these codes prepared and submitted for legislation and we have found that the man whose mind was of the small town nature with small town operations was endeavoring to write the code of New York and the city of Chicago, and also that the provincial New Yorker and provincial Chicagoan was trying to write a code for the man who was building small works in smaller towns, frame houses and dwellings and things of that kind.

Now obviously we have tried this code business in our own state in the building code and have gotten nowhere. We found that it just does not operate. To illustrate, and I believe I said that once before in a meeting of this sort, it was a code prepared by some committee on building work, I read the code over with considerable care and one thing that always stood out in my mind was that in excavated basements there should be so many ladders, so many feet apart and each strip should have so many nails in it. Now it is perfectly obvious that an excavation of that kind may have needed twice as many ladders or probably not one quarter as many ladders depending upon how many were working and how fast you were going to operate. To me, these things should be left entirely to the discretion of the employer or his agent.

If you have fixed legislative codes (I do not know how many people here have to do with factory inspection or are building inspectors) and have inspectors placed in your factory or in your business, who can know very little about it but have some notion about the work and they endeavor to tell you how you should run your plant, then this inspection can be a considerable hazard, and one thing I would like to bring out to you is that it can always lead to considerable graft and considerable racket. Those of you who come from large cities know what I mean by racketeering. It is a very splendid racketeering, just like gold digging is.

As an example of a code, in Chicago if we want to take down some work three or four stories high, it is comparatively light work, but needs a little stiffer scaffold than a plain rope scaffold, we are compelled to build a scaffold of 300 pounds to a square foot when the greatest possible that you would need would probably be 10 pounds to the square foot. Yet the law requires 300 pounds per square foot and can make you put it up. So you see how easy it develops into a case of a racket where

somebody who has a great deal of work, left-handed work to do, can get to bidding and the competitor has to suffer when he bids on that work.

I said before that the employer would have to be the principal educator and inspector. I know whereof I speak. I have insisted on safe practices and probably have raised more difficulty for my foremen and superintendents than anybody else, that is, as far as safe practice is concerned. For instance, it is not below my dignity to look over my laborers to see if they have good soles on their shoes when they work on used lumber, taking nails out and things of that kind and it is not below my dignity to see to it that the overalls they wear are not folded up two or three times around the bottom so that they form a bulky cuff and catch into things when they climb or walk on the floor and stumble and pitch into an opening or something of that kind and fall down; and it is not below my dignity when I climb up a ladder in one of my buildings to see that the ladder is standing sufficiently above the floor so that a man with a load on his back will not fall down backward, and you don't know, Mr. Chairman, how much difficulty you have in making your men construct sound and substantial ladders. They won't unless you make them fit extensions above the floor and they won't put the top rung just an inch or two above the floor and they won't use heavy material for cross pieces; and they like to see a ladder swing instead of making it rigid and workable so that you can do work with ease and with economy.

Now I am coming into the one thing that I want to talk about a little more at length, and by the way, gentlemen, if any one of you cares to ask questions when I am through, I will be very glad to answer such questions as I can and enter into the discussion to defend such points as I can. I always believe that you get more out of a discussion if you have the privilege to ask questions for many things come up that are otherwise overlooked. From the economical viewpoint or the cost to the employer, which is the insurance rate, the employer has a perfect right if he runs his job carefully, to ask for experience ratings. It is customary I know among insurance companies. He has an additional right to bargain with his insurance company for a better rating than the average experience rating in his line may be. We did just that thing for a number of years past.

Our business happens to be peculiar in some lines and we insist that we have special classifications made up. We do considerable office interiors which require bricklayers, plasterers, carpenters and painters. Now naturally a bricklayer who is laying a tile partition in a room where the ceiling is only six or ten feet high is not subject to the same or as many hazards as the one who is hanging out on a twenty or a forty story building, consequently, that man's rate should be less, for he is not subject to the hazards of a man working on the twenty or forty story building. There is no hazard to it except if he should hit his thumb with a hammer or trowel, or jump down the elevator shafts if he is in a hurry to get down for lunch, but I am trying to bring out this experience rating. Now I am a general contractor and we have twenty-five rates that we apply to our business. We started in with three.

We have so classified our business and have insisted on watching it that our insurance bills are never what they used to be and our experience rates that we now pay are not near what we used to pay because of careful operation and those of you who can't get your employers, your chiefs, to see that any money spent for safety is a saving, just tell him that there is somebody who has had experience and who has had considerable saving because he has taken an interest in safety work.

One of the few things that give us some concern is with the foremen at the work. They do not get sufficient detail to properly fill out the accident blanks. It doesn't cost anything, because the insurance company takes care of it, but here is what I am after. I believe that the insurance rates can be further divided and still better rates be obtained if the employee who makes out these accident blanks is careful to describe how the accidents occur and then a check up should be made as to how much they cost the company or the insurance company and how frequently they occur. That full detail is absolutely necessary to the rate makers. We will come to them a little bit later.

Now, I am touching on the high lights of the things that are not usually done in the general contracting business which have come to the attention of someone of experience on the Executive Committee of our State Association. There are a number of men who get the habit of getting hurt. You have all had that. What are you going to do about them? I have only found one thing to do and that is to kick them off the job. I have had men who used to get hurt every third week. Either something happened to their fingers, or they had a sore back, or a wrench or something of that kind. There is only one thing to do and that is to get rid of them. Education cannot do any good. You cannot tell them. And then you have the man who is constantly careless. He doesn't get hurt himself, but he is instrumental in getting others hurt. Only one thing to do is get rid of him. Let somebody else use him. Take away his compensation insurance and he will not get hurt so often.

Now coming back to legislation. We, in Illinois, had a sad experience last year in our compensation act which introduced a number of things which would have increased our insurance rate eighty-three per cent and it would have been very difficult to prove whether a man ought to be on the compensation list or not and whether he would have an occupational disease or not.

It is very difficult to distinguish between occupational disease and just plain hernias. If a man has a sore back that may come from a number of things that he did outside of working hours and if we get the compensation and occupational disease code, social revolution will take place in employment of men. Employers will not be able to employ anybody over 45. Only the young will get a job. If, for instance, we have some of the sad things that have happened in Europe in connection with occupational diseases thrust upon us, the first thing every employer would have to do would be to insist that the men have a thorough physical examination in every direction. Now you know that that is practically impossible as far as the building business is concerned. Yet, that would be necessary. When you pay high compensation you want these men to be physically fit, especially if you have the occupational question confronting you, you want to be sure that they haven't hernias and some of the other things that keep them from work, and it is pretty difficult with hernia. An employee may have had it for some time and he may have gotten it on your job and we have had the experience they usually get it two hours before they are laid off when they know a layoff is coming.

You would have to give men a real examination before you hired any at all. According to my view, you would be putting the old men, that is, the men over forty-five on the shelf. I don't see many that are over forty-five that don't still feel strong and my experience has been that the man over forty-five is worthwhile because he uses his head. So, it is a thing that must be seriously thought about before you go into it and have your legislative code accept occupational diseases because who can tell about Bright's disease or diabetes without a thorough examination.

Now here is one of the things that is very seriously objected to by me. The insurance companies with whom I insure make the rates, and I haven't anything to say about them excepting through bargaining. What is more, they don't get good information because the accident blank that is made out does not bear, unless the employer insists on it, the classification number under which this man has been insured or under which the employer has him protected. Now I feel that when you make out these reports, in order to have your employers or your chiefs get a fair showing at this insurance rating, you should insist that the classification, the number under which the accident is classified, be placed on the accident report so that the men who do this work have an opportunity to study and make up their statistics whereby the insurance rate is found.

Now generally speaking, the setting of structural steel on forty-story buildings is the same as on a three-story building or a store front. Now obviously, there are more accidents on the forty-story building than there are on a store front or on a three-story building. The three-story building should pay only its fair proportion to insurance but the forty-story building should pay its proportion to the insurance. Now,

when these reports come into the insurance people, they do not know whether this man worked on a three-story building or a forty-story building or what. This is a serious matter, gentlemen, the proper information should be given to the men who make the rates. Your chiefs should then insist on a proper hearing and you can represent them because you have the information that the chief does not possess.

We are doing a lot of work in Chicago and other places on safety work. The insurance companies usually have some young man out who hasn't had the experience of actually constructing a building or had any experience in construction work, but his business is that of applying rates to see that the insurance companies get the money the classification describes. I feel that we ought to have a joint safety engineer. It does not make much difference who pays him, but this safety engineer should take into consideration the contractor's viewpoint and also the viewpoint of the insurance company. I have had correspondence with these men; I have had untold arguments with them; I have sent photographs; I have worked at headquarters and always won our case. I would like to see some of these men on my work sometime; see what they look like. I read their reports when they come to me with a question on the applying of a rate, but I have never met any of these men and sometimes I believe they never get on the job except before seven o'clock in the morning and after eight o'clock at night so nobody can see them.

Now I believe that a safety engineer can do very much. I know of companies that have quite good ones. I can tell that they are good by the intelligent way they take a problem and the letters they write. If you could work with a safety engineer who knew his business, who went from factory to factory, who saw the appliances, who saw how people ran their business, who had good experience, you would get the benefit of the experiences gained from other plants. Just think of the money you could save in lower rates, the misery you could save and the ease and alacrity with which you could run your factory. Now, an employer can do many things, of course. He can issue an order but if he does not get on the job to insist that it is carried out, his educational work is for nothing.

I want to say something about accounting. This probably doesn't belong in a Safety Council but it belongs to the accounting and has to do with insurance companies and their money. We have twenty-five rates that are applied every week. The insurance company is entitled to its money and if there are any cheaters in your line of business you pay for the cheater. Consequently, I am insisting all the time on having voucher audits by the insurance companies on my own books because it has been known that men have run double sets of books and have beat the insurance companies out of a great deal of money. I have been paying for these chaps and I refuse to do it if I can help it, so I have evolved a system that has been copied very largely by a number of companies. The payroll is closed on Thursday night. On Friday the payroll is made out and usually it takes all day. About the first thing the bookkeeper does on Saturday morning is to apply the classifications on the back of the payroll and he does it every Saturday morning, so I know exactly what the insurance companies are to get from me. Before, I couldn't for the life of me know how much they were to get from me, and they couldn't know for the life of them how much I owed them, and they are pretty good guessers and their auditors are men who are smart and would get all that the traffic would bear. So, we take care of that every Saturday morning and we never have difficulty with our insurance companies. They are always glad to come in and as I have said, they have followed our course and have endeavored to have other contractors adopt it.

That goes also for the reduction of rates for if every man in the industry keeps his work carefully, naturally the cheaters are weeded out and responsible men will not have to pay for their work. Now as to the question of auditing and paying for insurance I think that the present system of so much percentage on a dollar is not the best way to handle it. I think it should be applied so many cents per hour because the smaller operator without an organization cannot, will not, apply the proper rates. If

he has it on an hourly basis, it is easier for him to compute. He knows what it costs on his bills, material bills, and on his time.

It has been found in my organization the rate on masonry is comparatively high. Comparatively few bricklayers get hurt. The laborers are the ones who get hurt because they are the ones who run nails in their shoes; they are the ones that fall in holes and are injured by falling material. The bricklayer, himself, is very seldom hurt, but his attendant is the one that is being hurt. Yet the bricklayer is getting the bigger money and the tender the smaller. There would be quite a saving if the hourly rate would be applied. On carpentry work (structural carpentry) the rate is high, on interior trim, it is low. There are two different classes of workmen usually employed. The interior trim man seldom gets hurt and the structural carpenter man is the fellow who hammers his hand or he falls or his shoulder is hurt or something of that kind occurs to him, but I believe that the trim insurance could still be reduced even if the structural carpentry would have to be increased.

Why not place the burden exactly where it belongs? I am leaving that thought with you so that we will endeavor to get as near uniform rates as possible. We are careful to see that the insurance companies get all that belongs to them, but we ought to furnish the classification number on the accident blanks so that the rate making bureau will have complete information and so that we will not have to pay for somebody who doesn't make honest returns to the company.

The last word I want to leave with you is the word I started out with and that is to say that safety work usually reflects the employers. If he is for it, the organization is for it.

M. L. GARWOOD (Lumbermen's Mutual Casualty Co., Chicago): I would like to qualify just for a minute as far as experience is concerned. I have had opportunities to come in contact with probably all kinds of inspection work and I have passed up through that into underwriting. Now as far as this gentleman is concerned, I will say this, that if every employer was like him, we would not have any need of safety work. This gentleman has been educated in safety. Probably he does not need the insurance safety service as much as other employers do. As far as the rate is concerned, I would like to say that in the National Council, the insurance companies have a representative who looks after the interest of the employer, i. e., his business. He is not paid by the company; he is paid by the insurance commissioners. He is a direct representative of the people and he is responsible to them for the proper making of the rate so that the employer does really have a representative in the National Council and I want to tell you that Commissioner Hobbs is very sincere in his criticisms and he is a man who is an actuary and he understands.

MR. MEYNE: Is he an operator?

MR. GARWOOD: No.

MR. MEYNE: The point I am trying to get over is the actual employer, the man who pays the bill, should be permitted to take his case to the Board of Commissioners and have the opportunity to be heard.

MR. GARWOOD: As far as this is concerned, in most of the bureaus, any employers who wish to come before the Board may do so, but most of the men on the committee who make the rates are men of wide experience, men who have been in this business for years and have worked from the ground up and know all phases of the work in which they are making the rates. I want to say that this gentleman has brought out a very strong point, and that is that safety work is of economical value: if every employer at every plant and industry makes his own rates, there is of course a general rate, but if every employer makes his own rate and if the rate is higher for one plant than it is for the other, it is simply due to the fact that one employer does not take the same care or does not exercise exact supervision or moral supervision as the other does. As far as insurance companies are concerned, they want to reduce the rates. They are not interested in getting all the money they can out of the employer, they spend a large amount every year for safety engineer work. They send their engineer

in the plant with the idea of reducing the accidents and cost of losses. When the cost of the losses goes down, the cost of the insurance goes down.

Mr. MEYNE: In defense of the gentleman who previously asked these questions, I want to say that there is a great deal of fine work being done by the factory safety inspectors. I know of a number of cases where safety inspectors have gone into the factories and shown the employer the light and they have done some real useful work. My observation and experience is chiefly building contracting and safety work has not been practiced to the extent that it ought to be practiced and it is there I want the joint safety engineer.

Mr. FARRA: I am in agreement with the speaker in regard to the building trades, but the argument we get (I am a safety engineer with about fifteen or eighteen years experience) is that the turnover is so great and their operations so diversified and so uncertain that you can get only about one per cent of the construction industry. We are not interested in having codes passed only so far as it is a protection to you; and other contractors who are interested in this thing are trying to compel the little fellow, or the big fellow if necessary, who just simply won't see the light.

Mr. MEYNE: I never saw anybody who could be compelled. We haven't had the proper cooperation of the insurance companies in charging the man who was at fault the rate that he ought to pay. We are bringing that out clearly, that the negligent man or the clout who does not want to do any safety work, who does not want to apply himself, ought to pay his own bill and not saddle it as a general compensation bill or classification bill. There is one way we get the experience rating and in addition to the general experience rating as I said before, we have special contracts with our insurance companies to take care of us; on certain things that we have developed we have shown to them that they were getting too much money. I can see where a code could be corrupted and would be so stiff that it would "ham-string" the industry and I am satisfied that that is what any legislative code would do. Education is the way out as I have found it time after time. I am going to recommend to your Council, men who have had great experience, probably have had the best experience in the contract business in the country, to speak to you if you have another meeting sometime in the future and just go into detail of how this thing can be done. I could go into detail but it is a long story. I am absolutely opposed to legislative safety codes going into law.

Mr. A. GIMBEL (General Electric Co., Philadelphia, Pa.): I am interested in your hourly method of computing insurance rates. I do not quite see through it.

Mr. MEYNE: Well, of course, I do not know how many classifications you have. I have twenty-five for contracting in which I do my own masonry, own carpentry, own concrete work and set steel; just four operations on the building, the rest are subcontracts. I have twenty-five rates for that. My reason for asking for an hourly accounting is to take care of the little man who was referred to a little while ago who will not practice safety work. He is always the fellow with a great turnover who is not paying the insurance company what it ought to get. I am trying to make it simple for him. We are paying so much, say three per cent, which would be three cents on the dollar. Reducing that to the hourly basis of fifty cents per hour, the rate would be one and one half cents per hour. The point is that the men then who make up insurance make up their insurance calculations as to what they owe the company. They will multiply by one and one half every week instead of forgetting it. That is why I want the hourly rate. It is easier for the auditor to get at the cause.

CHAIRMAN SMITH: This discussion is very interesting to me and I would like to go into it. There are so many theories connected with it that we haven't touched on the theory of compensation; why we have it and why there is no profit in the factory. I think the reason there is no profit is that we want to keep the state out of the business.

But the time is growing short so I think we should go to our next speaker. The next is a round table discussion to be led by Mr. M. C. Goodspeed, of the General Electric Co., Erie, Pa.

Round Table Discussion

Mr. C. GOODSPEED (Safety Engineer, General Electric Co., Erie, Pa.): In starting this round table discussion, I think it is just a follow-up of questions of yesterday's meeting and this morning's meeting. One of the questions which has come to me and that I want discussed right now by Mr. G. F. Meyne (I heard him cover this point in part last spring) is the relationship of education to discipline in securing the safe conduct of employees and the foremen. Mr. Meyne has his own set-up which he is working out.

Mr. MEYNE: You asked the question, how I manage to get my safety work across to my foremen and the employees? Well, in the first place to get anything across to your employees and to your foremen you have to do it yourself. Just placing notices or placing posters isn't going to do the work, but placing posters and placing notices does help a lot. It stimulates the thought and stimulates the knowledge and it has a good psychological effect. I told you before that in the event you had somebody who just couldn't be educated, that would not cooperate, there is just one thing to do and that is to discharge him, to let him lay sidewalk, which is an insult to any man who is used to a higher class of work.

Mr. GOODSPEED: One other point I wanted you to bring out is your methods of discipline in carrying out your safety work.

Mr. MEYNE: Meetings are occasionally held in our work, but the way I do it is to make a criticism right at the time I find a bonthead play or a lack of understanding. It is the criticism right then and there to the foreman that counts. It has been drilled into them so much now that when there is an opening in the floor, at the time that opening occurs, there is immediately a board put around it. I do not have to say anything about it. The men will immediately put a barricade around it and also place a board on the bottom; in the event that somebody walking along should happen to kick a stone, that stone will no go down on the floor below. Those are little common practices that men will learn to do automatically and I am sorry our friend here, who is in favor of the code to take care of that kind of work, has left. You cannot bring that with a code. The common laborer does not know what the law is and the law applies to him as well as it applies to the employer. He just couldn't get it, and if the employer wasn't insistent on it, he wouldn't get it. If those things are not done, why the foreman is responsible. If he doesn't want to play, why we just can't use him, that is all, because we feel a responsibility for those who are under us and we are leaders. We are supposed to have more intelligence, and as I so often say, if they were as smart as I am they would have this job. It is up to me to take a hand in these things and help take care of them. It is a part of my taking care of my brother. That is just a viewpoint that I have personally.

Mr. C. BARR (Lumbermen's Mutual Casualty Co., Chicago): I want to tell you that if you are not getting the type of service from the insurance representative that calls, it is your own fault because you ought to kick about it. You ought to write to your insurance companies and tell them about it.

Mr. D. KOPPELMAYER (Illinois Mfrs. Mutual Cas. Assn., Chicago, Ill.): As I sat here and heard all about what terrible people insurance men are, I was just itching to get up. I do not know if Mr. Meyne can hear what I want to say but I would like to bring out some opinions, if I am permitted, and to tell him that my job is inspecting and I go in a great many plants, flour mills, woodworking plants, steel and cement plants, furniture factories and what-not. Lord knows, I don't profess to be a master of all those industries and I don't think any insurance company can hire any man who has a complete knowledge of them. Every insurance company has a large line of businesses that they carry insurance on and it would be a practical impossibility to specialize in all of them.

The company I represent is a mutual company; we are chartered not for profit. I thought that I might bring issue with some stock representative so I didn't care to say that, but it answers Mr. Meyne's question on the profit of insurance. To get back

to the matter, it has been my experience in calling on plants to deal with foremen. I have had foremen's meetings all over Chicago and all over the state. I have charged the foremen with their responsibilities. From experience I have found that until we get the message out to the man on the job, we are not getting anywhere in safety work. We had a very good example of that in a plant where we have had safety meetings with the foremen every month, and at the end of the check up, the losses were terrible and, of course, I was asked to explain. I don't want to say that I had an alibi, but the reason why I felt that we were not getting results was because we had not been able to get a general meeting where we got the message to the man out on the bench and machine. If you do not educate him and sell him on safety work, you are not going to accomplish anything.

MR. GOOSPEED: Before this next gentleman talks, I want you to consider the matter of old jobs and methods as compared with the up-to-date.

W. E. MANHART (Fisher Body Corp., St. Louis, Mo.): I have heard very few words on the woodworking industry. I have listened to a long-drawn out talk and discussion on insurance rates and insurance companies and for three days here now we haven't heard anything on our industry. It seems funny to me so I thought I would just get up and say something about it so that next year we might have some information about the planing mills and other branches of the industry.

MR. GOOSPEED: I would like to say to this gentleman that he hasn't been at the last few meetings where they have covered these specific points and we have tried to take up some other points; they said they were tired, last year, of covering the same things over again. I think that is in justice to the officers of last year's section. Next year it will be taken into consideration.

MR. MANHART: I meant no criticism of the officers.

CHAIRMAN SMITH: There is nothing new under the sun about it. It is just as old as man is. You with fourteen years experience know more about safety work than I learned in ten years as an insurance inspector. You are the fellows to sit down and tell us how to prevent accidents.

Glass Shields

MR. GOOSPEED: I want to have your opinion about glass shields. Yesterday in the pictures we showed the glass shields over emery wheels, and the question I want to raise is what is your experience in the use of these glass shields in place of goggles?

L. C. SWAGER (General Electric Co., Fort Wayne, Indiana): It was our experience that in using glass shields that were movable, that the workman would go up to the grinder and turn the shield back and do his grinding so that the shield was defeated. This last year we had an experience in which a man was grinding on one of these pedestal grinders and didn't have the tool rest properly adjusted and the little piece he was grinding struck upward and hit the glass shield. We were using quarter inch plate glass. The glass broke in a great number of pieces and one struck the face of the operator and cut him badly. Immediately following that accident we had a meeting of our safety committee and discussed it and immediately replaced all quarter inch plate glass with triplex safety glass. Since that happened, in one of our tool rooms we have had an emery wheel explode when a man was working on it and the triplex glass was hit, of course, by some of the pieces of the metal and although the glass was shattered, there was not any flying glass and we felt that it was money well spent in changing over from the plate glass to the safety glass.

MR. GIMBEL: We have used these movable shields and it is true that the men push them aside. We have two wheels on each machine about ten inches apart and we thought up the idea of fastening both guards together by placing a band across and making the two stationary. We tried it on one wheel and no one kicked. We put it on ten more and no one complained so we went through the entire plant. These guards are so regulated that you can get them to move up and down but not aside. No complaints have been forthcoming, but there is one thing that I do notice and that is that some of the men get around to the side and assume risk by exposing themselves. It

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is a case of checking those fellows if you see them do it. If you keep the glass clean and see that the light which is under that glass is working properly you will avoid a lot of side grinding, and side grinding is poor business anyway. That has been our experience. I was somewhat surprised that plate glass had been used in so many places.

E. D. KOPPELMAYER: They must be maintained; they have got to be kept clean; if not, they are shoved aside; if clean, they are not. The idea of putting in a secondary glass is excellent. That is the only way they should be used.

A. W. BLOSS (Owens Illinois Glass Company, Huntington, W. Va.): We manufacture bottles. In our machine shops, that is, in our maintenance department where we have to repair machinery we find that the guard, if it is made stationary is bent out of shape. I would like to know how we could overcome that trouble.

MR. GOOSPEED: If I may be allowed to answer that directly I think there are just two answers. First, you cannot grind universally with a stationary guard you must depend on goggles with the guard off or you must have a guard that can be thrown back. When you do not use the guard you must use goggles.

MR. BLOSS: I think it is up to the company as to what shield they will adopt. Should we use a shield or goggles? If we try to put a shield on there and use both, you know what will happen. One fellow will use goggles and shove aside the shield and we start a controversy there among the employees. Should we adopt shields or should we adopt goggles?

MR. GIMBEL: What size are your wheels?

MR. BLOSS: From eight inch to twelve inch wheel about two inches in thickness.

We are having quite a few eye cases on emery wheels in our maintenance department where we repair machinery. In tool shops we can put the stationary guard on there and get by with it.

MR. GOOSPEED: You have answered your own question. It is best to determine yourself what type to use.

I would like to ask you to discuss for a moment, safe clothing and safety shoes. What are you doing about it? What is your experience in trying to get proper shoes worn by girls?

MR. MANHART: We charge our employees for the shoes and put them out at cost. We have been doing that for a year and a half and we find that it has cut down the accidents. A dandy will not wear any shoes unless his toes are sticking out. He will wear that kind in the plant and sport around outside with the ones we give him. However, they go over in a good way with the employees and we have sold a couple of thousand pairs of them.

Feminine Problems

MR. GIMBEL: Your question is about ladies' shoes. We are not doing anything about ladies' safety shoes but I did talk to a salesman and asked him about ladies' safety shoes. They are very reluctant to go into the business of manufacturing safety shoes for ladies. Too many things have to be considered such as different sizes, shape and style of heels. I do not know of any case where a lady fractured her foot and we have 150 working in our shop. I wonder if there are any cases. I am very much interested in safety shoes for men. We have been able to reduce accidents to the toes of men by having them wear these safety shoes in which the toes are particularly protected, but when something drops on the foot above the place where the safety toe ends, this safety feature doesn't help a bit.

MR. KOPPELMAYER: I have not an answer to your question but I would like to answer the question of the chairman. Those of you who were at the Midwest Safety Conference held this spring, heard Miss Ruth Stone, the Dean of women of Western Electric, get up and give her talk on the problems they have in connection with safety

work at Western Electric in dealing with 8,000 women. I am sure she could give you some information on the safety shoe question.

Mr. SWAGER: We have about 1,500 or 2,000 girls and we have had two fractured toes this year among the girls. We do not do anything, however, on safety shoes for the girls. We have thought of it but the job seems too big for us to undertake, but they do get hurt.

Mr. GOOSPEED: In connection with safety shoes I would like to say that in handling scrap material, we find that the wooden soled shoe has been of material assistance and has reduced the hazards in that particular work.

Another question I would like to bring up is what do you do about men who are subject to dizzy spells caused by diseases or certain physical conditions. Are you making any attempt to handle that kind of case?

Mr. MANHART: We have had several cases where the man dropped off onto the floor in the plant, but as soon as we find it out, we make plans to get rid of him because our industry is so hazardous that while walking around they might fall and go into some machinery.

Mr. GOOSPEED: I would like to say that I was very much interested when this question came to me. We had a case this last year in which we had a man lose two fingers. I was speaking to him afterwards. He said, "I do not know just what happened; I don't understand why it happened."

Just less than three months afterward, he dropped dead from heart disease. The answer was that he had had a slight attack of something probably at the time he lost the fingers, which illustrates my point that in the type of case where the man is known to be subject to attacks from disease, he should be properly safeguarded or put on some other job.

What About Housekeeping

Another point that we wanted to discuss is what are you doing about housekeeping? What is your attitude about the effect of housekeeping on safety in the department? Who will discuss that?

G. P. NEVITT (Paine Lumber Co., Oshkosh, Wis.): We had a plan that worked fine. During Fire Prevention Week each superintendent inspected one mill and reported on a form and then the report was given to another superintendent and he checked it. It has created a lot of fun and the results are gratifying.

Mr. MANHART: We have a system of inspection every night; if our watchmen find anything, oil on the floor, rags in the corner, they stick up a red tag on it. The red tag cannot be removed from it until the obstacle is removed.

Mr. GOOSPEED: Is there any check-up on the number of red tags?

Mr. MANHART: Yes, we check them every night.

Mr. SWAGER: A short time ago the Western Electric had an article about a housekeeping plan they were running. We took the cue from them, of having a general plan throughout the plant. We set up divisions and we took one division and said we would have a housekeeping contest, just this division between the general foremen; each foreman has a general foreman. Well that contest has become so keen that the inspectors at the present time are having a great deal of difficulty in deciding which is the cleanest. They are all fighting among each other as to who is going to win the gold star each month. One of the other divisions that we thought was pretty good and we decided we would not bother with, came around to me last week and said, "Say, our plant inspector is crabbing, we are so dirty in comparison that we want to set the contest up in our division." Monday of this week we had the first inspection. The interest is greater than you can imagine.

Mr. KOPPELMAYER: I should like to say as an insurance representative making an analysis of a plant, we consider housekeeping most important and that when the inspection is listed the question of housekeeping is a very serious consideration. The report of poor housekeeping is reflected in the rate.

I should like to tell of a plan used at Dixon, Illinois in reference to housekeeping. They have a skeleton dressed up. It is about the homeliest thing I ever saw and they call it "Black Mary." When any department is found to be unnecessarily dirty, they put Black Mary in that department and the workers in that department can't wait until Black Mary is removed.

ADJOURNMENT

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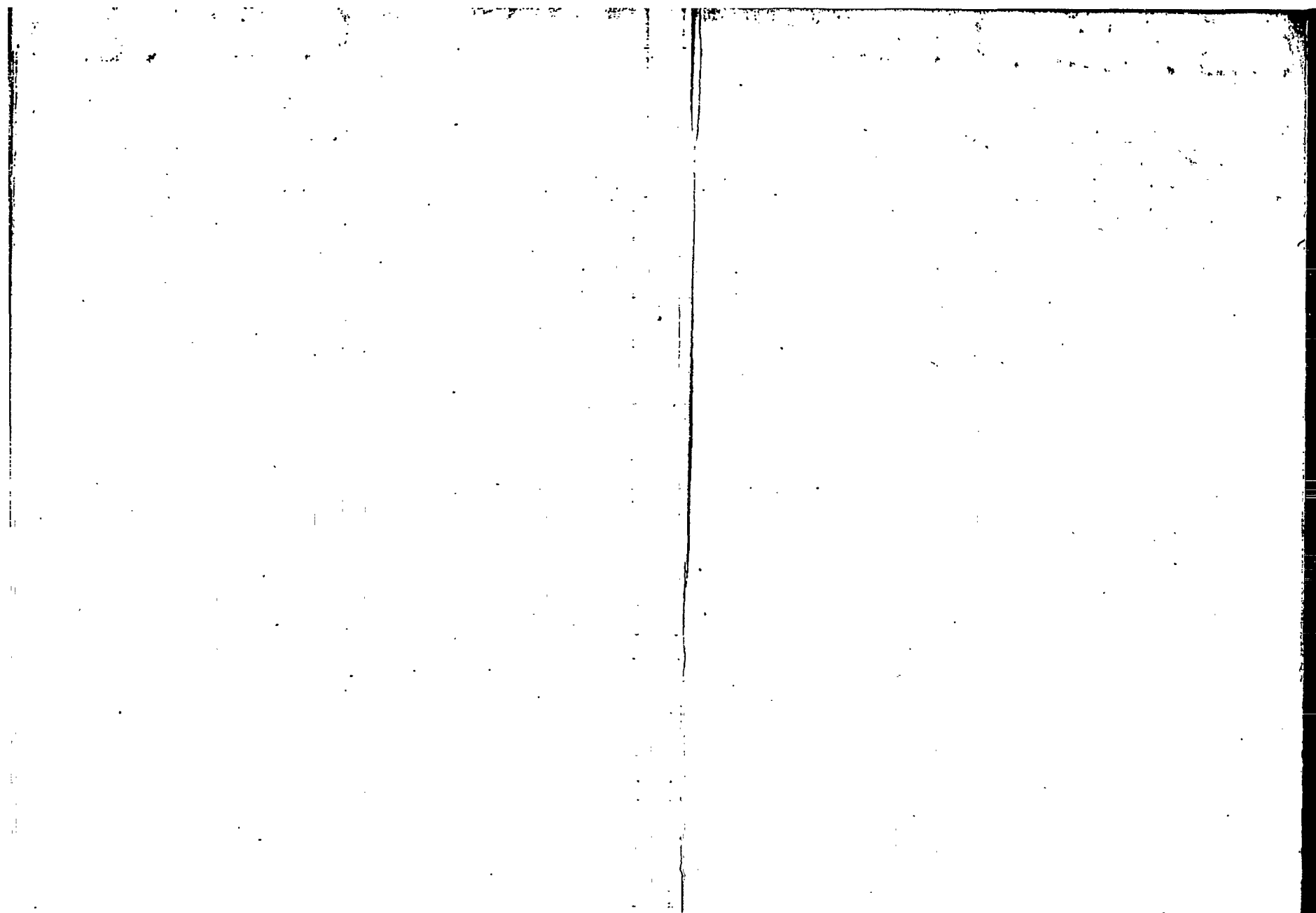
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1931

TRANSACTIONS

OF THE

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TWENTIETH ANNUAL
SAFETY CONGRESS



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The Community Safety session, held on Thursday Morning, October 15, during the Congress, is published as a part of the General Sessions, appearing in Volume I of these Transactions.

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TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Street and Highway Traffic Section

Executive Committee, 1930-31

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Monday Afternoon Session
October 12, 1931

Joint Meeting with National Safety Council Committee on the Driver

EDWARD DANA, Chairman

Vice-President in Charge of Public Safety, National Safety Council

The joint meeting of the Street and Highway Traffic Section and the National Safety Council Committee on the Driver was called to order by Mr. Edward Dana, Vice-President in Charge of Public Safety, National Safety Council.

CHAIRMAN DANA: The session this afternoon initiates the program of the Street and Highway Traffic Section.

Mr. Vollmer, who is the chairman of this Section, unfortunately will not be here. I think it is appropriate to start the proceedings with a few remarks from the vice-chairman, Mr. Clifford Davis, of Memphis.

CLIFFORD DAVIS (Commissioner of Fire and Police, Memphis): I am always glad to see this Section reconvene. One of the finest things about this Section to me is the fine spirit of fellowship existing between its members. We have 560 members in this, the youngest Section of the National Safety Council. I am glad personally to renew old friendships.

We have a very busy program. It has been wonderfully arranged by the Program Committee. The keynote today is the individual bad-driver. Tomorrow we discuss that same individual bad driver from the standpoint of the individual spot where he gets into trouble, the hazardous intersection. The third is what shall you do with that individual bad driver at that intersection when he doesn't try to conform to good driving habits. There you have enforcement against that bad driver. Fourth, we have talks about mass control of the traffic problem.

In this day we have to control the individual driver, and there we have the importance of the discussion on the enactment of good and sound drivers' license laws in the several states.

You are to be congratulated upon this fine attendance at the opening meeting of this Section. You will find plenty of interest during the week. We are fortunate to have in this Section men of outstanding ability.

I suggest that we lay especial emphasis upon the traffic school that starts at eight-thirty in the morning. There is no better way to take back to your respective cities a real message, than through these close-up traffic studies in the traffic school.

The whole traffic program has been designed to take up and correlate the actual discussions here with the traffic observation tour so that we can in the Thursday session combine what we hear and what we see in a more comprehensive statement of the problem.

I join with you in wishing for Mr. Dana and this Section every success in this and the coming sessions, so that we may be able to go back to the several cities of this nation and show them that public safety today, the most unselfish undertaking of any group of people, is the most important question before the people, as it affects so many thousands of automobiles and so many millions of people in their safe movement on the streets and highways of this nation.

CHAIRMAN DANA: The meeting today is confined to one phase, as other meetings will be confined to single phases of this problem. Today it is the driver, and you are fortunate in having here Dr. W. V. Bingham, of the Personnel Research Federation of New York.

Who Is the Accident-Prone Driver?

By COLONEL WALTER V. BINGHAM
Personnel Research Federation, New York City

At least one million automobile drivers now operating in the United States are suffering from the accident habit.

This is a conservative estimate. It is based on studies of the accident records of operators who are, I believe, representative of the driving population. The facts have been secured from state motor vehicle bureaus, from casualty insurance concerns, and from transportation companies. These studies indicate that at least five per cent of motor vehicle operators have had accident records over a period of years. These are the prone-to-accident drivers who have created for the safety movement its most serious and pressing problem.

In contrast to these accident offenders, a large proportion of all drivers now operate safely. They have the necessary skill and strength. They know and observe the regulations, and the courtesies of the road. When a sudden emergency arises—such as a blow-out, or a skid, or a sudden unannounced turn to the left on the part of an inexperienced driver just in front—they do not lose their heads. When they come

to a fine stretch of pavement and step on the gas, they do so with due regard to the operating conditions. They look after their brakes and their headlights. The vast majority of the driving population can be trusted at the wheel.

This assertion is not a mere personal opinion. It is made with greater confidence than would have been possible a year ago. Since that time Dr. Slocombe has examined and tabulated the accident records of about 5,000 drivers in two New England states. He classified them as either good drivers, ordinary drivers, or poor drivers. A good driver was one whose record showed no reported accident whatever during the five-year period. Those who had had either one or two reported accidents were called ordinary drivers. The others, called the poor drivers, had had anywhere from three to nine accidents during this time.

Using these definitions of good, ordinary, and poor driving, it was found that, in this sample of 5,000

5 Per cent were poor drivers.

32 Per cent were ordinary drivers.

63 Per cent were good drivers.

Evidently we do not need to worry very much about 95 per cent of the driving population. It is the 5 per cent of prone-to-accident drivers who need our best attention today.

In order to see whether the person who has a number of accidents in one period also continues to have accidents later, the five-year record was divided in half. It was then found that 80 per cent of the good operators who had no accidents in the first half of the five years came through the second half without any accidents. On the other hand it was found that of those who were poor operators in the first half of the five years, 80 per cent of them had one or more accidents in the second half of their record. The middle group, whom we have called ordinary drivers, have about 50 per cent chance of coming through the second half without accidents. This seems to show that chance conditions such as road surface, weather, etc., do have something to do with accidents; but that about 80 per cent of highway accidents depend upon the driver's ability. In other words, no matter how tough the going is, the good driver will not have accidents; but no matter how good the going is, the poor operator will have accidents.

This has been a discussion of accidents in general without considering how serious they are. An analysis of fatal accidents shows that they follow about the same proportions. In an earlier study the past records of 100 drivers involved in fatal accidents were compared with a sampling of the records of the ordinary run of drivers. It was found that the operators who had had a bad record during the previous year were seven times as numerous in the fatal accident group as in the random sampling. These data are fairly typical. Other studies of a similar nature, not yet made public, only strengthen these findings. They point directly at the sore spot. If we can somehow locate this five per cent of the driving population who suffer from accident proneness, and can cure them of their tendencies to accident, the number of automobile deaths would be reduced thirty-five per cent. This is the strategic point of attack in the battle for highway safety.

Who are these prone-to-accident drivers, and how can they best be located within the great mass of the population? Unless they can be found and identified, there is no way of dealing with them in a manner especially designed to be beneficial to them, and hence indirectly beneficial to the great mass of competent operators whose pleasure and safety in using the highways is now seriously affected by these accident-carriers.

One difficulty to be faced, in the effort to find these prone-to-accident drivers, is that they are not all alike. There is no single characteristic by which they can be identified, except through the relative frequency and seriousness of the accidents in which they are involved.

Some of them are accident prone because they are temperamentally unadapted to

the responsibilities of managing a car in traffic. They are anti-social—utterly lacking in consideration for others. A psychiatrist would call them egocentric personalities. Others call them road-hogs. The practical problem in curing these drivers of their accident tendencies is that of changing their social attitudes, so that they will want to be more careful and considerate of others.

Then there are many perfectly well-intentioned users of the highway who are accident-prone because they lack some essential item of knowledge or skill. Here is a man who has never learned the habit of keeping well to the right of the road except when passing. Another is thoroughly competent except that he cuts in too soon. A third is ignorant of the danger of coasting down a steep hill; a fourth has never got the knack of shifting gears quickly, when necessary; while a fifth has failed to develop the ability to make correct estimates of clearance. Some of these drivers are aware of their points of weakness; but many are entirely ignorant of the defect of knowledge or of practice which is causing them to have accidents.

Defects of health, strength, or eye-sight bring some people into the prone-to-accident class. Would you trust yourself behind an operator known to be even mildly subject to epilepsy? He might have a momentary lapse just as the car was approaching an open drawbridge. Equally dangerous is the dare-devil who loves to show off; and the emotionally unstable driver who tends to get excited or panicky in an emergency. Accident proneness results from defective personality or social attitude, quite as often as from ignorance, or lack of skill, or poor physique.

Then there are people who lapse into the high accident class, due to temporary conditions of illness, fatigue, or worry. Such drivers are easily distracted or become confused, and before they know it have landed in the ditch. By all odds the most common and insidious source of temporary susceptibility to accident is alcohol. A driver does not have to be intoxicated in order to be temporarily not quite himself at the wheel. A drink or two is enough to make most drivers step on the accelerator a trifle harder than usual, or approach a street intersection a little faster than their ordinary practice dictates. And then, unfortunately, their reaction-time in getting the foot off the accelerator and onto the brake is a few thousandths of a second longer than is habitually needed. So a little alcohol tricks a driver both going and coming. In this regard it is like fatigue and many other causes which lead to temporary unsettlement of sensory-motor reactions and acts of judgment.

Most drivers who are candidates for high-accident honors year after year are defective—we have found—in more ways than one. An inexperienced driver, or a man with poor eyesight, can often compensate for his defect and come through with a clean record, provided he uses a great deal of caution. A man with very little native ability or natural aptitude for driving can nevertheless avoid accidents if he is thoroughly and patiently trained and if he himself has the right attitude toward his job. A man with the personality of a road-hog, even, can keep out of the high-accident class, provided he has a good physique and health, and is skilful and experienced. But if a person is defective both in skill and in attitude, or in attitude and in health, or in health and in skill, or in some other combination of two or more kinds of disabilities, then the likelihood that he will be found in the group of dangerous operators is multiplied many times over.

My main purpose has been to throw the spot light on the 5 per cent of accident-prone drivers who are the greatest menace to all who use the highways. Later speakers will discuss the practical question of what to do with these drivers in order to help them to become skilful, considerate, competent operators. But before I close, let me stress one point: There is only one way now known by which accident-prone people can be found or identified—and that is, by means of an adequate and complete system of accident reports maintained over a period of years.

This file of information should contain the descriptions of a man's minor accidents as well as of his more serious casualties. It should also contain the record of any violations of rules or regulations even if they do not result in accidents. It has

been found extremely useful in dealing with traffic offenders and drivers involved in serious accidents, to have all in one file, not only the man's accident data and his record of previous convictions for traffic violations, but also all the other available data that may have a bearing on the case, such as court records of other kinds of misdemeanors, medical examination records, and the like.

It is no simple matter to devise and install a good workable system of drivers' records which brings together so many kinds of facts from so many sources and maintains them accurately and up-to-date, year after year. But it must be done. In every state there should be such records. Without them I see no practicable way of discovering who the accident-carriers are. With such records, the way is cleared for an adequate program of accident prevention, one which concentrates its efforts on dealing with those who really need help.

The public safety movement has, in my opinion, largely completed its task of educating good drivers and ordinary drivers. The time has arrived to concentrate more definitely on the 5 per cent of bad drivers. As Mr. Dietz has said, in the fight against accidents, the weapon we need now is the rifle, rather than the shotgun.

CHAIRMAN DANA: The next topic is "What to do," assuming the premise of the previous speaker, "With the Accident-Prone Driver?" Unfortunately, Mr. Hanna will not be here, but Mr. J. S. Baker, Assistant Traffic Engineer, National Safety Council, will read his paper.

Handling Accident-Prone Street Car and Bus Operators

By W. F. HANNA

United Railways & Electric Company, Baltimore, Maryland

Safe operation of public transportation vehicles presents one of the major problems with which street railways must deal. A sound practical program to attain efficient and safe operation is essential in order to successfully cope with traffic congestion and the problems resulting from it on our streets and highways.

Street car and bus equipment has been modernized on many properties to provide greater safety and convenience, and the operating personnel has had to be more thoroughly trained and supervised to successfully cope with traffic problems of today.

In any group of street car or bus operators, regardless of how carefully they have been selected and trained, some will have more accidents than others. This may be due to a number of causes, such as:

- Failure to recognize hazards.
- Operating too fast for conditions.
- Slow reaction in meeting emergencies.
- Violating operating rules and regulations.

Making too close calculation of stopping distance, and many other causes.

Studies of these groups always show the records of some operating employees are clear of accidents, although they operate over the same streets and have to cope with practically identical problems. Why are some of these men continually having accidents while their associates have few, if any? This question has to be uppermost in the minds of those promoting safety in the street railway. It leads logically to the question—What constitutes a good street car motorman, conductor, and bus operator?—and the answer is "An employee who attains proper operation as defined by the rules and regulations."

Every Move Recorded

Our definite objective therefore is to subject every employee to thorough and continuous individual studies in order to attain proper operation as defined by these

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rules. This system of man supervision we have developed literally permits no discoverable source of man-failure to escape undetected. Virtually every operating move these men make is noted and recorded. The Supervisory Force, consisting of 70 men, is required to study its men and report the results of its observations. The continuous operation of this system should bring any transportation service as close to efficient operation as it is possible to bring it. It not only permits a constant check on actual platform operation, but permits also a close check on the thoroughness and efficiency of supervision. From the number and character of reports received from inspectors the Company knows at a glance the actual work of each inspector.

For the supervision of motormen there are 9 classifications on the key used by inspectors for their reports, and 47 unsafe or improper practices to be watched for. For the supervision of conductors there are eight classifications and 35 practices. By including proper operation in these reports we give the operating personnel credit where it is due. These are considered with the accident and service records of employees.

During the first eight months of this year 99,626 reports were received on the operating practices of motormen, and 70,445 reports on the practices of conductors, a total of 170,071 observations; 7,497 improper operation reports were received for motormen, and 2,748 improper operation reports for conductors. These 10,245 reports were used for immediate follow-up instruction or discipline as the cases warranted.

These reports are made daily in code and are transcribed to detailed reports for each division arranged by badge numbers of employees. Over 20,000 reports are received monthly.

Accident Analysis

We had the familiar Safety Committee Plan from 1919 until several years ago, whereby operating and other employees were appointed to the committee until practically all had been members. We were dealing with small groups under the Safety Committee Plan and in many cases talking with men who had comparatively good accident records. At this stage we revamped the entire safety program by the continuous operating analysis I have referred to, and also by a more comprehensive system of analyzing and coding accidents. We adopted 32 main accident classifications and up to 16 sub-classifications in order to fairly indicate the exact type of accident, so that cases clearly beyond the control of operating employees would be indicated. A numerical coding system was worked out whereby every accident report is coded on an abstract card to show essential information regarding accidents, such as:

Date	Section of car
Case number	Weather condition
Line	Track condition
Badge number of employee concerned	Street condition
Length of service of employee	Description of person
Class of accident	Condition of person
Sub-class of accident	Type of vehicle
Hour	District
Day of week	Location in block
Car number	Street operating on
End operating	Intersecting street
Place of accident	Trip number

These abstract cards are forwarded to our tabulating division to be transcribed on coding cards. After transcription the coding cards are assorted and reports are prepared for each line. In these reports accidents are grouped by badge numbers so that the "High Accident Men" are indicated from month to month. One copy of this monthly report is kept by the safety department, one copy is forwarded to the superintendent of transportation and a copy for each line is forwarded to the

division superintendents. The individual accident record of each employee corresponds with his record on these detailed monthly line reports, the class and sub-class of accidents still appearing in code. There is no distinction between chargeable and non-chargeable accidents but all cases of discipline for accidents are noted on the individual accident records.

All this record keeping and coding is simply the start of the system of handling accident-prone employees. It furnishes the basis of supervision and follow-up instruction which begins on an intensive scale with the month's record of accident men available. The supervisory force first notes the type of accident in which its men have been involved and checks up on their operating methods which caused or contributed to their accidents. To illustrate, accidents coded 10-1, 14-1, 22-1, and 24-1 represent collisions with different types of vehicles at street intersections with varying degrees of severity. In such cases operators concerned are observed for their method of operation at cross streets, and under Class "C" of the operation analysis the inspector notes under:

Code 1—If operator did not reduce speed or have car under proper control at cross street, or

Code 2—If operator entered intersection before getting green light, or

Code 3—If operator did not exercise proper control at boulevard stop street.

The question naturally arises—"To what extent should street car operators reduce speed at cross streets in order to be reported by inspectors for proper operation at these locations?" We thought a definite rule should be adopted for the operation of street cars at cross streets which would be fixed in the minds of motormen from constant re-emphasis. The bulletin issued was as follows:

"You are instructed, when approaching street intersections where you are not required to make a full stop, that you must reduce the speed of your car so that it will be under absolute control when at the near side building line, and must see that the way is clear before proceeding. It will be necessary, of course, to take under consideration grades and other existing conditions."

In observing the operating practices of motormen at cross streets supervisors, line superintendents, and street inspectors are guided by these requirements and since this order was issued collisions at cross streets have shown substantial decreases, in spite of increased vehicular traffic.

Observations of operating methods are concentrated on the "High Accident Men" for the particular trouble indicated by the accidents in which they have been involved. This plan also affords us a detailed accident analysis for our entire system from month to month which enables us to consider all essential facts regarding these occurrences.

Some Results of Our System

During the first four months of this year 295 men were in the high accident class and were concerned in 1,451 accidents. In the second four month period, these same men had reduced their accidents to 799, a decrease of 652, or 44 per cent. 329 cases of discipline for accidents in which these men were concerned were reduced in the second four month period to 180 disciplinary cases, a decrease of 149 cases or 45 per cent. 204 men left the high accident class, 40 of them having no accidents, and 91 remained in the high accident class. This result is further shown in the accompanying summary by divisions.

In our Bus Operations 19 men had 76 accidents in the first four months and this was reduced to 43 accidents in the second four months, a decrease of 43 per cent. Our employee accidents have been reduced 35 per cent in the first eight months of this year and disability cases 39 per cent, which represents a saving of 42 per cent in compensation expense. Our plan to combat employee accidents is another illustration of results from increased supervision. The number of employees injured in 1930 was the lowest in our history. A decrease of 66 per cent appears when employee

Summary by Divisions

No. High Accident Men			No. High Accident Men		
Division	1st Four Mos.	2nd Four Mos.	Division	1st Four Mos.	2nd Four Mos.
1-	7	2	16-	13	3
2-	3	.	17-	14	5
3-	6	2	18-	11	2
4-	12	5	19-	33	11
5-	11	.	21-	4	2
6-	34	8	22-	.	.
7-	17	4	23-	.	.
10-	10	4	34-	9	2
12-	2	1	26-	.	.
13-	4	.	25-	11	4
14-	5	2	27-	17	7
15-	7	2	29-	16	4
			30-	6	1
			31-	25	14
			32-	18	6
Totals: 295 and 91.					

disability injuries for 1930 are compared with 1919. Accident damage repair expense has been reduced 38.17 per cent in eight months of this year compared with the same period of 1930. We had 5.2 per cent fewer accidents in 1930 than in 1929. This includes all sorts of accidents, no distinction whatever is made between chargeable and non-chargeable accidents in these computations. In considering this decrease in accidents weight should be given to the fact that in 1930 we were operating many faster and quicker starting street cars entirely unlike any to which the Baltimore public has been accustomed. When 1930 is compared with 1919, the first year of our organized safety department, the decrease in accidents is 38 per cent. In 1930 on the crest of the flood of motor traffic, there were 6,460 fewer street car accidents of all sorts in Baltimore than there were in 1919 when the hazardous situation on downtown city streets had not even been imagined.

Further Important Decreases

If personal injury accidents are considered alone, apart from property damage accidents, the decrease in 1930 compared with 1919 was 36 per cent or 2,872 fewer accidents. If collisions between street cars and autos are considered alone, including minor occurrences resulting in no damage, we show a 5.7 per cent decrease in 1930 compared with 1929.

There are similar results on many other electric railways and records show this industry is improving its accident experience from year to year in the face of the terrible toll from traffic accidents in the large cities of the country.

The emphasis I have given to results has been for the purpose of showing that accidents may be reduced by thorough and continuous supervision. We do not wait for evidence from an accident report to determine a motorman's fitness for his responsible duties. When they are observed violating essential safety regulations such cases are handled as the circumstances warrant because our first objective is to correct the shortcomings of our operating employees before accidents bring them to light, but if they reach the high accident class their records are used to guide the work of reinstruction.

Self regulation by the individual street railway operator, or by the driver of any vehicle, on our streets and highways is too much to expect because it will never reach the reckless and incompetent. If a street railway paid no more attention to supervision and safe operation than the average autoist, we can imagine the extent of accidents. If a street railway would turn 2,000 or 3,000 men loose on the streets of any large city with no greater ideal of public safety than the average motorist, and no greater training in the efficient and safe handling of high-powered vehicles, our streets would look more like battle fields than they do today.

The appalling record of automobile fatalities and injuries is chiefly due to the lack of any plan to follow up the accident-prone driver and either cure him or take him off the streets. The exposure to accidents has increased with traffic congestion and preventive measures have to be taken to successfully cope with the problem. The details of a system to handle accident-prone drivers and those detected for violating essential safety regulations might be somewhat similar to the systems I have referred to if altered to apply to motorists. Many of the State Motor Vehicle departments now have complete systems for analyzing accidents and could readily have these data arranged by operators' license numbers for the purpose of follow-up instruction with drivers. City and state police forces are now reporting traffic violations for action through Traffic Courts and these records could also be used for follow-up instruction with the drivers concerned. This seems the next logical step in coping with the national traffic accident problem which is pressing for a solution.

CHAIRMAN DANA: Mr. Wellington, of the Rhode Island Motor Vehicle Department, will continue with the subject, "What To Do with the Accident-Prone Driver."

What to Do with the Accident Prone Driver

By GEORGE R. WELLINGTON

Chief Clerk, Motor Vehicle Department, Rhode Island State Board of Public Roads

"War is hell." That famous declaration of a great American general some 60 years since has its counterpart today in "So is motoring." Then men slaughtered because of a principle; today we slaughter upon our public highways without a principle and callously dismiss the killings as accidental. Our present condition is worse than war, for war usually comes to an end, while these killings go on without end, taking a greater toll with each succeeding year, and placing everybody in constant jeopardy. In 1923 with a total registration of about 15 million motor vehicles in this country we killed 16 thousand people. In 1930 with a registration of twenty-six and one-half million cars we killed 32,500 people. In 1920 our automobile death rate was 10.4 per 100,000 of population, while in 1930 it has risen to 26.4 per 100,000 of population.

As one reviews the course of the past few years and considers the contributions of the greatest engineering minds of the country in the development of the finest of highways and the elimination of physical hazards—the equally eminent services rendered by engineers in designing and building better motor cars—the activities of the several National Conferences on Street and Highway Safety—the development and progress of uniformity of traffic regulations—the devising of stop-and-go signals—the rise of civic organizations such as the National Safety Council with its splendid work—the educational activities being conducted in schools and elsewhere—the reams of publicity given to the subject—in fact, all manner of concentration upon this all important question, one is amazed and stunned at the feeble progress which has actually been made nationally towards safety. We are not reducing accidents. Why? That is the baffling question. The reasons may be manifold, far too

numerous for me to undertake their enumeration here. One thing is quite evident to my mind however—namely, that there has been a failure to sufficiently stress the real underlying causes.

Study and research work, especially during the past five or six years, have produced elaborate and varied charts of statistics, which show the principal types of accidents, the numberless faults of users of the highways, the locations where accidents generally occur, and many other things, all merely on the surface, the externals of the situation, but which have not focussed attention on the more real causes of our accident problem, those causes which lie within human character. We have, I fear, been treating symptoms—somewhat to the exclusion of a deeper consideration of more important fundamentals. I am not unmindful of certain excellent results from this symptomatic treatment, but such treatment so far as the motorist is concerned, fails to reach necessary lessons—it is merely palliative, not curative. For example, a bad accident spot somewhere is cleaned up by the installation of a "stop-and-go" signal, but the motorist is not taught the necessary lesson of carefulness. He does not become more prudent or vigilant in his operation where there are no such devices. He completely fails to realize that such an installation is the result of motorists' lack of care, and often tries to beat the change of lights. These expedients merely correct a difficulty at a particular place, but do not reach to the more vital need of building care always into the habits of drivers—in fact the opposite reaction is often the case. Despite every aid that we have brought to the motorist we have a constantly rising tide of accidents. These artificial schemes are failures as factors in the development of careful driving—they but relieve one of responsibility, encourage his reliance thereon and tend to stultify his thinking processes. We must find more compelling factors to make our motorists careful in their movements. Long experience and close contact with the situation are teaching me that we must search deeper for those causes that actually underlie the difficulty. I believe that thoughtlessness, ignorance, carelessness, egotism, indifference—most of them manifestations of selfishness, that miserable trait in human nature—are at the bottom of our difficulty. Instead of developing our better natures the automobile has seemed to emphasize our worse traits. When we get back of the wheel we throw thought, care, caution, and good judgment to the winds and pursue our careless way without a thought for the rights of others. We insistently blow our horn at the pedestrian to get out of our way; we flash across street intersections without regard for another vehicle which may be there; we force our way to beat the other fellow wherever we may; we tear along the public highways at terrific rates of speed and when anything untoward happens it is an accident, or the other fellow's fault. This is so typical of our attitude as drivers that one wonders why the accident situation is not very much worse than it is.

I am not a pessimist. Discouraging as the situation seems, there are signs of hopefulness, and they lie in those few places where under distinctive treatment splendid improvement has been accomplished. There are many things which should be given attention, and I have perhaps already touched upon one—the matter of human nature. We may hardly expect to transform human nature, but it does seem as if a process of education might develop more careful traits. We can appeal to the better element of human nature. We can direct concerted effort towards subduing the selfish attitude now so predominant behind the wheel. We should be able to get people to think about the rights of others—just now a quite inactive thought. We think—if we do anything about it at all—only of our own desires, and we act upon those desires. The necessity for consideration of the rights of others is so vital a fundamental to the success and safety of motor vehicle operation, that we shall not get far in any correction of the present evils of driving until we arouse a consciousness of this fact and a realization of the paramount moral and legal obligation to consider and respect the rights of others upon the highways. We must understand first of all that our accident problem is due mainly to the failure of the human element, and then tackle the job of righting this fundamental difficulty by

striking at those selfish impulses so responsible for the trouble. We must strive for an appreciation of individual responsibility.

Now the fault is not all with the motorist—he is beset with many fool ideas which should be cleared up. Let us take as one example, speed. We all know that the motorist is no longer bound by any speed regulations. Often the only speed limit he recognizes is that which his car is capable of making. And who is to blame for this? I can think of at least two things that have a very important bearing upon his attitude towards speed—the flamboyant advertising by motor car manufacturers and others, who set forth as the salient feature of their products great speed ability; and official attitude towards the revision of speed limits. The desire to speed along is inherent in most of us, and those alluring announcements so subtly planned to capitalize a selling point have not been conducive to saving lives. Equally dangerous have been those inane public controversies waged in official circles, with which I have no patience, as to whether speed in itself is dangerous. Such discussions only serve to make a bad matter worse. They accomplish no good purpose. We have long since, for the most part, gotten away from the old-fashioned system of low-rate arbitrary speed limits, and have endeavored to leave to the motorist, within certain reasonable limits, the judgment of the speed to be used upon occasion. This right of judgment, encouraged by both unwise advertising and misconceived official expressions concerning speed and the reason for liberalizing speed regulations, has gone astray and is causing serious trouble. I hold no brief for the old-fashioned speed limits, and I fully realize that speed must be considered relatively. Research work in Rhode Island during the past few years in an effort to determine the relationship of speed to accidents, however, shows conclusively that wherever speed is reduced to reasonable rates, the accident peak is correspondingly lowered.

No one can tell me that the altogether too common speed of 60 miles per hour and even greater, yes, up to 85 miles per hour as is sometimes found in Rhode Island, are safe rates upon public highways, particularly in that section of the country, and the worst of it is that we are so lacking in the power of accommodation that we cannot get down to safe rates when we come into territory where speed must be greatly reduced to avoid accidents. Few operators are competent to drive at such speeds, to say nothing of the many other hazards involved.

One more thing, without taking time to go into detail, to which I would like to pay my respects, is the loose talk of "Speeding up traffic." We are often unfortunate in our choice of phrases and then get decidedly bad reactions. When we talk about "Speeding up traffic" we really mean more orderly processes of traffic movement to relieve congestion; yet the motorist misinterprets such phrases and goes on building up his speed into the realm of danger.

Realizing for a long time that the confused state of mind of the average operator concerning speed is undeniable, we have tried in Rhode Island, in our examination of applicants for drivers' licenses, to secure an answer as to speed regulations of the state which would show the applicant's clear understanding thereof, framing and reframing many times this all important question, only to find that the applicant selects as his answer merely the numerals in the state law, and completely overlooks all the conditions that must surround the allowable speed, finally abandoning hope of securing adequate answers and being forced to provide for special instruction on speed regulations before the applicant is allowed to leave the examination room and obtain a license. I am quite certain that as we succeed in clearing this confusion and secure an understanding of speed regulations rather than speed limits, we will secure a general lessening of driving speed, enabling better control of operation under existing circumstances and culminating in a large reduction of accidents.

The subject arbitrarily assigned to me on this program is, "What to do with the accident prone driver." You may, with justification, offer the criticism that I have strayed rather far from this theme, but it has seemed necessary to make the approach through this rather sketchy resumé of conditions. When the subject "What to do

with the accident prone driver" came to my notice, I wondered a bit what I was to talk about, for in my long experience of not far from a quarter of a century I have failed to segregate any particular class of drivers under this designation, and for this reason I am not at all sure that such a subject should be publicly discussed just yet by any Motor Vehicle Administrator, although fully realizing the propriety of such a discussion by some large fleet operator who has decidedly better opportunities for the selection and control of employee drivers. For the reasons already outlined, I believe the title of our discussion fits us all, and is limited to no particular type of drivers which as yet can be bound by class limitation. Our accident situation is shown to be due almost wholly to human failures, therefore we are all accident prone. To obscure this all important fact by an attempt to narrow our discussion does not appeal to me as a wise course to be followed by anyone with such broad responsibilities as those attaching to a Motor Vehicle Executive. Realizing this in Rhode Island, the State Board of Public Roads has, for several years, endeavored to attack the problem from this point of view, and I shall endeavor as briefly as possible to outline our system and show you some of the results that have been accomplished.

First of all, in late 1924 we began the development of research work to inquire into accident causation, to make traffic studies, to seek ways and means of accident prevention, and not for more than a year did we release the information obtained, or attempt to change our policies, desiring to be sure of our ground before making any commitments. The information gleaned in this way provided the approach to the problem through several channels.

All persons applying for first license in Rhode Island are required to have driven upon the public highways under the supervision of a Rhode Island licensed driver for a distance of at least 300 miles, and affidavit must be made by the supervising operator to this fact, whereupon the applicant is permitted to take a written examination which consists of some 30 questions principally covering the rules and regulations of operation and some understanding of accident hazards. This examination consumes not less than 40 minutes, and is concluded with a vision test. It frequently happens that during the period of examination the careful observation of trained examiners will develop a cause for further inquiry, often leading to the advisability of requiring a road test because of some physical defect or to test mental reaction; and cases are on record where it has been necessary before passing upon the applicant's fitness, to require examinations—physical, mental or both—by a staff of medical men located at the State Mental Hospital.

The application is then carefully checked to determine if anything on record is detrimental to the applicant. If the tests dictate the wisdom of the course, whatever limitation deemed advisable is written into the license. Hundreds of licenses are so limited. These limitations consist of provisions that license is good only when wearing properly prescribed eyeglasses in the cases of those with defective vision; bridged pedals, transfer of brake and shifting gear levers to the opposite side of the driver, where one-legged or one-armed persons are involved; limitation of the character of vehicle or the maximum weight in the case of undersized persons; requirement of inside and outside mirrors for deaf mutes; etc. Additional special licenses are issued for bus and taxicab operation only after the most careful check-up of applicants' qualifications, and continued under rigid regulations.

From the time that the operator is licensed a most careful check of that individual's record is maintained, and the smallness of the state is of great advantage in this practice. Sources of information for the careful keeping of these records are press statements, local and state police reports, as well as departmental investigators' and examiners' reports. The investigating staff, consisting of twelve men, is constantly in the field investigating accidents, thus furnishing a basis upon which the Board may determine the degree of responsibility attaching to all operators involved in accidents, and enabling the determination of necessity for withdrawal of

the licenses of such operators. It has long since been recognized that the two methods of attacking the accident problem insuring the maximum of results are education and supervision; the one to teach the operator what he should know and do, and the other to compel his compliance with proper methods of operation—the first primarily a function of the motor vehicle licensing authority, the latter that of state and local police. Therefore some time after setting up the Investigation Division with its corps of investigators, it was deemed advisable from the educational standpoint to establish a Hearing Section. This Hearing Section now consists of three officers whose entire time is utilized in dealing with persons who are in difficulties. Later there came into being a state police force who are giving very largely of their attention to traffic direction.

The greatest control over the accident situation today is amongst those states which have a system of licensing operators. No other known system begins to approach it in power. The opportunity afforded for selection of drivers in the first instance and the supervision of conduct after they are licensed are of incalculable value. This system is not so effective in some states as it might be, because in my judgment an erroneous view is entertained by the licensing authority as to his functions. One school of thought maintains that the recall of licenses should be limited to specific violations of law, and a code of penalties worked out to apply as circumstances may warrant. The other school, that the purpose of the licensing system is to gain highway safety, and this may be best furthered by the recall of the license only whenever the licensee shall have acted in a manner which may indicate his unfitness to continue as a driver, and the length of time for recall dependent upon a reestablishment of fitness.

Penalties can soon be paid and make no lasting impression—that seems to have been amply established by the failure of fines and jail sentences to reduce the growing number of violations constantly coming before our courts. The reason is obvious—the individual involved merely appreciates at the most that he has committed an offense in violation of law and has paid a penalty for his indiscretion—the thought goes no further; he fails to realize that after all his violation may have been one involving the element of danger which he should henceforth guard against. With the latter system, however, just this thing is accomplished. When the individual loses his license and is confronted by the licensing authority with the reasons for calling in the license, and realizes that until he is ready to change his method of operation he cannot have his license back, the process becomes educational and makes a lasting impression, because he learns, as the indefinite term of suspension goes on, first what the license means to him and secondly that his reinstatement as a driver is entirely dependent upon his understanding of and agreement to adhere to safe driving principles laid down by the department.

This latter is the Rhode Island viewpoint of a motor vehicle administrator's more effective use of his power to grant or recall licenses. Therefore we take licenses away only for one cause—that the operator is deemed at the time unfit to continue with a license—and set ourselves to the task of bringing about a basis of fitness. This is the chief function of the Hearing Section. If the growing record of an operator indicates that he is getting into dangerous and careless habits of operation, he is called in, confronted with his record, told what it will lead him into eventually—an accident—and warned that we must have his cooperation in making for safety or deny him the privilege of operating. Whenever it becomes necessary to recall an operator's license it is suspended without date and the person involved is notified to return it to the office forthwith. Before such person can be relicensed, he must come before the Hearing Division where a satisfactory basis to secure the return of his license is worked out, such as his promise to engage in safer operation. If his attitude is such as to engender confidence, he is, in due time, granted reinstatement of his license and permitted to resume operation, well knowing that further violation of law or good driving conduct coming to our notice will again subject him

to removal from the highways for a much longer period, and perhaps indefinitely. The terms of such suspensions and revocations vary from a minimum of 30 days to months and even years.

This Hearing Division held during the past year 9,300 of these hearings, about 2,500 of them consisting of preliminary warnings. The point of it all is that a large number of operators yearly, through this system, are taught something about safe operation and warned that they cannot have the privilege of operating unless they conform to safe practices.

In addition to this, a great deal of splendid educational and supervisory work is conducted by excellent local and state police organizations. Last year the state police turned in to our own department 28,708 reports of violations of law or good driving practice, and sent about 7,000 similar reports on non-resident operators to the motor vehicle authorities of adjacent states. These reports, while not permitted by the Commander of the state police department to go as official warnings, virtually become such, because the operator at the time of stopping is acquainted with his delinquency. During periods of unfavorable weather conditions, state police patrols are established to give friendly warnings to drivers to slow down their speed, thus checking accidents during such periods.

Much accident prevention work is being done by the Motor Vehicle Department in disseminating information concerning accidents and safe driving standards by departmental attaches speaking before schools and various other organizations, and showing both still and motion pictures. Its researches become available to all who may be interested, and oftentimes furnish the basis for plans for traffic regulations and elimination of physical hazards. A great deal of work is going on by numberless civic organizations, and the press is most generous in giving cooperative publicity to the work being done by both official and unofficial agencies.

As briefly as possible I have covered the salient points of the work being waged in Rhode Island, and just as briefly I will endeavor to give you some of the results obtained during the past two years. Over a period of many years we had a rising peak of accidents until with the close of 1928 we reached a total of 145 fatalities, and in 1929 a total of 4826 other accidents involving personal injury. With the close of 1930 these figures had been reduced to 106 fatalities and 4426 of the non-fatal type of accidents; a reduction of 39 deaths in two years and 400 accidents during last year, a most significant reflection of the preventative work going on. We have lessened the average driving speed throughout the state during the past year 5.7 miles per hour, bringing it from a peak of 36.9 down to 31.2. Bus and taxicab accidents, so far as responsibility for such accidents attaching to that class of operator is concerned, have almost disappeared.

The general accident experience during the past two years has been such as to cause voluntarily a considerable lowering on the part of the National Bureau of Casualty & Surety Underwriters of insurance rates throughout Rhode Island.

These results which we are just beginning to garner in Rhode Island have been accomplished by the smallest state in the Union, yet in a section of the country having the greatest relative density of motor vehicles both to area and population. The problem is largely one of education and I am quite sure that similar results can be obtained in any community which has a drivers' license law intelligently and efficiently administered. Without such a law, however, I cannot be sanguine or results, for of such control is it the very essence.

Problems of highway traffic common to both state highway building departments and state motor vehicle licensing departments are most excellently co-ordinated in Rhode Island where both departments are under the jurisdiction of the State Board of Public Roads, thus insuring the most complete cooperation in the development and exchange of mutually beneficial data and experience, and resulting in the prompt application of remedial action.

In closing I would hand on to you the words a friend of mine said to me not

long since as we were discussing the present stressful age. "What we most need now is less pep and more poise." "Less pep and more poise." Not a bad slogan to bring into our driving.

CHAIRMAN DANA: The Program Committee has arranged the last item on the program as a "Demonstration of Method of Diagnosing and Treating Accident-Prone Drivers," by Dr. Slocombe, associated with the Personnel Research Federation of New York.

Treatment of Accident Prone Drivers—A Demonstration

By C. S. SLOCOMBE

Personnel Research Federation, New York City

(The following is a summary of a very interesting but lengthy series of interviews and explanations staged at this Congress session.—Editor's Note.)

Dr. Slocombe explained that the treatment of two different cases would be shown. In the first case Dr. Slocombe interviewed S. E. Whiting of the Liberty Mutual Insurance Company of Boston, representing John Potter, a taxicab driver with a record of several accidents during his employment, who had been called in before the Motor Vehicle Department for a hearing. The second case was patterned after one from the records of the Boston Elevated Railway, an accident prone street car motor-man represented by Harry Hooper of the Chicago Surface Lines. He was interviewed by Wm. Pasche, supervisor of accident prevention, Chicago Surface Lines.

Five of Potter's accidents were discussed in Dr. Slocombe's interview with him. In the most recent accident the driver had collided head-on with a car going in the opposite direction around a curve to Potter's right. He admitted that he had driven 25 to 30 miles an hour around the curve but he claimed that the other man was on his side of the road. At first he denied that any injury had resulted from the accident but Dr. Slocombe showed him that in his own report he stated that the other driver was injured.

During the discussion of this accident Potter was somewhat beligerent and claimed that the other driver was trying to collect damages in an accident that was not Potter's fault. He seemed to consider the accident lightly, being little impressed by the fact that he was driving at high speed around a curve with the view obstructed by shrubbery.

The second accident had occurred in the middle of an afternoon. Potter had stopped for a stop sign and had then run into the street ahead of the car from his left. He said the other driver had started to go in front of him and had then swerved to the right and struck him. He claimed the other operator's car was out of control. He was still inclined to belittle his accidents.

The next accident had occurred about the middle of another afternoon, when a child had run from in front of a standing street car into the path of his cab. Potter said he was driving slowly, not more than 15 miles an hour, because the street was narrow and there was little space for him to pass the street car. He admitted that he knew that pedestrians often came from in front of trolley cars at that point but had not given the matter much thought and had not considered it necessary to watch for them.

In another accident a girl started to run across the street from a drug store on a corner and was struck by Potter's taxicab. No cars were parked along that side of the street and Potter was driving four or five feet from the right hand curb. It was raining. He claimed that he had not seen the girl until she was directly in front of his cab and said that he was startled by the discovery.

In the fifth accident Potter had backed into two men after being parked to discharge passengers. He said that he had been out of his cab but had not walked to the rear of it to see whether anyone was there. He said he had looked back before

starting and could see nobody, and had sounded his horn. But he had backed only a few feet when someone yelled, "Stop."

Then Dr. Slocombe summarized the five accidents, pointing out that Potter gave too little attention to surroundings while driving. He suggested that some of the accidents indicated that Potter might be talking to his fares or else had been half asleep when the accidents happened, but Potter denied ever talking with his fares. However, Dr. Slocombe said that the occurrence of the accident at one o'clock in the morning, while the others had occurred during day time hours, might indicate that Potter's working hours were too long. Potter said he had to keep going until twelve o'clock or later to make a living.

Dr. Slocombe warned Potter to concentrate more on his driving and to keep watch for unexpected occurrences. He also warned him to shorten the hours of his driving to enable him to get an adequate amount of rest. Dr. Slocombe told Potter that additional accidents would be cause for suspension or revocation of his drivers' license.

Then Dr. Slocombe explained to the audience that the taxicab driver had been quite a decent sort of an individual. His accidents were evidently due to not being on the job. He said there was no evidence of excessive speeding and that Potter had never been arrested on that charge, according to the available records.

Dr. Slocombe said that the Motor Vehicle Department of Massachusetts has just started to build up a record of the driving habits of those drivers whose accident record indicate that they are accident prone. He said the police department of Somerville, Mass., is attempting to keep adequate records of this type.

Then the second case was taken up. Dr. Slocombe said that in handling cases of that kind in the employ of companies that carefully scrutinize and supervise the improper operations of their employees, the interviewer is greatly helped. He said this man would be interviewed by another party representing a superintendent in the railway company's employ. The part of the superintendent was taken by Wm. Pasche, supervisor of accident prevention, Chicago Surface Lines.

Mr. Pasche started the interview with Mr. Hooper by pointing out that the latter was brought in for interview on his own time because of an accident at 8:45 p. m. a few days before. Hooper said that an automobile was being driven along beside his street car and tried to squeeze in between his car and a parked vehicle. He admitted that he knew it was the habit of automobile drivers on that street to pass street cars and that cutting in as in this case, was common. He admitted that he might have expected something like this to happen but asked what he could do when a driver deliberately ran in front of him after driving along beside his car.

Mr. Pasche explained that since Hooper knew that the driver had the smaller and faster vehicle and knew from past experience that such accidents were apt to occur, he should have thrown his controllers in the "off" position and applied some air to take up the slack in the brakes to be ready to stop quickly when the driver cut in ahead. Mr. Pasche pointed out that Hooper was simply not ready to act in the emergency.

Hooper pleaded that the accident hadn't cost the company any money. But Mr. Pasche said that all accidents cost the company money, due to delays, time for making reports, and time for handling reports in the office, if nothing more.

Then Mr. Pasche said that during the preceding year this motorman had eight accidents. He pointed out that the others were similar to this one and that Hooper had been instructed upon one occasion and reprimanded and suspended for a time on another. Hooper pleaded that he had to keep his car on schedule, an answer to which Mr. Pasche pointed out that on several occasions he had been reported as being ahead of schedule.

Then Hooper was told that the next morning Supervisor Jones would begin to ride with him and give him more instruction regarding his weak points. Dr. Slocombe suggested that this man's record indicated a bad attitude toward his work. He had missed his assignment of work three times and had been cautioned for crossing inter-

sections too fast. Mr. Pasche pointed out that he felt the motorman's tendency to run ahead of schedule had much to do with his accidents.

Then Dr. Slocombe gave some data regarding the results of this particular treatment. The actual interview had taken place in December, 1928. In 1929 there were several reports indicating still some bad attitude toward the company but showing that the instructors were giving the motorman frequent instruction. In 1930 only two accidents were reported. The motorman was exonerated in one of these because an automobile ran into the rear of his car but in the other the circumstances were very similar to those in the accidents brought out in the interview.

CLIFFORD DAVIS (Commissioner of Fire and Police, Memphis, who had taken the chair to give Chairman Dana an opportunity to catch his train): I want to invite all of you to join now in the discussion on any one of these papers or the philosophy as announced by any one of these three distinguished gentlemen.

E. K. EASTMAN (Director of Personnel, St. Louis Public Service Co., St. Louis, Mo.): I should like to ask Dr. Bingham a question. Do you think it is practicable in the examination of the driver before licensing, to determine by psychiatry and otherwise, in the time that would be available for such examination whether the applicant would probably be an accident-prone driver? I know that Dr. Slocombe does some of that in the hiring of motormen, but I am wondering about its operation to the examination of a large group of automobile drivers.

DR. BINGHAM: I hesitate to make predictions as to what may happen ten years from now. I would rather concentrate on the things that we are doing today.

For one thing, when the applicant comes up for examination we are convinced that the best present available test of his ability to drive is driving. So I would certainly put first in any program of examination for licensing operators the road examination.

If, as is done in Rhode Island, the examiner can convince himself from what he can learn without the previous history and experience of driving that this man can drive, perhaps that isn't necessary. Nevertheless, I feel that in general the road test, carefully standardized and honestly conducted, is the first essential step in the examination.

Secondly, an oral or a written examination to make sure that the man knows the rules, regulations and customs of the highway is an essential part of the examination for drivers' licenses.

This examination should be conducted for two purposes. One of them is to find out whether the man can drive well enough so that you are willing he should have a license. The other one is to find out, even though he can drive well enough, certain details about his attitude or his inclinations.

Consequently, if you can find those things out, you can start out and put him on the right road to still better operation.

In other words, I believe that the examination for a driver's license should be educational as well as for the purpose of elimination of the incompetent.

Commissioner Stockel of Connecticut tells me that he has just published a little pamphlet in which he describes an additional step which he is initiating in Connecticut. It is to undertake to get at the time of the first examination a little more information about the personality and the attitude of the applicant. He is undertaking to choose his examiners who are particularly keen and competent to size up the applicant to find out these features about his attitude toward the rights of others, his general habits of operation, his tendency to get excited and lose his head in an emergency, and other personality factors.

It is too early to say how successful that procedure will be in actual operation. I think it is a very hopeful and significant move. As Commissioner Stockel has experience in it he may be able to tell what the difficulties are and whether or not it is possible to do those things with and through keen and intelligent examiners who are not psychologists, who are not psychiatrists, but who have special training directed toward the discovery of just these features of a man's personal characteristics that are so important.

My own feeling at the present time is that there are not enough psychiatrists and not enough psychologists to put on the staff of a motor vehicle department to do this job.

That is one thing. The other thing is that I am not sure, even if there were enough, that they would really be successful in doing this sort of thing in a way that would make it practicable.

So it seems to me that for the present we had better work along the directions we are sure of and in the meantime, in cooperation with some of the departments that have psychologists and psychiatrists, in some city or state, carry on further experiments to improve and develop methods that will be still better and still more useful in connection with the regular, routine examining of drivers for licenses.

WALTER J. McCARTER (Supt. of Emp. and Training, Cleveland Railway Co., Cleveland, Ohio): In handling accident-prone men one of the problems is that of dealing with a man who is discourteous, who has a very bad attitude, a man who is emotionally unstable. That might be caused by a number of things. It might be the reaction to his supervision, it might be a defence against his own inefficiency, or it might be a reaction due to home conditions.

I wonder, Doctor, from the psychological point of view, whether the way to handle that man is to greet him with a threat and a kick, or would it be better to try to find some of these underlying principles which may be the cause of that particular difficulty.

DR. BINGHAM: I am all for getting all the information you can about the man, including his home and family circumstances, his difficulties, his health, financial problems, or anything else that may be making him emotionally unstable or worried or causing him to take the wrong attitude toward his job or to fly off the handle in an emergency.

A motorman in Boston had over a period of time accumulated a good many accidents, though in earlier years he had operated quite safely. When his case first came up for review, in talking with him it wasn't hard to see that he wasn't so very well. It certainly was a case where he was very much worried about something. He was distraught and distracted. He was immediately sent out for medical examination and the report came back as a bad case of malnutrition. In talking with him further the fact came out that he had several children and his oldest daughter would finish high school in a few months. His wife had died a few months before and this motorman was undertaking to be mother and cook for that little family. He wasn't a good cook. While he was on the front end of the street car he was worrying about conditions at home, about things that could happen to his children, and so on. The more he worried the less he could digest of his own poor cooking. It was a vicious circle and he was getting worse and worse.

We undertook to break the vicious circle into two different segments. The medical officer gave him a little something for his indigestion, and we finally persuaded him, even though it did come hard on his pocketbook, that he had better get a good woman to look after the kids and cook him a good dinner. Gradually he got his health back. He quit worrying about conditions at home and his accident record greatly improved. That is one of a thousand instances, no two of them alike, but all of them indicating that the more information you get about some of these cases, whether it is emotional instability or wrong attitude, the better position you are in to deal with it intelligently and helpfully.

CHAIRMAN DAVIS: You see, Mr. McCarter, that man didn't get a threat or a kick. He got something to eat and something for his indigestion, and a raise in salary.

ROBERT I. CATLIN (Vice-President, Aetna Life Insurance Co., Hartford, Connecticut): It seems to me that Dr. Slocombe in the first case particularly didn't go very far in trying to help that taxicab driver avoid future accidents. It seemed to me that he was an accident-prone driver. Just to tell him that if he came back again his license would be revoked or taken up wasn't quite sufficient. It seems to me that when these men are called in on the carpet, so to speak, after they have been told what is

wrong with them, it is highly desirable and important, if we are going to do anything for the accident-prone driver, to map out a course, maybe one involving supervision, maybe one involving reporting back periodically.

DR. SLOCOMBE: I have been criticized for the way in which that taxicab case was handled, apparently because I didn't go into more home circumstances and so on. The most direct criticism I get is for not taking that man's license away. I know whether I am right or wrong in handling them only as the results indicate. That is why I took the second case of the street car motorman who had been handled in that way and whose accidents had been cleaned up.

GALE H. ROSS (Captain of Traffic, Erie, Pennsylvania): The examination of the taxi driver brought out a point that I am much interested in. Has any legislation been enacted governing the working hours of the taxicab driver, the bus and truck driver, anywhere in the country. We have taken the matter up with the Interstate Commerce Commission and they informed us that they haven't anything to do with it, that it is a matter for the respective states to handle. I wonder if anybody here could enlighten me on that.

E. ROSS FARRA (Manager, Grand Rapids, Michigan): In Michigan we have a 14-hour law passed by the last legislature covering the transportation of passengers. It just became effective this September.

ADJOURNMENT

Tuesday Morning Session
October 13, 1931

Open Meeting—National Safety Council Committee on the Driver

DR. W. V. BINGHAM, Chairman
Personnel Research Federation, New York City

Mr. Sidney J. Williams, Director, Public Safety Division, National Safety Council, opened the meeting in the temporary absence of the chairman, Dr. W. V. Bingham.

MR. WILLIAMS: I believe that Dr. Bingham intended to call first on Dr. Alvin R. Lauer, Department of Psychology, Iowa State University, to tell us about his work.

DR. LAUER: The particular things that we shall discuss are perhaps not the things that are practical in the sense that we can use them tomorrow. However, what is now theoretical may be practical some time in the future. Our studies grew out of a very practical need. The National Research Council became interested after the National Safety Council had gathered statistics to present the situation. They have since organized a series of researches to analyze causes of accidents, particularly personnel causes.

One of the fundamental assumptions of modern experimental psychology is that for every stimulus there is a response. If a driver is going down the street and a child runs across his path, it is not solely a question of the child running across the way; the question is complicated by other factors, passengers who might be talking to the driver, signs present, various advertising displays in the driver's field of vision, the width of the street, the type of car and so on. Hence the total reaction that the driver makes to the situation is complex. The first fundamental assumption on which we are working is that for every stimulus there is a response. If you assume that either the stimulus or the response is not measurable, it is no use to carry on research, but if you can measure the stimulus, you can measure the response.

Dr. Lauer then showed pictures of the experimental work done at Ohio State University for the National Research Council, describing particularly the following studies:

1. Measurement of driving reactions by a device stimulating motor vehicle operating conditions. The "driver" is seated back of a steering wheel with his feet on pedals. By means of these devices he responds to certain stimuli presented by two moving pointers before him and signal lights above and to one side.
2. Measuring emotional reactions.
3. A test of judgment of speed and distance later elaborated by Mr. T. W. Forbes, then at Ohio State University.
4. Experiments in recklessness.
5. Special studies of habits of drivers actually in automobiles on the streets.

(Dr. Lauer summarized the results of his studies in a paper before the Delivery, Taxicab and Bus Section of the Congress. Parts of this paper have been reproduced in the December, 1931, issue of the *National Safety News*.)

CHAIRMAN BINGHAM: I want to call next on Mr. T. W. Forbes now a research worker in the New York Psychiatric Institute.

MR. FORBES: I was interested in judgment of speed and wished to know whether accident-prone drivers were defective in ability to judge speed. We began with apparatus which consisted of a simple pointer running behind a screen, from which we developed the other apparatus.

Briefly, these are the questions that the work attempts to answer:

1. How do people judge speed?
2. Do they differ in this ability and how much do they differ?
3. Are such differences responsible for accidents?
4. Can driving foresight be measured?
5. Do accident-prone drivers show lack of this type of foresight?

One of our experiments was made with actual cars on a section of actual road marked off with signs at ten-yard intervals for one hundred yards. The subjects tested were fifty students, some graduates and some under-graduates. Four at a time were carried in a sedan and required to estimate the point at which they would meet an oncoming car. Speeds were varied so that they would not know where they would meet the car the next trip.

It was quite evident that some drivers did not judge speed visually very well; they really judged by expectation rather than by seeing the oncoming car. Some of the subjects would make an error of twenty-five per cent of the distance from where they were to the car.

We found some evidence that it is slightly harder to judge speed from the rear seat than from the front.

Each person was given two series of ten trials each, a total of twenty trials. Individual errors ran from zero to fifty yards out of two hundred. The average error in the series was between five and ten yards for most people and some made an average error as high as twenty yards, just twice the average. Others would make an average of only three or four.

The inability to judge speed, as tested here and on our miniature apparatus, which I shall describe in a minute, did not turn out to be statistically as closely related to accident proneness as we thought it would be.

The miniature apparatus in the laboratory was developed from a simpler one in which a pointer moved behind a screen. The apparatus gave us a measure of judgment of speed and also another measure which turned out to be much more characteristic of the accident-prone group; we may call it "driving foresight."

The essential part of the improved apparatus is a fifteen-foot canvas belt which represents the road, and some miniature cars which are mounted on endless steel bands which run over the road and are geared in such a way that they always maintain their velocity in respect to the road. At one end is an eye piece, made in the form of a small windshield just wide enough so that the driver sitting behind it can look through with both eyes and see the miniature cars coming down the road. He can steer from side to side, and also control the apparent speed. If he steers into the left-hand lane as the other car approaches, he actually hits it. It is so real that some less emotionally stable people go to pieces for a couple of minutes when they have a collision. Our records were taken by means of an electric counter, giving us a measure of the speed driven, the number of smash-ups, the narrowness by which smash-ups were averted, etc. Then the figures were treated statistically for significant differences between non-accident groups of drivers and accident groups of drivers from a public utility where we had records on the men.

We found a differentiation that seems to show we have been getting a characteristic difference between the accident-prone and the non-accident-prone group. The learning curves of the accident-prone group and the non-accident group differ. The non-accident group picks the thing up within the one-minute practice period that we had. The high-accident group does not pick it up so quickly. Some take the total allowable time of the trial, fifteen minutes. Speed driven was not characteristic at all. The accident-prone group were trying to be careful and they still made poor scores. It was not a matter of recklessness as exhibited by unreasonable speeds.

W. C. SHRIVER (Chrysler Corporation, Detroit, Mich.): Have you reduced any of these measures of learning ability to the point where you can say how much drivers improve?

Mr. FORBES: They do improve on the apparatus itself as shown by learning curves. We have not tried much to increase the difficulty of learning.

CHAIRMAN BINGHAM: From the point of view of the motor vehicle commissioner and the fleet owner, the most important contribution that could come out of this would be the definite suggestions as to the best ways of improving people's ability to make these judgments and to control their mechanisms. We want to uphold further investigations in those directions.

Mr. SHRYVER: Will you tell us, Mr. Forbes, about the test you made with the man who was a little intoxicated?

Mr. FORBES: When this gentleman came in, I smelled alcohol but did not think he was particularly "under the weather." He watched some one else take the test for a while and then I gave him the usual instructions and practice period of one minute during which nearly everyone picks up the manipulation. But, one minute did not produce any impression at all on this gentleman. I gave him the instructions again. It did not work. As the cars came down the highway, he would see if he could hit them and I finally had to tell him it would be better for him to come back some other day because he simply could not manipulate the thing. I might say that he was hard on the apparatus.

E. K. EASTHAM (St. Louis Public Service Co., St. Louis, Missouri): Those of us in the practical operating of street cars and motor vehicle fleets are interested in knowing if the experiments have been standardized to the point where we can put them to work in our own industry.

CHAIRMAN BINGHAM: This question illustrates the value of a joint session in which laboratory investigators and practical men meet together.

First of all, you do have a fairly useful measure of ability to judge clearance, let us say in your records of the kinds of accidents that your street car motormen have. If you have a motorman who, after having his attention called to the fact, continues to have accidents in turning corners where the rear end of his car does not quite clear an automobile parked or standing nearby, you know something about his inability to judge clearance and you know that is something in which he should be instructed.

Now, you would like to know this in advance of the accidents and that is where such clinical tests as these will eventually play an important part. I am certain that the day is not far distant when most large fleet owners, street car operators, public utilities, etc. will have, as a regular part of their personnel equipment, the apparatus and the specialists to make these tests as aids to your selection, training and supervision. I think that some of these measures have very definitely reached the stage of practicability in immediate usefulness. I feel that it would be unwise for a firm or motor vehicle department to undertake to install and use them unless they also were in a position to have the joint supervision and consultation of someone thoroughly familiar with all the background and difficulties and limitations, as well as excellences of these methods.

I think first of the history of the Psycho-Technical Bureau connected with the Paris Tramways which for a number of years has used laboratory studies of this character as part of its employment procedure.

The Milwaukee Electric Railway & Light Company, as you know, began nearly ten years ago to use some such psychological measures, the first work being done by Dr. Viteles, who is now Professor at the University of Pennsylvania, and who in recent years had been working in connection with two or three of the public utilities in Philadelphia. In Milwaukee, a successor, Dr. Shellow, has continued to develop and improve the various kinds of apparatus in connection with their accident clinic and their employment office.

Dr. LAURE: Suppose an electric railway was located in a mid-west city where there is a fairly good University with a department of psychology, but no man in

the department who has any particular knowledge of this type of psychological testing. Should the company go to the department of psychology and say "We want a psychologist" just as they would go somewhere else and say "We want a bookkeeper?"

CHAIRMAN BINGHAM: They would want to insist that the psychologist whom they brought in for consultation or for actual survey not only knew statistical methods but that he also had made himself thoroughly acquainted with the actual practical problems of employment and supervision in the transportation industry.

E. P. GOODRICH (Consulting Engineer, New York City): Do you feel at the present time that you could honestly go to a motor vehicle department and say that it is now advisable to install apparatus in each one of the driver testing stations and that you can exclude certain drivers from the road on the basis of the tests?

CHAIRMAN BINGHAM: Yes, I would say that, but I would immediately add that I do not think it is as advisable to establish such a department for the primary purpose of excluding drivers as to begin right away to help drivers keep on the road.

Mr. GOODRICH: I would exclude drivers rather than let them practice on the road to the detriment of others.

Mr. SHRYVER: A year ago, Dr. Bingham asked me to find out if the man who is a traffic accident repeater is also liable to personal injury accidents not related to traffic? We found no men in the traffic-accident-prone group who did not show some non-traffic personal injury accidents. We found that a man once started on a given accident rate seldom deviated from it. If you take the record of one man from the date of employment to the present day, you will not find a poor condition in one year, then a year and a half free of accidents and then another year with many accidents. At the point of the man's third accident, we are able to indicate pretty clearly the time at which he will have his sixth and ninth accident.

At the beginning of 1931 a group of sixteen men in a certain fleet were picked and accidents for those men forecast. The accident rate in that group is one accident per four men. There are 404 drivers. On September 30th, we found these sixteen men had turned in twelve accidents! The very consistency with which those accidents came in is an indication to me at least of the value of such a method of observing your prone-to-accident men.

Now, I shall read a few records of drivers to give some indication of the type of man some of the reports cover. I will emphasize only their non-traffic accidents.

Here is a man by the name of Seeger, who had three traffic accidents in the year 1928. His license to drive was revoked by the company and he was assigned to loading gravel. Seeger was hit in the wrist by another man's shovel. Later he was rolling a pole on a truck and his foot slipped and he got caught. He had the same accident three months later. Another time he was pulling a pole out of a pile when it slipped, causing it to strike in back of his ear. He had had three traffic accidents in five months. We removed him to other work in which the hazard was not considered great and he continued at the same accident frequency rate, except that he transferred his activities from the automobile to some handling job.

Here is another example. The man was up in a tree, failed to throw his leg over a limb and fell to the ground, injuring his back. Under the same foreman, a shower of rain came up and this man, starting to run for the truck, slipped in some mud and fell on the street. He was transferred to another foreman and while wiping a cable joint, the cloth slipped, burning his hand. Next, while pulling the emergency switch, he burned his fingers. Later, while using a pick and shovel, the pick made a blister in his hand, later developing into an infection. He also sprained his left side while tugging at a man-hole cover. Then to cap it all off, someone gave him an axe and asked him to open some crates. The axe slipped and cut his finger.

That man is not now connected with this company but he was an accident-prone man in almost any way imaginable. It was unsafe to ask him to do almost anything.

Here is one more case: While cutting up some brush, the axe slipped off the limb and cut him on the left shin. Next while trimming a tree, he fell and the trimmers struck him in the eye.

Another case. While pulling a head guard over a pole to get blocks on it this man threw his weight on the right ankle and sprained it. He also picked up a broken insulator and cut his finger on it. This man had practically every available type of accident on the job, and I only regret that those who seemed yesterday to doubt this matter of accident-proneness did not have the opportunity this morning to check these men.

Dr. Lauer came to cooperate with this organization in March, 1930. At that time the traffic accident rate in which he was primarily interested was 6.8 accidents per 100,000 miles. It had been 7.4. Today the accident rate is 3.4 accidents per 100,000 miles.

Dr. Lauer and Mr. Forbes were able to pick from a mixed group, without any mistakes, the bad drivers and the good drivers. They were able to select, without any difficulty the upper 25 per cent and the lower 10 per cent, but in between the selections were not so good. After all, it is this lower 10 per cent in whom you are interested because 10 per cent of the drivers are causing about 50 to 55 per cent of the accidents.

S. J. WILLIAMS (Director, Public Safety Division, National Safety Council, Chicago): Some years ago I had a man working for me who got into all kinds of accidents. We found eventually that he was merely near-sighted and needed glasses. Did you mention whether you tried to find out what might be the matter physically or mentally with these high accident men?

MR. SHRIVER: Physical examinations were given to all. In most cases, physical defects were discovered. It was impossible, except in one case, to lay your finger on what was causing this accident situation. The one exception was a case involving judgment of speed. Within three years the man had nine accidents and since that time has had no accidents.

Unfortunately, a regrettable number of men who were in the 10 per cent prone-to-accident group had "E" intelligence (rated in the lowest eight per cent of the population as a whole).

Another question is this: If a man has three accidents per year while the normal is one accident in four years, he is just twelve times as bad as normal. Now, if you reduce his accident rate fifty per cent he is still six times as bad as the average. At Boston have they made a good driver out of any bad drivers? Originally this group of accident-prone men had 12 to 17 accidents per year. Are any of those men today in the zero-to-three accident group, or have they not been somewhat improved but still not down to the point that you would hire them if you knew of their records as new employees?

CHAIRMAN BINGHAM: There are a few who, in spite of some improvement, are still prone-to-accident, and if the question of re-employment came up, they would not be employed.

I think that the prone-to-accident group on the Boston Elevated Railway when we first took hold in 1927 was, from the point of view of intelligence, health and general ability, a distinctly better group than the group you have described. They had had for many years a high standard in their employment office.

Let me interject right here that if you set the standard high enough, you do not need psychological tests to eliminate morons, because they probably will not have completed the eighth grade in school. A moron certainly will not have completed the eighth grade in nine or ten years.

F. ROSS FARRA (Manager, Grand Rapids Safety Council, Grand Rapids, Mich.):

Has anyone data on the relation between traffic accidents and traffic law violation? I believe there is a positive relationship between violations and accidents.

CHAIRMAN BINGHAM: Everyone who has gone into it will join you in that belief.

That is one of the first things we found in looking over the records of the Boston Elevated Railway. The high-accident group were also the men who had, on the average, a much larger proportion of minor infractions and rules. They would forget to change the sign on the front of the street car, fail to report on time once in a while, and they would be guilty of trivial and serious violations of the rules.

MR. FARRA: How high was the correlation?

CHAIRMAN BINGHAM: It is far from one hundred per cent, but high enough to be positive and significant.

MR. FARRA: The difficult man is one whose intelligence is average, health sound, family relations, happy, whose violations are not above the average and yet who falls into the accident-prone class. I speak of 300 men whom we tried to study. What is wrong with that man; what can we do to help him?

DR. LAUER: We should distinguish between wilful and careless traffic violations.

We must also remember that we are working for the National Research Council. We are not allowed to tell everything we know, because we are trying to avoid putting out information which may be detrimental.

Likewise it takes someone who has the necessary knowledge to apply the remedies. For instance, if I break a leg, I cannot go to the doctor, get the apparatus and use it myself. It takes someone who has had experience.

CHAIRMAN BINGHAM: The next report, will be from Professor J. E. Evans, Psychologist, of Iowa State College, Ames, Iowa.

PROF. EVANS: A few figures that I am about to give you were obtained from accidents involving a street car and automobile. These figures were taken from a study of data obtained in Des Moines.

Des Moines has 140,000 people, 126 miles of street car lines on which ran 150 to 160 cars at peak periods and about 65 during slack periods. All of these accidents represented a collision between a street car and automobile.

These 1,184 accidents during one year "peak" at certain periods of the day. We find a peak in the morning from 7 to 9, and a slight peak at noon. From 5 to 6 p. m. there is a tremendous peak and at theater time 8 to 10 p. m. another rise. From about 3 a. m. to 6 a. m., while not a peak, is a period in which the fatalities occur.

The months of January, February, and March are the worst so far as the condition of the streets is concerned, because we have snow, sleet, and ice. January had 88 accidents, February 81, March 99, April 84, May 121, and June 83. In October there were 102 and 102 in November again, but 120 in December.

Most of the people in these accidents were between the ages of fifteen to twenty and thirty-five to forty-five. The group in between was not so large.

We made a check of the cars driven by women and men. About 9.5 per cent of the accidents were with cars in which there was a man and about 4.4 in which there was a woman.

MR. STREETER (Detroit, Michigan): There is a difference between the experience of the street railway and general traffic. When the first bad weather comes, automobile drivers are more cautious so far as accidents between themselves are concerned, but they have more collisions with street cars.

J. S. BAKER (Assistant Traffic Engineer, National Safety Council, Chicago): We sent out a mimeographed form briefly outlining proposed changes in accident report forms to provide personal data on the driver to guide the investigator of the accident-prone driver.

In addition to usual material with respect to place and circumstances of the accident, we have "Identification of the Driver:" name, address, sex, occupation, experience, years in the employ of the company, etc.

Specifically applying to the driver are:

1. *Action of the Driver* to law violations, such as Passing on a curve.
2. *Condition of the Driver.*
3. *Obedience to Rules and Regulations*, to indicate whether the man lacks training.
4. *Conditions which might lead to an accident*, such as hurry.
5. *What might driver have done to avoid accident?* This will often bring out the keynote to the situation.

We have to put out one form that can be used by commercial fleets and another by police departments.

CHAIRMAN BINGHAM: We must insist that nothing shall go on the report calling for the reporter's opinion or inferences but only for his statement of facts that he has observed or obtained. What we want is facts and nothing but facts. No inferences, no opinions, no judgments on the report. I think we will all agree to that.

R. I. CATLIN (Vice-President, Aetna Life Insurance Co., Hartford, Conn.): I believe you will have opposition in getting a very lengthy form adopted by the insurance companies generally. There has been opposition to the present form. The most practical way to get cooperation would be to approach insurance companies with the idea that they use it for certain fleets where the fleet owner might be a member of the National Safety Council and willing to cooperate to the extent of furnishing it.

I have felt that if the National Safety Council wants to get their cooperation, they can best do it by going to insurance companies and saying "Will you tell us in confidence the names of large fleet owners that are insured by you? If they are members of the National Safety Council, we will approach them with your consent and ask if they will use this form." In that way you will get the cooperation and a greater number of reports than you will get through trying to use it generally.

CHAIRMAN BINGHAM: Perhaps this will summarize the consensus of the group.

1. We recommend that a minimum of important information about the condition of the driver be added at this time to the revised model report form for general use; that only those items be recommended for inclusion which we are thoroughly convinced can be gotten reliably.

2. A more inclusive form should be prepared and recommended for trial on the part of the State Motor Vehicle Departments, fleet owners and other groups who are willing to cooperate with us in the effort to improve and develop report forms and find out what additional information is most reliably obtainable.

ADJOURNMENT

Tuesday Morning Session
October 13, 1931

Joint Meeting with the Statistics Section

(See page 199 of this volume.)

Tuesday Luncheon Session
October 13, 1931

Business Meeting

Chief August Vollmer, Chairman of the Section, was unable to attend the Congress and Commissioner Clifford Davis, Vice-Chairman, presided.

For the Committee on Membership, Clifford Davis, chairman, reported 564 members of the section. He classified these as follows:

Community Organizations	138
City departments	123
Public Utilities	115
Commercial Vehicle Fleets	47
Insurance companies	47
State Departments	27
Miscellaneous Industries	26
Equipment manufacturers	9
Boards of Education and Schools	6
Miscellaneous Public Safety	26

The chairman reported marked increases in police department and state department memberships during the past year.

Wm. C. Knoelk, chairman of the Annual Congress Program Committee, reported that actual demonstration of methods of traffic administration had been one of important objectives in preparing this year's Congress program.

Captain Lawrence A. Lyon of the Michigan State Department of Public Safety reported for Commissioner Oscar G. Olander, chairman of the Rural Highway Hazards Committee. He said that some rural highway jurisdictions, particularly states, are making studies of individual dangerous highway locations. One or more collision diagram studies had been submitted to the National Safety Council by highway or other state departments in Massachusetts, Pennsylvania, Michigan, Illinois and Minnesota. However, not enough cases had been studied to warrant any conclusions except that the methods were practicable.

Judge Levi M. Hall, of Minneapolis, chairman of the Committee on Enforcement, reported that about 15 cities are known to be doing some investigation of accidents for conviction of violators. He said that the committee had concentrated its attention on promoting this activity and was pleased that considerable interest is being shown in some other cities.

For the Committee on Uniformity, Burton W. Marsh, chairman, reported that 48 cities are known to have adopted traffic ordinances conforming more or less closely to the Model Municipal Traffic Ordinance. He said that the National Safety Council staff had aided in the promotion of drivers' license laws in several states during the year and that laws had been successfully passed in Colorado, Iowa, Kansas, Michigan and Oregon.

For the Nominating Committee, Lewis W. MacIntyre, chairman, reported the following nominations for elective officers of the Section for the year 1931-32:

Chairman—CLIFFORD DAVIS, Vice Mayor and Commissioner of Fire and Police, Memphis, Tenn.

Vice-Chairman—F. C. LYNCH, manager, Kansas City Safety Council, Kansas City, Missouri.

Vice-Chairman—LEWIS W. MACINTYRE, traffic engineer, Pittsburgh, Pa.

It was voted to accept this report and the Secretary was instructed to cast a unanimous ballot for these nominees.

It was voted to amend the by-laws to add a standing committee on Traffic Engineering to continue activities of the National Safety Council's former independent committee on Traffic Engineering.

ADJOURNMENT

Tuesday Afternoon Session
October 13, 1931

Traffic Demonstration in Grant Park

This demonstration was given with the assistance and cooperation of the following organizations, to show the practical operation of important features of traffic administration:

Board of South Park Commissioners.
Chicago Surface Lines.
Evanston Police Department.
Automatic Signal Corporation.
Eagle Signal Sales Corporation.
General Electric Company.
Weaver Manufacturing Company.

The program was divided into four parts, each demonstrating a different feature of traffic administration.

Traffic Accident Investigation

The investigation of a well known traffic accident that occurred in Evanston, Illinois, was re-enacted. The circumstances found by the Accident Investigation Squad upon its arrival after the accident were as nearly reproduced as conditions would permit.

The demonstration started with the squad arriving at the accident scene. A vehicle from the west on a through street had been struck by another from the south that had failed to stop for the stop sign and had entered the intersection at high speed. The latter vehicle was but slightly damaged and had left the scene of accident. The clues that remained when the squad arrived were:

1. Vehicle No. 1 badly damaged about the right front, driven about ninety feet north of the cross street by the collision.
2. Skid marks of vehicle No. 2 extending 37 feet to the point of collision and 51 feet beyond, leading across the sidewalk on the north east corner and leaving the imprint of the tire tread in soft dirt where it stopped after collision.

The squad measured the skid marks, took photographs of conditions adjacent to the intersection and obtained evidence from witnesses. The photographs showed the damage to vehicle No. 1, the clear view across the corner between the two approaching vehicles, the stop sign on the south east corner, and the imprint of the tire of vehicle No. 2 in the soft dirt. Vehicle No. 2 was found to have carried the injured persons to the hospital and the driver and vehicle were brought back by one of the officers of the squad. Then a photograph was taken of the tire corresponding to the imprint, for later comparison. Drivers No. 1 and No. 2 and witnesses were questioned, their statements were recorded and the signatures of these witnesses were obtained.

This investigation was made to obtain evidence for presentation in support of a charge of assault with a deadly weapon on which the driver of Vehicle No. 2 was arrested. The trial was later demonstrated at the Wednesday morning session of the Street and Highway Traffic Section on "Convicting Violators."

Testing of Vehicles

A fleet of vehicles was driven through a safety lane with a lecturer describing the character of the test at each station.

Station 1. The driver received a card on which the results of separate tests were to be recorded.

Station 2. The headlights were tested for focus and elevation and the operation of the tail light, stop light and parking lights were checked.

Station 3. The operation of the windshield wiper, rearview mirror and horn were checked here.

Station 4. The amount of steering wheel play was observed and the driver was instructed about driving over the wheel alignment indicator at the next station.

Station 5. The vehicle passed slowly across the wheel alignment indicator which showed the number of feet of side travel of the wheels per mile and whether the wheels toed in or toed out. Here the driver was told how his vehicle should be driven onto the brake tester at the next station.

Station 6. The vehicle was stopped from a speed of five to eight miles per hour by sudden application of the brakes with the wheels on the platforms of the brake tester. The height of the corresponding column of liquid in a glass cylinder showed the braking effort of each wheel. The total braking power and its distribution was thus indicated.

Station 7. The driver handed his card to an attendant who gave him an O. K. sticker if the tests were passed satisfactorily or handed him a copy of the card showing the defects to be corrected before approval could be given.

Traffic Actuated Signals

A temporary installation of traffic signals and control had been made for this demonstration, on an important thoroughfare in Grant Park, at an intersection with a minor street. Detectors were placed on the pavement surface in each approach to the intersection. In a permanent installation they would have been inserted in the pavement. Vehicles driving over these detectors were electrically recorded in a central control box and signals were operated in accordance with traffic demands. Two different types of operation of traffic actuated control were demonstrated:

1. The demonstration started with the equipment set for full vehicle actuated control. This gave no preference to either street. The detectors in all four approaches to the intersection were connected to the control device. Vehicles were delayed in crossing only when traffic on the cross street was using or about to use the intersection. When this traffic had cleared the waiting vehicles were given the "go" signal automatically. The operation was thus adjusted to the needs of changing traffic.

2. The second type was called semi-vehicle-actuated control. During this part of the demonstration the detectors on the main thoroughfare were disconnected from the control. Thus, traffic on this street had the green light continuously except when there was traffic on the cross street. When a vehicle crossed the detector in approaching the intersection on the cross street, it obtained the green light as soon as the right of way had remained on the artery for a predetermined period. Then it was given sufficient time to cross the artery in safety. When additional cars followed on the minor street the green light was automatically extended for each up to a total maximum period.

Flexible Progressive Traffic Control

For this demonstration a temporary installation of three traffic signals was made, one at each of three designated intersections. Six different features of control were shown with a fleet of vehicles circulating through the system to show the effect on traffic.

Street and Highway Traffic Section

1. The demonstration opened with the system set for a total cycle of 35 seconds with a speed of 12 miles per hour in both directions. This low speed was due to the short spacing of the signals for the demonstration. The percentage of red and green was different at each intersection. In practice it would be adjusted to the traffic flow in the different directions.

2. This was the same type of setting with the cycle increased to 45 seconds, thus reducing the speed to 10 miles per hour. This would ordinarily be done to handle a greater volume of traffic in both directions at a slightly decreased speed. Each of these first two settings corresponded to a normal and approximately equal flow of traffic in both directions on the main street.

3. Then, the signals were set to favor west bound traffic, corresponding to a morning rush toward the city. The cycle was still 45 seconds and the division remained the same as before at each intersection. But the relation between the signals was changed and west bound traffic moved at 18 miles per hour instead of ten. A few vehicles were able to go through east bound without stopping at 21 miles per hour but continuous movement was not assured.

4. In this demonstration the system was reversed to favor east bound traffic, corresponding to the evening rush away from the city. The cycle was changed to 50 seconds, giving an east bound speed of 20 miles per hour. Some vehicles were able to go through westbound at 16 miles per hour.

5. When a traffic signal is not operating on a normal automatic cycle, a flashing signal should be shown at each intersection. In this case a flashing yellow was shown on the main street to indicate caution and a flashing red on the cross street to require cross traffic to stop before entering the intersection. In a case where neither street is a through street the yellow should flash in all directions when the signal is not operating.

6. The system was set for an emergency, such as fire run, with all traffic required to stop except the emergency vehicle. The red light was displayed in all directions at each signal. When the emergency ceased regular operation was resumed.

Signs for Traffic Control

Signs were used in connection with different events of the program. Some were placed temporarily for the demonstration. Others were permanent installations. The following types of signs were used:

1. STOP—red letters on yellow background.
2. NO LEFT TURN—black on white background.
3. NO RIGHT TURN—black on white background.
4. NO PARKING—red on white background.
5. STREET END—red reflectors.

Wednesday Morning Session
October 14, 1931

Convicting Violators

JUDGE LEVI M. HALL, Chairman

Chairman, Committee on Enforcement, Street and Highway Traffic Section

The meeting of the Committee on "Convicting Violators" convened with Judge Levi M. Hall, chairman, Committee on Enforcement, Street and Highway Traffic Section, presiding.

CHAIRMAN HALL: This is to be a "Symposium of New Developments in Traffic Law Enforcement." I might say as a sort of general report for the Enforcement Committee of this Section of the National Safety Council, that the major activity of this committee during the past year has been the development of accident investigation squads in the various municipalities. We have met with more or less success.

Having been Traffic Judge for some years, I have always believed that enforcement is probably the principal angle to the traffic problem. You have your engineering problems, but after all, unless you have an adequate enforcement to back up the work they have done, it necessarily fails. You must have strict and orderly enforcement by your Police Department and a Court who is in sympathy with the traffic problems of the community and more particularly with what the Police Department has been attempting to do. You must have complete coordination.

The first subject for discussion this morning is "Uses of Radio" in traffic law enforcement. Will somebody tell us what they are doing in his locality with the Use of Radio in traffic law enforcement?

E. W. BROWN (Ass't Supt., Metropolitan Police Dep't., Washington, D. C.): In January of this year, we installed a radio in our Police Department and it is working out very satisfactorily. Observing the use of radio in dispatching men to scenes of crime, it occurred to me that we could utilize our radio in connection with traffic work. On July 24th of this year, I put in operation from the Traffic Bureau a radio car with two officers.

In addition to a radio receiving set, I equipped that car with instruments for testing brakes and cameras for taking pictures at the scenes of accidents. While this car does not go to every accident,—that would be physically impossible—we are dispatching it by radio to the scenes of all accidents where there are personal injuries or considerable property damage. These men conduct an investigation in a more intelligent manner than the average patrolman will. We are training our men in the use of these different instruments. The greatest difficulty I am encountering is in the use of the camera for the men are not experienced photographers.

By constant patrol throughout the city with this car the officers are not only able to respond to radio messages; they are also able to observe other things. For instance, if they see a truck that appears to be overloaded, they may stop it and inquire as to the overload. They also examine the headlights on motor vehicles. If a vehicle has improper lights the driver is given a ticket.

HARRY N. WETTERGREN (Superintendent of Traffic, St. Paul, Minnesota): In St. Paul we also investigate accidents for evidence to present to the courts in prosecutions. We decided that it would be necessary to have some kind of a special squad to make these investigations, so we inquired around to find out where such squads were in operation. Minneapolis had such a squad working and we went over there for information. Then we organized an accident investigation squad to consist of seven men.

These men were picked out of a police training school and put through an extensive training for thirty days. They were young and capable men. They work eight hour shifts and we have seven of them and an extra man as a relief man. They have one day off each week. These men have a radio-equipped car. This car is also equipped with kodaks and steel tape measure, first aid kit, and we have a brake testing machine.

We realize that one squad in a city as large as St. Paul is not enough. We ought to have at least four or five of these squads, inasmuch as when they are not investigating an accident, they are doing general police work. They carry a shotgun and all the necessary implements that the rest of the squad cars have including first aid kit.

We found before we undertook this work that the ordinary officer would go out to an accident and take a few names and addresses; especially in the case of "a hit-and-run driver" or a drunken driver he seldom obtained the necessary information to present to the courts for getting a conviction. But since we have organized this investigation squad, it has been a great help in getting the proper evidence to present to the court to get convictions in such cases.

SIDNEY J. WILLIAMS (Director, Public Safety Division, National Safety Council, Chicago): This Section has a good many members who were unable to get here because of distance and I thought you would be interested in a letter from the Department of Safety, Montclair, New Jersey. It is written by the Secretary of the Board of Public Safety of Montclair. He reports that in the first nine months of this year accidents were reduced from nine last year to six in this year, through the installation of various lights and signals. Then he reports one thing which I think might be of interest. He says, "We have just installed traffic lights at a congested school crossing for the exclusive use of the school children. The light operates automatically at all times, except when it is operated by a pupil during those hours when children are going to or from school."

I am not certain whether it is a light operated by the pedestrian himself or a light operated by the school for the children. If there are any here who have experience on that, it would be interesting to know whether other cities are making use of special types of lights at school crossings, operating in some special way at the hours when the children are using those crossings. We get inquiries every little while as to what is the best way to protect crossings at school buildings at school hours when it is not necessary to operate a traffic signal at that point all the time.

I also want to be able to reply to our member in Montclair that his letter was presented here and I would like to be able to give him some help on this particular point, if I can.

JOHN T. HART (Captain of Traffic, Police Department, Minneapolis, Minnesota): We had one of those installations on a through street which allowed traffic to move all day long except when the school children wanted to cross. They could push a button at one of the four corners. They all tried to get at it and we had to disconnect it entirely for that reason.

CHAIRMAN HALL: Prior to the organization of an accident investigation squad in Minneapolis, cases that came into the Traffic Court were violations where there had been no accident. Of course, we did get those few instances where there had been a rather serious accident. But after the development of the accident squad we got not only the violator who had not had an accident, brought in by a motorcycle patrolman, but we also got violators who had caused accidents.

In the absence of an accident investigation squad the principal trouble in the ordinary accident usually is that a personal injury suit results and the parties get together and settle before the case gets to Court. So from the Court's standpoint, the squad is of great assistance. A photograph gives a true picture of what actually occurred. In many instances in Minneapolis there were differences in the testimony, usually a direct conflict in almost every case where there was an accident. The pic-

ture would decide the case as far as the Court was concerned. That is an observation from the standpoint of one who sits on the bench.

CAPTAIN HART: Assume there is a fatal accident. The officer investigating has made a charge of inadequate brakes. Possibly the case is taken up before the Grand Jury. Is there a chance for conviction in the Municipal Court?

CHAIRMAN HALL: In Minnesota a man may be guilty of traffic violation and still not chargeable with manslaughter. We have had some cases like that in the city of Minneapolis. We had one man who had killed a pedestrian at a street intersection. The Grand Jury did not think there was sufficient testimony on which to indict this violator with the charge of manslaughter so his charge was "Failing to yield the right of way to the pedestrian" and he was convicted on traffic violation but not manslaughter.

MR. BROWN: In Washington, if a violator is convicted of manslaughter, I doubt very much that they would consider the lesser charge of "bad brakes." We have had such cases (and it is rather difficult to get conviction in fatalities resulting from traffic accidents) but then we drop the lesser charge and charge them with "mechanically defective brakes," and since the Courts recognize the apparatus for testing brakes we get conviction in practically every case.

CHAIRMAN HALL: We will pass to the next subject, "Pennsylvania's School Boy Patrol Law," and I am going to ask Mr. E. P. Curran, of the Keystone Automobile Club, Philadelphia, to lead the discussion.

Pennsylvania School Boy Patrol Law

By E. P. CURRAN

Safety Director, Keystone Automobile Club, Philadelphia, Pa.

On May 29th of this year Governor Pinchot signed an Act legalizing Safety Patrols in Pennsylvania. This very important act has already greatly influenced the minds of the school people in Pennsylvania in regard to child accident prevention. That we may appreciate the significance of this Act it is necessary that we examine the status of Safety Patrol work in Pennsylvania previous to May, 1931. A short history of the work is necessary to give us the proper background.

In 1920 Philadelphia, Pittsburgh and the other large cities in the state realized the advantages of a Safety Patrol organization in each school. The Philadelphia Rapid Transit Company in the City of Philadelphia sent a young woman, "Miss Safety First," into all the Philadelphia Schools to instruct the children in safety methods, and to organize Safety Patrols. The work of this young woman was outstanding, the advantages of a Safety Patrol system were brought forcibly to the attention of the Philadelphia Board of Education, and in 1924 they assigned the work to Philip Lewis, a supervisor of the Physical Education Department and made safety one of the regular activities of the school system. The patrols under his supervision in 1924 to 1929 stood foremost among the large city safety patrols. Accidents to children while going to and coming from school were greatly reduced and not one safety patrolman during those five years was injured while performing his work.

The Keystone Automobile Club, realizing the effectiveness of the Safety Patrol system in the Philadelphia Schools and the necessity of extending this work throughout eastern Pennsylvania, organized its Public Safety Department, September, 1928. The principal function of that department was to assist the schools in organizing Safety Patrols and Safety Committees. We organized the one hundred and twenty-five Parochial Schools in the City of Philadelphia during the first year in order that both the Public and Parochial school children should have the proper protection in crossing the city highways. The Department then organized Safety

Patrols and Safety Committees in over 200 schools in the cities and towns of eastern Pennsylvania. Today the safety instruction and safety protection of the club are brought daily to over one-half million children. The patrols organized by the club are not and never have been permitted to interfere with vehicular traffic. Their job is to protect the school children while crossing the street. We have always advocated safety instruction in the schools and have organized safety committees in the grades to promote this instruction.

In the Spring of 1929, when the patrols were operating in a splendid manner throughout the entire state, a safety patrolman in Harrisburg, where patrols operated on lines always opposed by the Keystone Automobile Club, signaled to a vehicle to stop. The operator failed to do so, was arrested and fined. During the hearing the question was raised whether the school authorities had the power to appoint boys to direct vehicular traffic. Dr. Keith, then superintendent of Public Instruction, asked for an opinion from the Department of Justice and Deputy Attorney General O'Hara wrote the opinion. He said in effect:

"We are of the opinion, and so advise, that a Board of Education may safeguard its pupils on the streets and highways by establishing reasonable rules for their conduct while passing through the streets and highways going to and from their homes to school, but it is without authority to otherwise regulate the use of public streets and highways by the general public, or to enforce regulations for traffic movement through student patrol."

Mr. O'Hara did not express an opinion as to the liability which would rest upon the individual who directed the students to perform such services. This case referred to safety patrolmen directing vehicular traffic and was, therefore, misleading as to the proper function of Safety Patrols. Immediately following this case the Solicitor Board, said that the members of the Board of Education had no power to appoint safety patrolmen and if they did and injury resulted to any patrolman in the performance of his work the individual members of the Board could be held liable. As a direct result, all Philadelphia Public School Safety Patrols were disbanded. This action affected many of the cities and towns throughout Pennsylvania and in the club, including one hundred and twenty five Parochial Schools in the city of Philadelphia, did not disband. Many legal opinions by prominent attorneys, newspaper editorials and magazine articles were written favoring the Safety Patrols and requesting schools to reorganize, but to no effect.

Realizing that the public school children of Philadelphia and many other cities and towns throughout our state were being deprived of this very necessary service the club for two years petitioned the school authorities to do something to remedy the condition. We felt that saving the lives of children was much more important than discussing legal technicalities. In 1930 the Pennsylvania Legislature met and almost three months elapsed before any action was taken to amend the School Code in regard to the Safety Patrol activity. We, fearing that the opportunity would pass by, prepared the School Boy Safety Patrol Bill, submitted it to Dr. Rule, Superintendent of Public Instruction, and after changes were made that were suggested by Dr. Rule the amended bill was introduced by Senator Buckman in the Senate March 23. This Bill was passed by a unanimous vote in both houses, then sent to the Governor for his signature.

The Act reads as follows:

"Section 9. That section four hundred and four of said act is hereby amended to read as follows:

Section 404. The board of school directors in every school district in this commonwealth may adopt and enforce such reasonable rules and regulations as it may deem necessary and proper regarding the management of its school affairs and the conduct and deportment of all superintendents, teachers and other

appointees or employees during the time they are engaged in their duties to the district as well as regarding the conduct and deportment of all pupils attending the public schools in the district during such time as they are under the supervision of the board of school directors and teachers including the time necessarily spent in coming to and returning from school.

In the exercise of this authority the Board of school directors are empowered to organize school safety patrols and with the permission of the parents to appoint pupils as members thereof for the purpose of influencing and encouraging the other pupils to refrain from crossing public highways at points other than at regular crossings and for the purpose of directing pupils not to cross highways at times when the presence of traffic would render such crossing unsafe. Nothing herein contained shall be construed to authorize or permit the use of any safety patrol member for the purpose of directing vehicular traffic nor shall any safety patrol member be stationed in that portion of the highway intended for the use of vehicular traffic. No liability shall attach either to the school district or any individual director, superintendent, teacher or other school authority by virtue of the organization, maintenance or operation of a school safety patrol organized, maintained and operated under authority of this section.

Section 38. That section one thousand six hundred and seven of said act which was amended by the act approved the twentieth day of May one thousand nine hundred and twenty-one (Pamphlet Laws nine hundred eighty) is hereby further amended to read as follows:

Section 1607. In every elementary public and private school established and maintained in this Commonwealth the following subjects shall be taught in the English language and from English texts, English, including spelling, reading and writing, arithmetic, geography, the history of the United States and of Pennsylvania, civics including loyalty to the State and National Government (training in safety first methods), safety education and the humane treatment of birds and animals, health including physical training and physiology, music and art. Other subjects shall be taught in the public elementary schools and also in the public high schools as may be designated or approved by the State Board of Education. All such subjects except foreign languages shall be taught in the English language and from English texts."

The Act, therefore, strictly provides that safety patrolmen shall not interfere with highway vehicular traffic. The boys simply direct the school traffic. Every safety patrolman must have the written consent of his parent or guardian before he can serve on the patrol.

Effect of the Bill

The passage of this Safety Patrol Bill focused the attention of everyone on the necessity of greater child safety measures. The newspapers in Pennsylvania carried the message with a great spirit of cooperation. The Philadelphia public schools and the schools which had disbanded their patrols in 1929 throughout the state reorganized them the beginning of this present school term. The Philadelphia public schools have decided on an even greater plan of organization than they had in 1929. Safety patrolmen can be seen operating all over the City of Philadelphia. The following is a letter received from Dr. Edwin C. Broome, Superintendent of the Philadelphia Public Schools:

"My dear Mr. Curran:

The Safety Patrols in Philadelphia have been a tremendous success. While they were in full operation, accidents to school children going to school or returning to their homes were reduced to a minimum. When, because of a decision of the Attorney General, it was necessary to suspend them such accidents sharply increased. Thanks to the Mansfield Act passed at the last Legislature, our Philadelphia patrols have now been restored with even greater

strength than formerly and we are expecting a continuance of the splendid service that they are rendering.

We are grateful to the Keystone Automobile Club for their usefulness and their enterprise.

Yours sincerely,

(Signed) Edwin C. Broome
Superintendent of Schools."

The State Department of Public Instruction, the Bureau of Motor Vehicles and the Department of Highways have prepared a pamphlet containing the rules and regulations governing the operation of patrols in the State. Governor Pinchot and Superintendent Rule are strongly advocating the organization of a patrol in every school in Pennsylvania. The plans adopted by the State are in accord with the Safety Patrol Regulations as prepared by the National Safety Council. Miss Isabelle Stevenson was called in by the State Department for assistance and most of her suggestions were accepted. The State Highway Patrol and the motoring organizations in the State are sending men out to the schools to assist in the work.

The Department of Public Instruction is now preparing a Course of Study in Safety Education which will be sent out to every school in the state. Superintendent Rule realizes the advantages of the Safety Patrol, but he also appreciates the fact that the volume of child accidents occur after school hours, and the only feasible way to attack this condition is through safety education from kindergarten up through the grades. The schools of Pennsylvania have for many years included Safety instruction in their course of study. We of the club have not thought that sufficient and have been backing more extensive safety education since 1928.

We sincerely hope that every school in Pennsylvania will cooperate with the Governor and Superintendent of Public Instruction and that the children of our state will be given the proper safety protection and safety instruction, and that Pennsylvania will become one of the leading states of our Nation in so far as child accident prevention is concerned.

J. W. A. BOLLONG (Traffic Engineer, Seattle, Wash.): In Seattle, an ordinance has been passed empowering school boy patrols to direct traffic and this ordinance further states that it is unlawful to disobey the orders of the School Boy Patrols. In three years' operation, they have reduced the school child accidents from 200 to 300 a year down to three to four a year. Several drivers have been arrested for disobeying orders of School Boy Patrols and have been convicted in the Municipal Court.

The patrol crossings are marked on the pavement and the School Boy Patrols are under the direction of a Police Officer, who devotes his entire time to that. They are equipped with stop signs by which, at a lull in traffic, they collect the students at the curb and conduct them across the street.

We found at heavily traveled streets that the patrols were having difficulty in stopping two or three lines of traffic with a hand stop sign, so pedestrian-actuated signals have been installed at several intersections throughout the city. The school boy captain presses a button and does not allow the school children to interfere with the operation of the signal. The signal is turned on automatically by an electrically operated clock during the periods of an hour before school, the noon hour and an hour after school. We have found them quite successful on heavily traveled streets.

CHAIRMAN HALL: We have one more subject for discussion, "Dispatching Motorcycle Patrol," and I am going to ask Mr. Brown, of Washington to lead this discussion.

MR. BROWN: Washington, in line with other cities and other states, adopted the motorcycle for use in traffic work. We assigned a certain number of men in each precinct throughout the District of Columbia for Motorcycle Patrol. At that time the Bureau, of which I am the head, had only ten motorcycle officers. These men who were assigned to Motorcycle Patrol in the precincts were under the command

and direct supervision of the Captain of that particular precinct. While I am not criticizing the ability and integrity of the captains, I found in studying our Motorcycle Patrol work that the men in the precincts were not rendering that degree of efficient service that the small force I had was doing in traffic work.

I looked into the cause and I found that the captains, in their desire to maintain an orderly, well-regulated precinct, were freely using their motorcycles for other than traffic duties, with the result that the very important work of traffic enforcement was not being given the attention that it properly should. So in 1929 we decided on an experiment and we assigned, temporarily, additional men from the precincts to the Traffic Bureau. I have in my official personnel experienced traffic officials; men who have grown up from privates directing at traffic intersections to captains in the Traffic Bureau. We found that by directing these men from the Bureau to certain assignments throughout the district we were able to accomplish better results. So after going through the experimental stage for a period of six to eight months, we determined on reorganizing our motorcycle force and transferring all motorcycle patrolmen from the precincts throughout the District of Columbia to the Traffic Bureau.

Before putting this transfer and reorganization into effect, we naturally wanted to study the qualifications of the men who constituted that patrol. In the District of Columbia, we never assign a man to motorcycle patrol until after he passes through his probation period. So he is pretty well informed on general police work. In selecting men and studying their records, we found that some of these Traffic Patrolmen were good policemen, as general policemen go, but they were not especially fit for traffic duty. So we selected only those men who, by their records and from the study and observation that we were able to make in personal contact, were best qualified for Motorcycle Patrol duty. As a result we reduced our motorcycle patrol 35 men and now I am operating a force of only 50 motorcycle patrolmen directly from the Traffic Bureau.

The District of Columbia is only about ten miles square and men assigned to Motorcycle Patrol can be dispatched in a few minutes to most any section where we find their services are most needed. The majority of traffic complaints sent in by our citizens go to the Traffic Bureau, and on receipt of these complaints, we can dispatch our Motorcycle Patrolmen to these locations promptly.

We have in our department a Bureau of Statistics in which we compile statistics of all police activities—crime, misdemeanors, and traffic. We use a spot map on which we show, by pins of different colors, the type and location of each accident. By studying the reports of traffic accidents and observing how they are grouping on the spot map, we can dispatch our motorcycle men to the danger spots. The traffic problem today must be met from a point of view other than enforcement. There is an engineering angle to every problem in traffic today, and in the District of Columbia, we have the full cooperation and are working in full harmony with our traffic engineers. We are bringing about a very much improved condition.

We also have a Citizens Committee, who work with us and give their time freely in working out some of our problems. No matter how well our traffic engineers may function, no matter how much our citizens give their services to the community in the betterment of traffic, neither the traffic engineers nor our Citizens Advisory Council are going to obtain the results they feel they should have unless the enforcing agency cooperates with them and functions as efficiently as possible.

We are training our men in traffic enforcement, and I believe that the centralization of our patrol force under one directing head has accomplished more than we would if we continued under the heads of numerous captains throughout the District of Columbia, who do not always give to the traffic work that attention that this important subject now requires.

F. C. LYNCH (Manager, Kansas City Safety Council, Kansas City, Mo.): In Kansas City we are considering the advisability of discontinuing the motorcycle

officers. There are two functions of a motorcycle officer; the one is enforcement and the other is the dispatching of traffic. There are two ways to enforce. The first is by the presence of the disciplinarian. The other way is by the possibility of an enforcement officer being present. Now, the argument which has been used by the motorcycle advocates is that the mere fact that an officer is there tends to make people obey the law and for that reason it is not necessary to arrest them.

When you stop to consider a city like the District of Columbia with fifty motorcycles operating on three shifts, I fear the mere preponderance of their presence is not going to be a very effective means of enforcing the traffic ordinance. We feel that the enforcement must come from a desire on the part of the individual motorist to obey the law for fear there might be an officer present, rather than from the fact that he knows an officer is present. We think a mistake has been made in segregating traffic violations from other police functions. We believe that the public is beginning to be educated to believe it is not a crime to commit a traffic violation, it is not a crime to kill the people that are being killed now, but that it is a crime to steal the motormeter off the car.

Should a city with a population of 400,000 and a police force of 400 police officers take 360 of those officers and start them out on crime work, and take 40 and try to cut down this loss of lives and this economic loss in traffic which is in one year perhaps ten times as great as the loss which comes from crime?

How many of your better people are lost to community through crime? Look up the names and addresses of most of the persons who are killed and you will find they are in the bad ends of the city. As a matter of fact, I do not think that the police chiefs really appreciate the relative importance of the crime and the traffic problems. We propose to discontinue this division of the department and throw onto the captain of the district the entire responsibility for law enforcement in that district, regardless of whether it is traffic, stealing motormeters or whatever it may be. Put the men in radio-equipped cars, have every officer on the street feel a responsibility for the enforcement of traffic, the same as other enforcements, and then you will begin to build up a greater efficiency.

CHAIRMAN HALL: I am sorry we cannot continue this discussion as Mr. Lynch has opened up a very interesting subject but our time is just about up. We are going to have an intermission, which will be followed by the Traffic Court Session to be conducted by Judge Harry H. Porter, Police Magistrate, Evanston. I want to introduce Mr. Frank Krenl of the Police Department of Evanston, Illinois, who will tell you what this is all about and who, in turn, will introduce to you Judge Porter who will preside over the Court.

Dramatization of a Traffic Court Session Hearing Evidence on an Accident Case

JUDGE, HARRY H. PORTER

Police Magistrate, Evanston, Ill., Assisted by the Evanston Accident
Investigation Squad

MR. KREML: For the benefit of those who were not present yesterday at the accident that we staged in Grant Park, this is a trial that parallels an actual trial of a defendant in the Criminal Court of Cook County about two years ago. We tried yesterday, in the staging of the accident, to portray as faithfully as we could the actual conditions and we will today, in Court, try to portray for you the actual procedure when this defendant was tried. Now we will proceed with the trial.

BEAT LIVINGSTON (Bailiff, Evanston Police Court): Everybody rise. Hear ye! Hear ye! This Branch of the Criminal Court is now in session. Everybody now be seated.

"PEOPLE OF THE STATE OF ILLINOIS VS. CHARLES PORTER."

JUDGE HARRY H. PORTER: Mr. Porter, you are charged by the indictment of the Grand Jury with the crime of assault with a deadly weapon. What charge do you prefer?

CHARLES PORTER: Not guilty, your honor.

JUDGE PORTER: Mr. Clerk, enter a plea of "Not Guilty."

ATTORNEY FRANK KREML: In this case the State will attempt to prove that on or about the 11th day of November, 1929, the defendant, Charles Porter, was driving a certain motor vehicle on a certain highway in Evanston, Illinois, in a wanton, negligent manner, that he did drive at a high rate of speed through a stop sign, striking the car of one Herman J. Spoerer. As a result of this wanton negligence, two passengers in Mr. Spoerer's car were seriously injured. The State will endeavor to prove that these elements constitute the crime of assault with a deadly weapon and that the defendant is guilty thereof. That is all, your honor.

ATTORNEY WALTER B. HOBBS: The defendant will attempt to prove that while he was driving an automobile on Orrington Avenue on the 11th day of November, 1929, he was not driving such automobile in a wanton, reckless manner so that the life of anyone was in danger and he did not commit the crime of assault with a deadly weapon.

ATTORNEY FRANK KREML: The State will call the first witness, Mr. Spoerer. (The witness was then sworn in.)

ATTORNEY KREML: Q. Under what circumstances did you become acquainted with Mr. Porter? A. Following an accident on the 11th day of November, 1929, at the intersection of Orrington Avenue and Central Street, in Evanston.

Q. Please relate to the Court just what happened immediately prior to and at the time of this accident. A. On the 11th day of November, 1929, I drove to the city of Wilmette to pick up my mother and cousin, to take them to a doctor in Evanston. In Evanston, I decided to turn left on Central Street. When I arrived at the intersection of Orrington Avenue and Central Street, I was struck by the defendant's Packard car.

Q. Where in the intersection did this collision occur? A. About the center.

Q. When you first saw the defendant's car, approximately how far was he from the point of impact? A. About one hundred feet south.

Q. Where was your car at that time? A. Just entering the intersection.

Q. How long have you driven an automobile? A. About ten years.

Q. And about how many miles have you driven? A. About 200,000 miles.

Q. Do you have an opinion as to the defendant's speed at the time that you saw him one hundred feet south of the point of impact at Orrington Avenue? A. About sixty to seventy-five miles per hour.

Q. What happened subsequent to the collision? A. The driver of the Packard backed off the sidewalk and helped me pick up my mother and cousin and he took them to the Evanston Hospital.

Q. Did you notice whether there were any signs, signals or controls at this intersection? A. There were stop signs at the north and south approaches to Central and Orrington.

Q. Can you describe these signs to the Court? A. They were octagonal, about eighteen inches across. The lettering was red and the background yellow. They were in first-class condition and legible.

Q. What kind of a day was this, Mr. Spoerer? A. Clear, dry and sunny.

Q. Did the defendant make any attempt to stop prior to the time of collision? A. He skidded and landed on the sidewalk.

Q. From where did this skid mark run? A. The skid mark started about six feet south of the stop sign.

Q. Was this skid mark interrupted or uninterrupted? A. Uninterrupted.

Q. Was anybody else on the scene of the accident besides yourself and the defendant? A. Yes sir.

Q. Who else? A. About five minutes after the crash, two officers from the Bureau of Accident Prevention from the Police Department arrived on the scene.

Q. What did they do? A. They took pictures of the two cars, of the corner and of the skid marks, and measured the skid marks. They also tested the brakes on the Packard car.

Q. Who took the pictures and made measurements? A. Officer Labbe.

Q. Here is a picture marked People's Exhibit No. 1. That picture is a true and correct portrayal of what it purports to show? A. It is.

Q. Do you recognize the object and location of that picture? A. It is my Essex car.

Q. Where with respect to the intersection of Central and Orrington was this picture taken? A. Ninety-four feet north of the intersection.

Q. Here is People's Exhibit No. 2. Do you recognize the location of that picture? The objects in it? A. It is the northeast corner of Central and Orrington Street. It shows the stop sign on the southeast corner.

Q. Here is People's Exhibit No. 3. Do you recognize the location? A. That is the southwest corner of Orrington and Central Street.

Q. Here is People's Exhibit No. 4. Do you recognize any of the objects and the location? A. It shows the officer pointing out the point of impact at Central and Orrington Avenue.

Q. Here is People's Exhibit No. 5. Do you recognize the location of that picture? A. It is the northeast corner of Central and Orrington.

Q. I now give you for identification, People's Exhibit No. 6. Do you recognize the location and objects in that picture? A. It is the tread mark laid down by the Packard car on the sidewalk on the northeast corner of Central and Orrington.

Q. Here is People's Exhibit No. 7. Do you identify any of the objects? A. It is a picture of the tire on the defendant's car. (Officer Robt. J. Labbe was then sworn in.)

ATTORNEY KREML: What is your name and occupation? A. Robert J. Labbe, Police Officer, City of Evanston.

Q. Are you acquainted with the defendant? Will you indicate the defendant in this case?

(Officer Labbe pointed out the defendant.)

Q. When and under what circumstances did you first meet the defendant in this case? A. On November 11, 1929 when we were called to the scene of accident at Orrington and Central Street. We found there was a damage to his car and skid marks on the pavement. There were stop signs there in very clear view.

Q. What did you observe at the scene of accident? A. An uninterrupted skid mark 91 feet long.

Q. Where did the skid mark start and where did it terminate? A. It started six feet north of the stop sign and terminated on the sidewalk of the northeast corner.

Q. Did you, in examining this skid mark, find anything peculiar about it? A. We found a mud mark on the north side that looked as if it had been made by the tire of the car. We took photographs and measured the width of it.

Q. When was the first time you saw the defendant after arriving? A. After my partner brought him back from the Evanston Hospital.

Q. You stated that you measured the print on the pavement. What else did you do? A. We measured the length of the skid marks and took pictures of the intersection, of the right rear tire on the Packard car, of both cars, and of the stop signs at that intersection.

Q. Officer Labbe, have you had any preliminary training in the taking of photographs such as you mentioned you took on that date? A. A six months' course in photography two years ago.

Q. Since you took that training course, approximately how many pictures have you taken? A. Four hundred.

Q. What objects have you photographed principally in taking these four hundred pictures? A. Skid marks and wrecked cars at scenes of accidents.

Q. In what capacity have you made these pictures? A. As a member of the Accident Prevention Bureau.

Q. What else did you do at the scene of this accident? A. We tested the brakes and noticed the imperfections on the tire of the Packard car.

Q. What did you do specifically as regards these tire imperfections? A. We measured the width of the tread on the tire and the size of each individual hole.

Q. Did you make any comparisons of the print of the tire on the sidewalk and the tire of the defendant's car? A. Yes sir, with a steel tape.

Q. What did you find? A. They corresponded exactly—the tread of the tire and the mud imprint that was left on the northeast corner of the sidewalk.

Q. You testified also that you tested the brakes on the defendant's car. How was this brake test made? A. I got into the Packard and had the defendant, Mr. Porter, drive his car at the rate of twenty miles per hour. At a given place to stop, he applied his brakes as hard as possible. We also had a motorcycle policeman along side of us to see that the speedometers were correct. After we got through with the test, we measured. It took him twelve feet to stop.

Q. Is the intersection of Central Street and Orrington Avenue, where this collision occurred, in a business or a residential section? A. It is a residential district in the city of Evanston.

Q. I have some pictures marked People's Exhibits 1, 2, 3, etc. Here is People's Exhibit No. 1. Did you make that picture? A. I did.

Q. What did you do with it? A. I developed and printed it and kept it in my possession until now.

Q. Do you recognize the object of that picture? A. It is the Essex Coupe that was at the accident.

Q. Is this picture in an unaltered condition, portraying correctly the conditions as you found them on November 11, 1929, at that location? A. It is.

ATTORNEY KREML: We now submit to your honor People's Exhibit No. 1 in evidence. (Then this procedure of identification was followed for six other exhibits.)

Q. What did you do, after you had made these pictures, taken measurements and tested the brakes on the defendant's car? A. We took the defendant to the Police Station and booked him with the crime of assault with a deadly weapon.

ATTORNEY HOBBS: Officer Labbe, when you made measurements of the skid marks at the intersection of Orrington Avenue and Central Street, in the city of Evanston what end of the tape measure did you hold? A. The end at which the measurements are indicated.

Q. When you took pictures of the scene, what kind of a camera did you use? A. A Graflex Camera.

Q. Are the pictures exact reproductions or enlargements? A. They are enlarged.

Q. You have previously testified that you took a six months' course in photography. Were you taught how to correctly bring an object into focus so it would not be distorted? A. Yes sir. I went to actual accidents at different places.

Q. When you tested the brakes on the Packard car, were you driving or was the defendant driving? A. The defendant was driving.

Q. And the only record you have of any attempts made to stop at the time of accident are the measurements of the skid marks? A. Yes sir.

Q. Isn't it possible to apply the brakes of that car without making a skid mark? A. Not when you apply them as hard as possible.

(Officer Phil. Middy was then sworn in.)

ATTORNEY KREML: What is your name and occupation? A. Phil. Middy. I have been a Police Officer for two and one-half years.

Q. Did you or did you not see the defendant on the 11th day of November, 1929? A. I did. About 9 A. M. we were called to the scene of an accident at Central Street and Orrington Avenue. Upon arriving at the scene, we found a damaged Essex car and its driver. I asked the driver of the Essex car where the other car was. He said it had taken his mother and cousin to the hospital. I then went to the hospital and saw the two injured women and the defendant. I asked him whether he was the driver of the car that was in the accident and he said he was.

Q. Will you identify the defendant?

(Officer Middy identified the defendant.)

Q. What did you do after that? A. I then had him drive his car back to the scene of the accident. There, we took pictures and measured skid marks and tested brakes. (The defendant, Charles Porter, was then sworn in.)

ATTORNEY HOBBS: What is your name and occupation? A. Charles Porter, 854 Ridge Avenue, Evanston. I am employed by Dr. David L. Heidberg as a chauffeur.

Q. How long have you been employed there? A. Approximately six years.

Q. During this time, have you ever had any accidents? A. No sir.

Q. Have you ever been arrested for speeding or any violation of the law? A. No sir.

Q. On November 11, 1929, were you driving a motor vehicle in the city of Evanston? A. I was.

Q. Will you tell the Court what happened? A. I had an accident at the corner of Orrington Avenue and Central Street. I collided with the car of the complaining witness. I had been going twenty to twenty-five miles an hour and slowed down to about fifteen miles per hour as I came up to the intersection of Orrington Avenue and Central Street.

Q. Did you see any stop sign at this place? A. I did not see any stop sign.

ATTORNEY KREML: Mr. Porter, did you on November 11, 1929, subsequent to this accident, make a statement to the Police? A. I did.

Q. Is this the statement that you made to the Police at that date and time? A. It is. Q. We submit this evidence, your honor, and read to the Court the question "Tell in detail what happened." The defendant answered as follows:—"I was driving north on Orrington Avenue when I was about two car lengths from the intersection of Central and Orrington Avenue, I stopped my car and looked over to the right and then proceeded across the street. I did not see the other car until it was right upon me. I swung over to the right to try to get away from the other car and then we hit." The question is repeated—"Did you make any other stop except the one two car lengths from intersection?" And the answer was "No." Defendant now testifies that he did not stop because he did not see the stop sign.

JUDGE PORTER: The State action for the conviction of this defendant accuses him with the crime of assault with a deadly weapon which carries with it one-year imprisonment and a fine of \$1,000. The evidence on the part of the State shows that the defendant traveled in Evanston at a speed of sixty-five to seventy miles an hour, a reckless and dangerous speed; that the accident occurred, resulting in serious injury to several people, as a result of the reckless manner in which the defendant operated his automobile. In support of the testimony of Mr. Herman Spoerer, the only eye witnesses for the State are Officer Labbe and Officer Middy, who testified that they arrived on the scene of the accident a few moments after its occurrence; that they took the names and addresses of witnesses, observed the conditions, printed certain photographs which have been received and offered in evidence, and measured the marks laid down in the street by the tire of the defendant's automobile and the tread of that tire. These skid marks have been very clearly linked up with the defendant's automobile by a minute comparison. The whole has been preserved as evidence by means of photographs which are now introduced.

There can be no doubt in the mind of the Court that the skid marks are those of the defendant's automobile, nor can there exist a doubt that these photographs, both of the skid mark and tire, portray the situation exactly as it was or as nearly thereto as it is possible by means of the art of photography to portray them. The defendant skidded ninety-one feet through a stop sign, thence continuing uninterruptedly to a point on the sidewalk on the north side of the street. The brakes were tested at a speed of twenty miles an hour and the automobile stopped at a distance of twelve feet, which raises at least a presumption that the brakes were in good working order.

The defendant entered a denial of the charges and claims he was operating his automobile at a reasonable rate of speed at the time of the accident. His testimony, however, is now impeached by means of a signed statement offered in evidence by the State's Attorney, which contains serious discrepancies when compared with his testimony on the stand.

In view of the fact that the defendant's veracity has been impeached, the Court finds the defendant guilty.

ADJOURNMENT

Wednesday Morning Session
October 14, 1931

Joint Meeting of the Committee on Rural Highway Hazards with the Statistics Section

(See page 226 of this volume)

Wednesday Afternoon Session

October 14, 1931

Traffic Observation Tour

This tour was conducted for the purpose of showing delegates of the Twentieth Annual Safety Congress, some of the important traffic problems of Chicago and the measures that have been taken to correct them. The delegates were taken over the tour in buses furnished by the Chicago Motor Coach Company, and a lecturer was provided for each bus to point out interesting features along the route.

The tour first went south to Jackson Park, over Michigan Avenue, South Parkway, Lake Park Avenue, and Hyde Park Boulevard, paralleling the new Lief Erickson Drive along the Lake front. Attention was called to the simultaneous signal system on Michigan Avenue with high crest speeds but an average speed of only 12 miles per hour. Viaducts across the Illinois Central Railway tracks, connecting this route with Lief Erickson Drive were pointed out as were, also, grade separations where these viaducts discharged traffic on the Drive. It was explained how the new drive had relieved these streets that had formerly carried the heavy traffic along the south shore from the loop district, by providing a high speed thoroughfare with grade separations and few conflicting traffic movements. Other features that were pointed out were the boulevards with service drives each side for deliveries and local traffic on South Parkway and a traffic actuated signal at Hyde Park Boulevard and 53rd Street.

From Jackson Park to Washington Park, the tour covered the Midway Plaisance, the famous four drive parkway that was a part of the 1893 Columbian World's Fair. All of these drives are often heavily traveled.

The route extended west from Washington Park along Garfield Boulevard to Ashland Avenue. Attention was called to the flexible progressive signal system set for a speed of 25 miles per hour and to the elevated lines and railroads that are carried across on bridges for grade separation. Beneath some of these bridges there is a serious problem of drainage during heavy storms and traffic must sometimes be diverted to other routes.

Over Ashland Avenue, Pershing Road and Damen Avenue the buses were taken through the business and industrial districts west of Union Stock Yards. Raised street car safety zones, protected by large concrete buttresses, flashing lights, and flood lights were pointed out. Another interesting feature was the viaduct on Damen Avenue built over railroads and the Chicago River, to extend that street to the central manufacturing district.

Over Blue Island, the buses went to Western Avenue, at a newly widened section of this longest thoroughfare in Chicago, which extends 24 miles straight through the city and on in both directions. Over Ogden Avenue the tour continued northeast to Lincoln Park. This crosses several main thoroughfares leading from the west to the Loop. Some locations for proposed traffic actuated signals were pointed out. A short detour gave delegates a chance to see the new Ogden Avenue viaduct that is being built over the north branch of the Chicago River and several railroad tracks.

The tour went along the west side of Lincoln Park to a complicated intersection of Sheridan Road, Outer Drive and Melrose Street, where traffic actuated control had recently been installed. Melrose Street enters at the point where the other two important thoroughfares unite from the south into a two drive boulevard. North bound traffic on Lake Shore Drive is never stopped by the signal because there is no cross movement. South bound traffic that leaves the

intersection on Sheridan Road is stopped only infrequently when vehicles approach on Melrose Street. But traffic from the south on Sheridan Road and from the north going south on Outer Drive flows alternately, the signals being operated by detectors in each approach to the intersection. Lane lines have been used to separate traffic into the right lanes in approaching the intersection, so that the signals will control their respective lanes. Here the tour turned south again over Stockton Drive, La Salle Street, Lake Street, Wacker Drive, and Michigan Avenue. Pedestrian tunnels under Stockton Drive were pointed out. On La Salle Street flexible progressive signals were pointed out at ten intersections set for an average speed of 20 miles per hour. The buses were taken on the lower level of Wacker Drive, after crossing the upper level, to show the delegates how the former is used for trucks, for free municipal parking, for entrances to garages and for loading. The construction work on the Randolph Street Viaduct over the Illinois Central tracks was pointed out, the pedestrian subways at Randolph and Van Buren Streets were shown, and the free parking space in Grant Park for accommodating 3200 vehicles was pointed out.

Thursday Afternoon Session
October 15, 1931

Joint Meeting with the Institute of Traffic Engineers

ERNEST P. GOODRICH, Chairman
President, Institute of Traffic Engineers, New York City

The joint meeting of the Street and Highway Traffic Section and Institute of Traffic Engineers was called to order by Ernest P. Goodrich, who presided as Chairman. CHAIRMAN GOODRICH: This joint session will consist of the presentation by a number of signal manufacturers of any three points of their particular systems which they consider most worth while.

Mr. J. G. Regan of the General Electric Company will speak concerning his company's devices.

A New Traffic Control Apparatus

J. G. REGAN (Traffic Control Specialist, General Electric Co., Schenectady, N. Y.): In presenting the G. E. traffic control apparatus I wish to emphasize the G. E. viewpoint and attitude behind the equipment.

General Electric has always felt that traffic control should never be adequately advanced unless research and development went hand in hand with sales. To this end General Electric has always applied itself, and eight or ten years ago when traffic control engineering was in its infancy, General Electric not only promoted traffic control equipment, but performed such details as traffic engineering for the community, the making of parking surveys, traffic counts, pedestrian counts, the laying out of one way streets, etc. In a word, we furnished engineering and supervising work which you traffic engineers now rightfully perform.

We are now glad to be able to relinquish this phase of the work to you—we can now concentrate on our other problems, but this complete knowledge of the field has led to mutual advantages. We have engaged in research and development, and combined with our practical knowledge of the traffic problem, resulting from our traffic studies in the municipalities, we have been able to develop traffic control apparatus to meet your requirements.

Since the formation of traffic engineering bureaus in municipalities, we have, of course, kept in constant touch with traffic engineers, both in groups and separately, and as a result have been able to develop our flexible traffic control which places us and you in our respective roles. You are the doctors, you know your patient intimately—you write your prescriptions and we fill them. We stand ready at all times to act as consultant, however; to lend a hand, make reports, charts and suggestions with the full knowledge that our apparatus is universally applicable and is so constructed that you can change its adjustment at any time in the field.

We have consistently urged the writing of functional specifications rather than detailed requirements, and have furnished municipalities with complete sets of functional requirements for all traffic control problems.

In a word we carefully watched the development of traffic engineering and assisted in its growth. We have made careful surveys of the field and its trend, and based on our intimate knowledge have made provisions to take care of inevitable future requirements. It is with this in mind that we wish to emphasize the new G-E composite traffic controller which has been developed to meet future requirements based on the modern traffic control requirements.

I thought it would be of interest to lead up to the new composite controller by means of a set of pictorial witnesses to the contribution of G-E to the development of traffic control engineering, as well as traffic control apparatus. (Then Mr. Regan showed slides as follows:)

1. Early type post top traffic signal in center of the intersection, manual operation by officer at base of signal.
2. Early G-E layout showing 4-one way signals, right far side mounting.
3. Slide showing dummy one way signal vertical sliding mounting on wooden pole used by G-E in field tests to determine proper mounting height.
4. Early G-E arrow signal design developed in 1923, and since adopted in two State codes.
5. First directional signal, using arrows (Boston) G-E installation.
6. View of Boylston and Tremont Street intersection, Boston, 1926 showing first left hand control by arrow signals operated by officers from the curb.
7. Meriden, Conn. 1924 first signal with pedestrian control, G-E development.
8. View of Boston pedestrians walking across intersection on the pedestrian controlled signal of combined red and yellow lights.

Other slides covered such features as early manual control from booth and "walk" lenses at school for pedestrian control.

Then a series of traffic engineering slides showed Time-Space diagrams for various control systems such as synchronized, staggered, and limited progressive.

Then a set of three slides showed the possibilities of applying the new triple reset feature to progressive traffic movement making it possible by a central control adjustment to handle morning peak traffic, average traffic, and evening peak traffic. The slides showed how by throwing a switch at the central point, the controls are lined up to give progressive movement downtown in the morning, average progressive movement during the day, and a progressive movement from the downtown area out towards the suburbs in the early evening.

Slides were then shown covering the range of application of the new G-E composite traffic controller, emphasizing such features as the jack mounting of the timer, the accessibility of the apparatus, the accuracy and flexibility of the various percentage adjustments and total cycle control, the provision for various color combinations, and how the changes can be made in the field.

Here it was pointed out that 41 color combinations were in operation in various cities of the country as tabulated and cataloged by General Electric Co. for reference.

Then a series of slides were shown covering the early Boston manual control booths for one intersection only, the City of Pittsburgh downtown master control panel, and the latest de luxe Philadelphia panel which has just been installed to control the 300 intersections in the downtown area.

In concluding the salient features of the new G-E composite traffic controller were summed up as follows:

1. The new timers are for universal application.
 - (a.) In a limited progressive traffic control system, these timers are kept in step by the new synchronous motor speed control.
 - (b.) Isolated timers can be interconnected at any time to a master controller or a master control panel to give flexible traffic control, thus providing a "planned" traffic control system in which controllers can be installed at any intersection at any time and interconnected later on as the traffic conditions may require.
2. The timer has accurate setting adjustments.
 - (a.) Total cycle adjustment is accurate and independent of voltage variation.

- (b.) Percentage adjustments are the same regardless of total cycle, whether the controller is operating isolated or interconnected.
- 3. The settings are easily accessible and extremely flexible.
 - (a.) Total cycle may be changed for a given range in small steps.
 - (b.) The percentage adjustments often vary to 100% in 1% steps.
- 4. Triple reset permits three distinct settings of the control in an interconnected system to handle both morning and evening peak traffic and also daily average.
- 5. It is capable of wide variation of color combination by a simple field adjustment of the contact drum.
- 6. New flexible and manual control can be added at any time in the field and gives only correct combinations in their proper sequence.
- 7. Interconnecting cable system is capable of any required expansion.
 - (a.) Only 6 conductors and an interconnecting cable perform all the central control features including triple reset, fire control, flash control, and central shut down.
 - (b.) Local power can be used for operating.
 - (c.) Any damage to interconnecting cable will not affect the system which continues to run at the last supervised setting because of synchronous motor timer.
 - (d.) Additional controllers may be connected to the system at any time by running out an extension to the nearest point of the three conductor interconnecting cable.

CHAIRMAN GOODRICH: Mr. Otto Schultz, representing the Acme Traffic Signal Company,

The Acme Signal

OTTO SCHULTZ (General Manager, Acme Traffic Signal Company, Los Angeles): Perhaps the Acme traffic signals aren't so well known in the East and Central West, but they have quite an extensive use all along the Pacific Coast. We have been in business for the last eleven years and have specialized in traffic control as the need appeared.

We felt at first that there was only one requirement for isolated timing at the intersection. You have before you here an isolated timer. (Here Mr. Schultz exhibited an Acme Signal.) This is one of the newest types. It gives the timing at an intersection independently of any central control.

This device controls the different periods at an intersection, north and south, east and west, and it has the interval control. The interval control is not used in the East, but out West we are using it almost exclusively. We are not using the three lights.

Instead of using the amber light when the change is taking place, we do not give any advance notice as to the change of direction of traffic, but we simply turn on all the stop signals and let them be in position for any number of seconds until the intersection is clear.

We have found that on a good many intersections close to each other we can use central control to take care of almost any type of regulation, in the central area or in the business district of the outlying area.

We are controlling the outlying business districts by giving the most flexible progressive control you can expect. By changing a switch at what we call the sub-central control, we can readily transfer the direction of movement one way or another. That means to progressive control in each direction.

In our type of signal we are employing a semaphore. The arm extends twenty-two and one-half inches out of the housing. It can be erected close to the curb line. It is painted on both sides and gives two-way directions in traffic. The semaphore is made of an aluminum alloy which does not bend. This always keeps the arm in shape so it cannot be put out of order.

We also have standard types of this signal with glass reflectors properly focused.

To take care of all the conditions which arise in traffic regulation, we have developed a pedestrian control which is used at school crossings. In conjunction with that we have a traffic actuated signal. A plate is installed in the street and operates the signal like a push-button.

We have developed a train coordinator for a condition where a train travels on heavily congested streets, such as Alameda Street in Los Angeles. As the train approaches the cross street the train coordinator sets all signals at stop. If it is a long train, there is a certain interval of time, so that the traffic which has accumulated at the crossing has enough time to get away when it is cleared. If the train stops just before it arrives at the intersection, the signal, after a short period, assumes its normal operation. The train then has to wait until it gets the proper signal before it can go ahead. That happens at a switch crossing when there is any switching to do.

We have divided the general control apparatus into three different functions. First is the central control, which is developed and used in large metropolitan areas where from 50 to 150 or 200 intersections are employed. Of course, that necessitates an expensive layout for installation work, but it gives almost any type of control you may desire. The controllers are so flexible that no matter what system you want to employ you can use them. You can combine two systems in one if you care to do that.

For smaller cities we have what we call a group controller. It has five different combinations. You can use six or seven different circuits and regulate them by this group controller.

This controller has ten settings, controlled by ten knobs. The progressive control goes in one direction. You can reverse the knobs and get progressive control in the opposite direction. That is valuable where your traffic is flowing in during the morning and out during the evening.

The steps in between this grouping are not limited. You might have a block 600 feet long or you might miss or skip an intersection. All you have to do is to regulate these knobs a little to accomplish that result.

Another situation is where you have a lot of isolated crossing signals installed at intersections. You may have as high as ten crossings pretty close to each other and you wish to coordinate them. Then we use this controller on our operating drum by a one-wire connection which resets after each total cycle is completed. The timer starts at zero and you gauge time, speed and distance to be traveled. You set it at the exact time that is required for the automobile to arrive at the next intersection. It is thus conforming with the continuous flow of traffic.

In many cases where isolated crossing signals have been installed they require a great deal of attention by the police department. In our central control we do that collectively for the whole system. The time should be extended during different periods of the day when you have peak loads of traffic. So we have developed a time clock or flow clock which not only takes care of the starting of the semaphore but late at night it shuts off the semaphore and turns on the traffic lights. Later on at night it shuts off the traffic light and operates the flasher during the remainder of the time.

On this time clock there is an attachment for every hour of the day. It may be in the early morning about eight or eight-thirty, when most men are going to work. It may be at twelve o'clock noon when people use the streets a lot. It may be set for three o'clock at some nearby school intersection. You can make these adjustments in half hours anywhere on the time clock. When that time comes around the thing automatically changes. The minute the half hour is up it goes back to the regular setting.

Another thing about our traffic signal that should be noted is the economy of its operation. If you have a two-way three-color light installed, it uses approximately 3200 kilowatt hours per intersection per year. Our type of signal, using ten hours on

the semaphore arm, four-hour light service and ten-hour flash service, only uses 550 kilowatt hours.

CHAIRMAN GOODRICH: The next is the Eagle Signal Corporation, Mr. Williams.

The Eagle Signal

G. E. WILLIAMS (Eagle Signal Corporation, Chicago): The main points of interest in our control are: first, the interlocking features of our equipment with new or old equipment, second, the fine adjustments which we are able to get and third, protective devices which in case of failure of cable, keep you from losing the whole system.

The Eagle Signal Corporation was one of the pioneers in the field. One of the first flexible progressive systems ever built was constructed by the Eagle Signal Corporation, the city of Chicago control board.

All Eagle Signal equipment will tie in with existing systems or with other systems of its own kind.

Second, to meet some of the variable traffic control conditions we must be able to give adjustments in small steps. We have designed our equipment on a percentage adjustment basis, so steps of one per cent can be made in a setting. In a signal system we can set the zero points in the several signals so that each intersection is in proper relation to each other.

Third, a system to be foolproof must be able to operate under almost any conditions excepting absolute power failure. We have designed our equipment so that in case of the cable interlocking and the switch is cut, the system will continue to operate as two separate steps. Even if you cut off the end and the power is lost at the central point, the system will operate from the farther end.

When we went into the signal business, we adopted a three-light signal of the optical type as a standard. In the modern signal we have attempted to get not only practicability and usefulness but ornament as well. We have designed our signals so that they are beautiful and in keeping with the type of post lights which the city uses.

Today our signal equipment is nearly all die cast giving interchangeability of parts. If one part of the signal is broken another can be substituted without any difficulty.

CHAIRMAN GOODRICH: Mr. Hummel, of Crouse-Hinds, is next.

The Traffic Flow Regulator

J. G. HUMMEL (Traffic Signal Engineer, Crouse-Hinds Company, Syracuse, N. Y.): You are all familiar with the common automatic traffic signal timer which arbitrarily causes the green, amber, and red lights to go through a definite sequence at an arbitrary rate.

At an intersection during certain hours of light traffic a "GO" period of fifteen seconds on each street may be found very satisfactory, while during rush hours, especially on Saturdays and Sundays, a "GO" period of sixty seconds each may be demanded. With the equipment available to date, the only thing that could be done was to compromise. The result is a timing of thirty seconds on each street. This compromise is maintained all day long, and every day of the week. During the hours when a fifteen-second "GO" is best, the thirty-second compromise "GO" is 100 per cent too long; and during the times when a sixty-second "GO" is best, the thirty-second compromise "GO" is 100 per cent too short.

There are very definite peaks and valleys for every week-day as well as Saturdays and Sundays. These variations occur with definite regularity each day of the week. While the traffic may differ very materially on a week-day from that on Saturday and Sunday, the flow on every normal Monday, for instance, will be the same. Likewise, the peaks and valleys of the traffic flow will occur with definite regularity on each and every day of the week, perhaps different for week-days and week-ends but with a very definite repetition.

It is not practical or economical to send out officers to change the timing on every isolated traffic timer in the city or county to take care of each changing condition.

Traffic Engineers of the Crouse-Hinds Company have been studying this problem and now offer a solution in the form of a traffic timer known as the "Traffic Flow Regulator." This device makes it possible to automatically vary the timing to take care of these varied traffic peaks and valleys that a traffic survey and count show so distinctly. Essentially, this device consists of a variable, or arbitrary, timer and timing elements which are operated in conjunction with a studied and preset program or schedule which, in turn, is actuated at a definite time by an electric clock.

When traffic is light on both streets, the "Traffic Flow Regulator" operates on a short total period thus passing vehicles and pedestrians safely and rapidly. As the traffic increases, the timing is automatically extended to take care of this increase. When the rush is over, the timing is automatically shortened.

There are fifteen different cases, or symptoms, a traffic engineer may be called upon to prescribe for. The nine average conditions which are encountered at practically every intersection are:

1. *The Period of Operation* by which we mean the time at which the signal is turned on and off or on a flashing indication for off-duty.
2. *The Early Morning Light Traffic* which may extend up to 7:30 a. m.
3. *The Morning Rush Period* generally occurring from 7:30 to 9:00 a. m.
4. *The Morning Off-Peak Period* extending from 9:00 to 12:00.
5. *The Noon-Hour Period* generally occurring from 12:00 to 1:30.
6. *The Afternoon Off-Peak Period* occurring from 1:30 to 4:30.
7. *The Afternoon Rush Period* lasting from 4:30 to 6:00 p. m.
8. *The Dinner Off-Peak Period* usually lasting from 6:00 to 8:00.
9. *The Evening Pleasure Driving* extending from 8:00 to midnight.

These times have just been assumed. They are not set and the traffic flow regulator is not limited to these particular times. It is simply a question of setting the clock so that it brings these different periods in at whatever hour you decide upon.

In addition to the above regular conditions that are met at practically every intersection there are certain special conditions that depend more upon the location of the timer. For instance, a timer located adjacent to a school should be capable of allotting protection to the school-children while passing to and from school and to regulate the traffic expeditiously and safely at all other times. A timer located adjacent to a church should be capable of giving protection to the church-goers on Sunday and at all other times control traffic in a manner dictated by the traffic conditions.

At certain intersections a great deal of out-of-town traffic must be cared for on Saturdays, Sundays, and holidays.

At an intersection where a particularly bothersome left-turn is encountered it should be possible to insert a period to take care of this left-turn whenever and as often as desired. Likewise, the control should be capable of inserting a period for pedestrians at a corner when the pedestrian travel is heavy.

At intersections where there are more than four streets it should be possible to control the traffic in two movements during hours of light traffic, and during rush hours the timer should automatically change to three or four movements of control.

All of the above conditions are taken care of by the "Traffic Flow Regulator." Its flexibility is almost limitless and it is possible to furnish a "Traffic Flow Regulator" to take care of any condition you might imagine.

The installation cost of this equipment is exactly the same as an arbitrary or fixed type of control, while the cost of the "Traffic Flow Regulator" complete is less than three times the cost of the old obsolete arbitrary timer.

The "Traffic Flow Regulator" has been in successful operation for approximately two years in one of the largest cities in the United States. Its practicability has been proven and it is, therefore, with full confidence and assurance that the Crouse-

Hinds Company offer the "Traffic Flow Regulator" for the improvement and advancement of traffic control.

CHAIRMAN GOODRICH: Next is Mr. Kelcey of the American Gas Accumulator Company.

A. G. A. Timing Equipment

GUY KELCEY (Mgr., Traffic Engineering Div., American Gas Accumulator Company, Elizabeth, N. J.): The gentlemen who have spoken previously have limited their discussion to what the apparatus does. I shall go at it from a slightly different angle. I shall point out the three cardinal principles upon which our engineering department is operated, and which design in that department must meet.

They are simplicity, ruggedness and reliability. From the standpoint of those three principles I will discuss some of the elements that have been put into the A. G. A. timing equipment to meet those requirements.

The motors have ample power. All parts are made with tools and jigs which insure accurate fits. The bearings are high-grade and oilless. The drive is positive and there are no peak loads. Ample power with no peak loads are important elements. In cold weather the oil hardening down causes an additional load on the motor, which, added to that imposed by riding over cams, creates a peak load. If the motor doesn't have ample power that condition sometimes will stall it.

In designing that, while the drive is direct, we store the energy from the motor and then use that energy which is stored in the spring to drive the contacts. The result is that the motor has a constant loading. There is no peak to it; it is very nearly a constant loading.

All bearings are oversize and so are the gears. The contacts are rated at eight amperes, while the same size contacts in some other forms of electrical apparatus rate up as high as twenty amperes. They are therefore considerably oversize.

From the standpoint of simplicity, the apparatus can be completely taken apart with the use of ordinary tools. It can be completely assembled in a like manner.

The purpose of the functioning parts of the apparatus is evident at a glance and one standard assembly gives all color sequences.

By slight readjustments of standard apparatus it is possible to work into all of the very complicated color sequences and control six circuits.

CHAIRMAN GOODRICH: Mr. Dodds of the Automatic Signal Corporation.

Traffic Actuated Controls

R. D. DODDS, JR. (Traffic Engineer, Automatic Signal Corporation, New Haven, Conn.): We are manufacturers of traffic actuated controls, not signals. It will not be possible in the short time here to go into the detail of operation of the control equipment. Anyone may see the equipment in actual operation in Booth 112 downstairs.

It is, I believe, the consensus of opinion among the various traffic engineers that there are two major reasons for installation of traffic signals. One reason is for relief of congestion; the other for the reduction of accidents. I am going to bring out a few points where traffic actuated equipment fits in especially well.

Mr. Hummel pointed out the variation in traffic from week to week and day to day. I should like first to carry that point one step further. I believe there is no question about the efficiency of the actuated type signal at lightly traveled intersections. But there is also much to be gained at the heavily traveled intersections.

Most of you saw the installation of traffic actuated signals at Outer Drive, Sheridan Road and Melrose Street on the traffic tour yesterday. Here is considerable variation in the green time required by the traffic on the two heavy movements, at the rush hour in the afternoon and in the morning, from cycle to cycle.

Observations of successive cycles of operation of these signals showed the first cycle 40-35 seconds; the second 25-17; the third 31-47; the fourth 47-22; the fifth

9-25; the sixth 16-19. I won't bother to list others but you can see there the extreme variation in the demands of traffic from cycle to cycle.

It is just as possible to reduce delay within the cycle length as it is to reduce it by changing the cycle from Monday to Tuesday or from January to June. The amount of delay that is avoided in this way may be very much greater than by just changing the cycle length from 60 seconds to 50 seconds at different times of the day.

There is a minimum cycle for each volume of traffic. A minimum cycle will pass a given volume of traffic with the minimum of delay. The cycle lengths for different volumes of traffic are of course different.

Obviously if the length of the cycle is increased the delay will increase proportionately. If the cycle is too short, there will be left one, two or three cars, depending on how much too short the cycle is. The delay mounts rapidly. The curve of cycle length plotted against delay is in a V shape for each individual volume of traffic. For a lower volume of traffic a similar curve will result but the minimum point is at the lower cycle length, and so on.

It is impossible to adjust the cycle length fast enough to meet conditions, because not only is the cycle length variable, but the distribution of the green period between the two movements changes constantly. I should hate to be faced with the problem of keeping the delay down anywhere near reasonable values with this condition, because you can see here that if the cycle length is the least bit off, either too long or too short, the delay goes up rapidly.

The design and development of the electromechanical traffic actuated type of control has been for the purpose of building a device which will give the maximum efficiency of operation, and will respond promptly to the changing demands of traffic.

As a result of that, our control gives the maximum of efficiency by keeping the cycle length adjusted to the minimum value from instant to instant. It gives a minimum of congestion. That is the first point.

The other is safety. We are all familiar with the recommendations of the National Conference on Street and Highway Safety. Traffic engineers in general agree with these recommendations that arbitrary signals should not be left on after a certain hour of the day. You also recall that it was stated in the same code that the traffic actuated signal need not be operated twenty-four hours a day. The fact is that in all cases I know about the traffic actuated signals are operated twenty-four hours a day. That point alone results in a considerable reduction of accidents.

The second reason that the actuated type of signal results in a reduction of accidents is that it is more or less psychological in its effect. The actuated equipment does not stop traffic unless there is a good reason for it. As a result it has been found rather generally that the obedience to traffic actuated signals is considerably better than to other types that do not automatically respond to traffic demands.

A third reason worth considering is the fact that in properly laid out installations the traffic detectors are placed a sufficient distance from the corner to allow a driver to stop in safety if he is stopped. But he isn't stopped unless it is necessary.

There are other refinements in control that might well be mentioned, but the important thing is that the designers of this equipment have had paramount in their minds building a machine which has a maximum of efficiency and also of safety.

Traffic Signal Timer

CHAIRMAN GOODRICH: The next speaker will be J. N. Paul of the Tokheim Oil Tank and Pump Company.

J. N. PAUL (Sales Manager, Tokheim Oil Tank and Pump Co., Fort Wayne, Ind.): I appreciate what the speakers before me have said in stating the general problem and in their treatment of its particular phases. The control at isolated intersections has been very well covered by two different speakers.

When we started in the traffic signal business along in the pioneer days, we went to various cities to ask the people in charge of traffic what their problem was. The problem was one of man-power; they wanted signals to relieve man-power. A certain

number of manual controls were already in use, but there seemed to be a demand for a thoroughly reliable automatic traffic signal timer. We asked what the requirements were and were quite uniformly told that signals should be flexible in adjustment and reliable and care-free in operation. When we asked what would be considered reliable and care-free, we were told that they should receive attention not more than once in two to four months. We said we were working on an idea for equipment that would require no attention in two years.

After some research and experimenting, the traffic signal timer which you people have seen in different demonstrations for the past five or six years was put out. It has met all of the requirements that we said it would. We put out some of those timers over six years ago that have operated continuously without oiling or any other attention.

The reliability that we obtained was due to certain basic principles. One was the principle of using a motor with three different driving speeds, one for each of the two periods, red and green, and one for the amber period. We have in some cases added a fourth driving element so as to give independent adjustment of the two amber periods. This permitted the cams on the camshaft to be set in fixed positions. The control of the driving elements is adjusted by a pointer outside. No moving parts are necessary. That type of construction gives us a timer unit on which the cover can be sealed, making the unit moistureproof and dustproof.

Another fundamental principle of design to obtain reliability involves the construction of the contactor. It is quite common practice to have the contact points on a finger, the opening and closing of which is done by flexing of the finger. That is satisfactory for a lot of different types of equipment, but the number of operations made in traffic signal timers run into a great deal more than for other kinds of devices. So we use a construction where the finger carrying the contact point is of rigid material. It is on a hinge, so there is no flexing of the contact finger.

The spring pressure is obtained by a long, flat flexible spring. We have never had any trouble with crystallization of fingers or any breaking of them.

Another point in the construction of the contactor is the use of a tungsten alloy, which is very hard. It has peculiar characteristics for conducting electricity. We find that for currents up to the rated amperage, which we give as six amperes, we have a comfortable margin of about 20 per cent as a factor of safety. The life is almost indefinite, but beyond approximately seven and one half amperes the life is very short. We have contact points that have run on test in the factory, starting in May, 1925. The test has been running continuously, operating at the rate of once a second. That is 86,000 times in 24 hours. In the six and one-half years that material has gone through more than 2,000,000,000 operations and it is still going.

Translate that into the use in a traffic signal timer operating on an average of once in sixty seconds. Then you can figure out how long it would probably last in service. It would be well over 200 years. That is the type of construction we developed something over six years ago. We have never used any other type.

Another point that has contributed to reliability and efficiency over this long period of years is the fact that we obtain a high factor of safety by making the parts relatively light in weight, so that they don't break down from their own weight. We have obtained a higher factor of safety by making the parts light and reducing the size of the bearings, thus getting a smaller ratio of bearing pressure to bearing area than we would if we made the parts seemingly more rugged. This light construction can be compared to the construction of a high-grade watch which runs anywhere up to 50 or 100 years.

Light construction reduces the bearing and lubricating problem to a minimum. We put out our equipment and guarantee it to function for a period of two years without oiling or other attention.

The three driving elements which we built into the original timer were all that were necessary or essential for a coordinated traffic signal system. To bring those

units into a coordinated system it was necessary to bring the separate magnets to a master control. The current from the master timer advances each secondary timer. It doesn't need any matching of contacts or depend upon any restricting mechanism. They can't get out of step by running ahead.

As for traffic control at isolated intersections, that has been very well covered. Our specialty has been coordinated traffic movement. By coordinating traffic at different intersections, we found on the first installation, which was on Carnegie Avenue in Cleveland in December, 1925, that when the traffic was controlled by hand it took fifteen and two tenths minutes for it to move a distance of about three and one-half miles. By staggering the signals (this wasn't actually tried but it was figured out) the traffic would move through the system in about eleven and nine-tenths minutes.

After the traffic signal system was put into service, the actual time for the average car running through the system was seven and three-tenths minutes. By coordinating traffic we decreased the running time to less than one-half.

Our main work has been in building timers that were reliable and, by the way, no piece of equipment that we ever built for traffic signal work has become obsolete. The old equipment that came out six years ago can have new contacts added to it. The bearings that have run for five years can be renewed for thirty-five cents apiece. The whole timer unit for less than about twenty-five per cent of its original cost can be made into the very latest design with all of the latest refinements.

The three main points I want to reiterate are these: One is reliability, the next one is flexibility, and the third is coordination of traffic. Those are the three objectives that we have been working for and that we are still working for.

CHAIRMAN GOODRICH: The last speaker is Mr. McOmber of the Essco Manufacturing Company.

L. W. McOMBER (Engineer, Essco Manufacturing Co., Peoria, Ill.): Regarding our line of signals and controls, I simply want to repeat the statement made by Mr. Regan, your first speaker, who seems to me to have covered the ground very well indeed.

Our design and our product is not dependent upon us; it is dependent upon you engineers and you traffic men in the various cities. The manufacturer is simply building the equipment that you want to use. He has just two factors in which he is interested. One is the quality of the product; the other is its price. The price goes back to the quantity which can be built. That brings up the old problem of standardization of equipment, one in which the manufacturer is as much or more interested than you men who are using the equipment.

In our signals we are trying to furnish the best quality of materials, and our time in engineering design is devoted to getting the smallest number of parts, and the cheapest construction that will fit into the quality of the signals themselves.

The types are up to you. We try to make every short cut we can, in so far as we are allowed by the specifications that we have to consider in filling your specifications.

On the controls we naturally have a greater variety. Of course every company has its own special type with a special theory. We are using a variable speed motor with a new style speed control. We depend upon centrifugal force and have a ball-type governor, the action of this governor being to shunt the circuit to the motor. We have something equivalent to the old-time regulator. By loosening or tightening the compression spring which controls the throw-out of the ball of that governor, we are able to get a variation within the limit of the required cycle.

In closing I want to say that we are interested in standardization of design.

CHAIRMAN GOODRICH: Are there any questions?

BURTON W. MARSH (Traffic Engineer, Philadelphia): I should like to ask Mr. Paul how much amperage has been going through those contacts for six years and what was the size of the contacts?

MR. PAUL: On that test there have been four 50-watt lamps. The contacts are approximately three-sixteenths of an inch. We have found on that type of contact

that the use isn't of much importance. It is a very hard metal. We have even reduced the total area of those tungsten contacts some and have not decreased the efficiency—perhaps even increased it.

HARLEY S. DODDS (Research Engineer, American Electric Railway Association, N. Y. C.): Mr. Dadds made several unsupported statements. I was wondering whether he had accident records following the installation of the automatic signals as well as before their installation. I believe he stated that the installation of the traffic actuated signals had improved the accident record. If he has the comparable figures in mind it will help to confirm the statement.

Mr. DODDS: It has been difficult to get accident records prior to the past year or so. I can say that in Connecticut we have such records available in rather complete form. There are many installations of the traffic actuated signal in Connecticut. They have been operating there for the past three or four years. The last records I saw showed an average reduction in accidents of two per cent. The actual reduction in the number of accidents over the fixed-time signals was 65 per cent. In severity of accidents I believe it was 76 per cent reduction.

J. F. HUNLEY (City Traffic Engineer, Boston, Mass.): I should like to ask Mr. Dadds whether the comparison of fixed-time and traffic-actuated signals involved fixed-time signals that operated 24 hours a day or only at locations where the signals were operated part time.

Mr. DODDS: I would say that they were not operated 24 hours a day, because I don't know of any place where fixed time signals operate continuously. Ours were operating 24 hours a day in all cases.

J. W. A. BOLLOX (Traffic Engineer, Department of Streets and Sewers, Seattle, Wash.): I should like to ask a blanket question of all these manufacturers. What method do they use for keeping the local controls in step after the progression has been set?

Mr. WILLIAMS: When our progression is set, on the local controls we pause one revolution and all start off together by the master. At the end of each cycle they all start. They are actually in step then. Even if they are a little out at the end of the cycle, they are brought back at the start of the next period.

Mr. HUMMEL: The Crouse-Hinds system has a little period where the timer is stopped and checked. Then they all start off together again. That is done electrically. I believe it will answer for practically all equipment.

Mr. PAUL: Ours is operated on the same general principle. The energy for moving the timer ahead through each green period is received from the master timer. That carries it into the amber period. It cuts in the secondary timer and cuts off the contact to the coil for the opposite green period. It has to wait in that position for the energy to come on the wire from the master timer. The energy from the master timer advances it from one wire one half cycle and on the other another half cycle.

ADJOURNMENT

Friday Morning Session
October 16, 1931

Traffic Legislation

BURTON W. MARSH, Chairman

Chairman, Committee on Uniformity, Street and Highway Traffic Section

The Traffic Legislation Session of the Street and Highway Traffic section convened with Burton W. Marsh presiding.

CHAIRMAN MARSH: In the field of traffic legislation the National Safety Council has been very active. It has been one of the sponsors of the National Conference on Street and Highway Safety which has developed model legislation. There has been great progress during the last year in the move toward standardization and uniformity. The states and cities which have adopted the Vehicle Code and the Model Ordinance are considerable in number, and if your state or your city is not included you should be doubly interested in this session.

We are coming toward the end of our sessions of the Street and Highway Traffic Section. We have some splendid speakers to present to you this morning. It seems unnecessary to introduce to you one so well known as Dr. Miller McClintock. I am sure you all know of the many large cities where he has conducted traffic surveys, his leadership in the field of traffic control, his participation in the National Safety Council affairs as Vice President in Charge of Public Safety for a period and his leadership in the National Conference on Street and Highway Safety.

Adapting the Model Ordinance to Your City

By DR. MILLER McCLINTOCK

Director, Erskine Bureau for Street Traffic Research, Harvard University,
Cambridge, Mass.

When I speak of the "model" ordinance I refer of course to the Model Municipal Traffic Ordinance promulgated by the National Conference on Street and Highway Safety.

This is one of the uniform documents promulgated by the National Conference on Street and Highway Safety. There are two other uniform documents of equal importance. One is known as the Manual on Traffic Signs, Signals and Markings; the second is known as the Uniform Vehicle Code. The former is designed for the use of municipalities so that public officials may erect signs and direction markers in accordance with national standards. The second is composed of a series of statutes dealing with the registration and operation of motor vehicles over the highways, and is designed primarily for statutory adoption by the legislatures of the several states.

In 1928 it had become apparent that the interest of the National Conference in state legislation alone wasn't adequate. There had arisen a demand among the cities of the country for a uniform ordinance which they could follow with the assurance that they were in accordance with the general uniform standards of the country.

This Model Ordinance had its first deliberative inception in 1928. At that first meeting of the technical drafting staff a resolution which I think is fundamental to the consideration of this ordinance was adopted. It was the guiding resolution

for all of the deliberations of the Conference in bringing this document to its present state of refinement and perfection.

That resolution was that no provisions should be written into the uniform ordinance except provisions of a clearly general character. By those were meant regulations which were by their very nature of universal application. Thus you will find no attempt in this ordinance to lay down general laws and regulations for conditions which are strictly local in character.

All of us who had anything to do with drafting this document were surprised to find that there were many provisions concerning the operation of motor vehicles in cities which ought to be incorporated in an uniform ordinance of this kind.

Two things may be said about the Model Ordinance as it exists today: first, it does not impair the local autonomy of any community in dealing with its peculiar problems; then, if any city adopts it with the addition of regulations of local character, it will have a regulatory document which is complete and adequate in every detail.

The first phase I shall refer to is the authority for the administration of the ordinance. It doesn't matter how good an ordinance may be; it is not capable of administering itself. No matter how adequate or comprehensive the provisions may be, it is always necessary that there should be some authority within the community capable of applying it, expanding it, and making it flexible to suit the constantly varying local conditions.

Thus among the very early provisions in this ordinance there is one referring to traffic authority. It provides that, "The board of police commissioners or traffic authority is hereby empowered to make and enforce regulations necessary to make effective the provisions of this ordinance, and to make and enforce temporary regulations to cover emergencies or special conditions."

Until the National Conference began to deal with ordinance matters in general, it was regularly considered that the entire power and responsibility for the making of traffic regulations of all kinds were vested in the city council and, of course, by law such power is vested in the city council, if that council desires to exercise it. But if there is any one condition in American cities that leads to an inflexibility in traffic regulations and to the passage of awkward provisions, it is an attempt on the part of the city council to entirely monopolize not only the legislative but likewise the administrative functions in connection with traffic regulation.

For that reason we have attempted wherever possible to make a careful distinction between strictly legislative function and administrative responsibility.

Let me illustrate administrative responsibility in this way. The Ordinance provides that at certain places and under certain general conditions loading zones may be established as a part of the parking provisions.

A loading zone is a space reserved at the curb for the exclusive use of vehicles stopped to load or unload passengers or merchandise. When we made our original study of the Chicago ordinance, we found that the city council had passed, with respect to the Loop district alone, more than 300 ordinances dealing with the establishment of loading zones. The ordinances went something like this: "There shall be established, from a point 117 feet east of the intersection of so-and-so, extending to a point 27.9 feet east of so-and-so, a place to be known as a no-parking zone." The terminology was different for almost every one of these regulations.

Obviously, this is not a satisfactory method of selecting or indicating loading zones. In the first place, the council cannot intelligently exercise such a minute and detailed power in connection with traffic regulation. The result almost inevitably is that regulations of that character, where they are exercised by the city council, degenerate into a kind of patronage. A merchant who believes that he will be particularly benefited, or sometimes a merchant who believes

that he can embarrass his competitors by the establishment of a loading zone may go to his councilman and ask for this special piece of legislation. Wherever the council attempts to deal with minute and detailed matters of traffic regulation of that character, the regulations almost always degenerate into a means of patronage distribution. And you find in many cities today regulations of that character carried along on the books and sometimes even marked on the streets for years after any possible utility has disappeared.

So that this type of detailed regulation may be made flexible we have recommended that the council indicate the proper traffic authority within the community to make such regulations and to carry out the general ordinance provisions respecting loading zones.

There are also other administrative duties in connection with traffic regulation which must be assigned to some authority other than the city council. I need mention only a few of them: the marking of crosswalks at intersections; the marking of streets with center lines and lane markers; the very complicated and technical problem of erecting traffic signs and signals and other control devices.

Obviously, the council cannot do this by itself. I know of one large American city where the city council has attempted to specify each location of a traffic signal, and this city is an outstanding example of an almost ridiculous traffic signal installation. Signals are installed at all sorts of places where they have no utility whatever and where their only end can be the hindrance of safety and reasonable driving facilities.

It is highly desirable that the responsibility for the administration of the ordinance and, likewise, the responsibility for the erection of traffic devices, be consolidated wherever possible into the hands of a single administrative agency so that the council may hold one individual or one commission responsible for the fulfillment of all of these duties.

One of the great moot questions in this country today is whether this authority should be given to the police department or one of the engineering departments of the city. In many instances the police departments are in a better position to handle the matter than is any other department. They already have the responsibility of enforcing the traffic regulations and in many instances have the only men in the city who are competent by experience, interest or temperament to carry out the function. Nevertheless, I cannot help feeling that both the police department and the public will in general benefit if this administrative responsibility is given to one of the engineering and technical departments of the city government.

In the first place, it is not a natural function of a police department to engage in engineering work such as, for example, the conduct of traffic surveys to determine the necessity for traffic signal locations at various places. Nor is it a natural function of the police department to engage in construction work which is involved in the installation of traffic signs, signals and markings.

There is an even more valid reason for the objections against the establishment of the police department as the traffic authority. We have attempted in the past to throw into the lap of the police department all of the dirty jobs which we could not dispose of in any other way. We have loaded them in many instances with traffic responsibilities far beyond their desires or capacities. If the police departments of American cities comprehensively and intelligently enforce the traffic regulations which are made by the city councils and those made personal to them by administrative authority, they will have all of the work that they need to undertake.

Furthermore, the police department is put in an unfortunate position where it is made both the maker and the enforcer of the regulations. It is always much simpler for an officer who is enforcing the law to be in a position to say, "Our

only responsibility is the official enforcement of the law as it is made." Then there is no question as to whether the law or regulation is desirable or not. Let legislative authority be exercised by the proper legislative officials; let the regulations necessary for the enforcement of those laws be made by a responsible administrative agency; then let the regulations be carried out by those officers of the city, the police officers, who are qualified and delegated by law for that particular purpose.

I have taken somewhat more time than might seem to be justified in discussing this particular provision of the Model Ordinance because I believe it is essential to the proper application of the ordinance in any community anywhere in the United States. The ordinance may be passed exactly as written and in full accordance with uniform standards, and then if permitted to be invalidated by frequent amendments which are often forced upon it by city councils, within a period of six or eight years there is a hodge-podge of unrelated regulations which are far worse than no ordinance at all.

I am now going to turn my attention to some of the alternative and optional provisions of the Model Ordinance.

First among them is the matter of pedestrian control. Should a community in adopting the Model Ordinance provide for strict pedestrian regulation or for the optional provision for only partial control of pedestrians? The milder form of pedestrian regulation merely provides that between intersections pedestrians shall grant the right of way to motor vehicles; but that at intersections motor vehicle operators shall grant the right of way to pedestrians, provided, however, that when any motor vehicle operator is passing through an intersection on the green or go signal the pedestrian shall grant the right of way to the operator of the motor vehicle. All of these, of course, are subject to reasonable and cautious action on the part of both parties. That is a very mild form of pedestrian regulation. It merely provides for a mutual tolerance and a mutual granting of the right of way.

The alternative provision is one which provides that at intersections when pedestrians are confronted by a red or stop signal they shall not enter the intersection or crossing, a specific and direct requirement for full pedestrian regulation.

The problem will never be solved until the pedestrian and the motor vehicle operator are given very specific duties, responsibilities and requirements. No one in the country is more enthusiastic than I am for full pedestrian regulation. I was connected with the city of Los Angeles in 1924 when full pedestrian regulation was put into effect, the first great city, I believe, to attempt it and to make it stick. It had and still has full pedestrian regulation, and it has full pedestrian regulation by the grace of the public opinion which supports it. There are scores of other cities in this country which have tried pedestrian regulation, some of them successfully and some of them with the most complete failure. Among them, for example, is the city of Chicago, which some two or three years ago attempted to regulate pedestrians and failed miserably.

This brings up an interesting phase of traffic regulation and I am going to emphasize it particularly because it has a bearing upon every provision of the Model Ordinance.

We can enforce only those rules and regulations regarding personal conduct which appeal to the public as being rational, and can be incorporated into community habits. I don't care whether it is traffic regulation or any other kind of regulation: we are merely throwing upon the shoulders of our police departments impossible and intolerable enforcement problems if we do not follow that very simple principle. Let's see how it applies to pedestrian regulation.

If the physical conditions of the streets are such as to permit the full control of pedestrians, then one has gotten over the first consideration. There are some

places in the United States where pedestrian traffic is so heavy and the sidewalk space is so narrow, with such great interference from moving vehicles turning both right and left, that pedestrian control will not work. In other words, pedestrians waiting for the signal to change overcrowd the sidewalks.

In the second place, it is necessary that the signal system or the traffic officers be so arranged that pedestrians are not required under normal circumstances to remain standing upon a curb unless there is in the street a sufficient movement of vehicular traffic across the path to be taken by the pedestrians to make it undesirable for them to cross.

That is why in those cities that have failed in pedestrian regulation you can almost always trace it to the fact that the regulation as put into operation hasn't appealed to the public as being reasonable. They have been required to stand for five seconds with an entirely empty street in front of them. They will not stand there. You can't put on enough police officers to keep back an impatient crowd who think they are being treated in an unreasonable manner. Chicago failed to put pedestrian regulation over primarily because the police order was issued on Saturday afternoon and the regulation was inaugurated on Monday morning, without an educational campaign to create a public opinion in support of that regulation.

The result was that when the public came downtown on Monday morning and found police officers attempting to hold them back against the lifetime custom of crossing streets when and where they pleased, they simply laughed at the regulation.

In the first place, in pedestrian regulation, if you are going to follow the full form as given in the Model Ordinance, it must have the proper physical features behind it. In the second place, it must have the support of public opinion.

I shall tell you how we put pedestrian regulation over in Los Angeles. Six weeks before the regulation was put into effect, we began a very intensive educational campaign. We went to radio stations and got five or ten minutes to tell the public about the pedestrian hazards, difficulties, and conflicts which exist between the walker upon the streets and drivers of motor vehicles. We went to parent-teacher associations and told them about the hazard when children ran out into the streets in front of fast moving vehicles.

The newspapers gave us unlimited support. The result was that when the morning came to introduce pedestrian regulation in Los Angeles the entire public knew what the requirements were, what the responsibilities were, and why the regulation was being put into effect. The hadn't made up their mind whether they were going to like it or not, but they were put into a sympathetic frame of mind when they knew that something was not being taken away from them arbitrarily without their having an opportunity to react upon it.

That wasn't all. The police department of Los Angeles was very intensively educated as to what was to be done on that particular day and on subsequent days. The pedestrians in Los Angeles put pedestrian regulation over themselves by the very simple process of laughing at those who were caught disobeying it. So far as I recall from the record, there has not been an average of more than three or four arrests of pedestrians a year for violation of the pedestrian regulation, and we have almost perfect obedience there. Those arrests were of intoxicated or vicious persons who were picked up when disagreeable or nasty.

Just a few words regarding parking regulations and stop streets. Regarding parking, I want to lay down some general principles rather than methods of procedure in attempting to apply this particular regulation as stated generally in the Model Ordinance. This Ordinance doesn't attempt to tell any city what sort of parking regulations it should have. It does indicate for their guidance certain types of parking regulations. It indicates among others, for example,

that there are certain streets in every city where the complete prohibition of parking is desirable. It indicates that at certain places in the street system, those places which naturally form bottle-necks, or near intersections where the full width of space at all times is desired either as a reservoir for traffic to be released at signal, or at the curb opposite safety zones where the usable width of the street is restricted, not only should parking be prohibited but likewise even the stopping of vehicles for any purpose other than obedience of the traffic signal or to prevent accident.

It sets forth the loading zone regulation, and then, of course, takes due cognizance of the fact that regulations upon the time of parking should be established in order that there may be a proper allocation of the available curb space.

Parking is a form of traffic regulation which comes closer to the operation of business than does any other regulation in the Model Ordinance because the operator of the vehicle, who, having come from his home to his business destination, desires to leave his vehicle for a period of time and transact his business. The great majority of such parkers are those who are going to adjacent establishments to buy goods or commodities of one kind or another.

There are practically no safety factors involved in parking, except along highways and at intersections where it may interfere with the safe movement of traffic. The regulation of parking is primarily and almost exclusively a business function. Unless a regulation of parking of any kind can be justified as a necessary regulation, as an assistance to business, there is a very strong reluctance against its installation in the code. For that reason those of you who are responsible for parking regulations should constantly remember that you must design parking regulations which will be helpful to business.

There are only two reasons anyone should ever participate in the regulation of traffic. One is to provide greater safety, and that includes the overtones of safety convenience and comfort, and the other is to make possible the more economical and businesslike use of the streets of our cities.

We should all remember that if we aren't achieving greater safety and a more expeditious and businesslike use of our streets, we had better throw the regulations away and go out of business.

CHAIRMAN MARSH: I am sure that it has been a pleasure to you all, as it has been to me, to hear Dr. McClintock present this very interesting subject.

The next subject for discussion will be presented by Mr. Harold G. Hoffman, Commissioner of Motor Vehicles of New Jersey.

State Responsibility for Traffic Law Uniformity

By HAROLD G. HOFFMAN

New Jersey Commissioner of Motor Vehicles, Trenton, N. J.

May I say, first, that it is a pleasure to be invited to address the National Safety Council, the agency whose unflinching effort has been of inestimable value to the whole cause of safety and particularly to that aspect of it relating to motor car use? The latter, of course, is the one with which I personally am best acquainted. I am sure I speak for all motor vehicle administrators when I say that the Council's activities in the cause of street and highway safety are tremendously valuable.

Many times in my consideration of uniform traffic regulations I find it profitable and helpful to go back to the primary aspects of the subject. I ask myself: "What is the fundamental purpose of traffic regulations, anyway?" And the answer is: "To provide the individual with a knowledge of the correct thing to do under a wide variety of conditions in order that, by repetition, he eventually will be able to make this action instinctive."

We must admit that, psychologically speaking, the automobile still is an innovation. We have not yet reached the stage in our use of it where our actions are instinctive. When, in driving our cars, we are confronted by any one of numerous conditions and decide to act in a certain way, it is the result of mental processes which, rapid though they are, nevertheless require more time than if the decision were instinctive.

Some day, no doubt, we shall all learn to act as quickly in stopping our cars at the sign of danger as we do in closing our eyes when an insect approaches too closely. So, in final analysis, in making traffic regulations we are formulating standards of judgment which it can be hoped some day all will make instinctively when certain conditions arise.

Regarded from this standpoint—that they will eventually become instinctive judgments—uniformity in traffic regulations becomes a matter of tremendous significance. The motor car recognizes no boundaries. It carries its owner everywhere and it carries him into danger when he decides, instinctively or otherwise, to do something entirely foreign to the training and experience of others in his immediate vicinity.

We are just now venturing into the field of driver psychology. I am not a psychologist and I have no idea where the current venture will lead. It requires no scientific knowledge, however, to see the definite connection between a driver's action under certain conditions and what he has been taught by the regulations under which he has learned to drive.

I am sure there no longer remains any dispute over the advantages of uniform traffic regulations. Even our European friends who laugh at our American passion for standardization are willing to trek along with us in this particular respect. It is a concession that I regard as altogether admirable.

But, if we are to have national traffic regulation uniformity it must be achieved through some particular method of orderly attack. That is where I conceive of the State as fitting into the scheme.

The State is the logical agency to handle this important subject. Its responsibility is two-fold.

First, it is the duty of the State to see that the traffic regulations of its partially autonomous subdivisions—cities, towns and boroughs—are consistent and uniform. Second, it is the State's responsibility to see that its own regulations conform, in so far as possible, to a nationally uniform standard.

The average motor vehicle administrative set-up at present makes the State the ideal agency for carrying out this important program. In the first place, the State makes the basic regulations governing traffic within its boundaries.

In making these regulations the State prescribes the manner in which turns shall be made, speed limits under various conditions, the type of signals drivers shall give, where vehicles may and may not be stopped; in short, all of the basic rules of motor vehicle operation. Furthermore, it provides that none of the points covered in this code shall be modified or abridged by municipal enactment, with but a few exceptions. And even the exceptions are generally subject to the approval of State authorities.

This degree of jurisdiction obviously places the State in an ideal position for the achievement of uniform motor vehicle regulations within its borders.

Without arbitrarily intruding into the rights of municipalities, most States are taking full advantage of this fortunate position today. The result is decidedly wholesome.

I am, of course, familiar with only what is happening in New Jersey. There, the Motor Vehicle Department, with the cooperation of the State Traffic Commission, is working toward absolute uniformity of traffic regulations throughout the State, and is trying to bring these regulations in line with the nationally accepted rules. New Jersey is a small state, forty-fifth in territorial extent, yet it looms large in the traffic picture, for in addition to nearly a million cars of our own. Our highways carry millions of foreign cars, by reason of our location between populous states

of New York and Pennsylvania. The traffic count in the Holland Tunnels, between New York and Jersey City last year, totalled 12,066,777, while 12,285,359 vehicles passed over the Camden-Philadelphia bridge to say nothing of hundreds of thousands of cars crossing the ferries and other points of interstate entry. A friend of mine recently traveling over our new highway between Newark and Trenton, a distance of 60 miles, noted cars bearing license plates of 36 States, two Providences of Canada, and Porto Rico. Need more be said to convince you of New Jersey's interest in national, as well as State, uniformity of motor regulations?

When the work was undertaken more than a year ago the need for cohesive action became quickly apparent. It was nowhere more clear than with respect to the use of signals and signs. The misuse of signals and signs is as notorious a fact as that their intelligent use is an indispensably valuable aid to traffic control. New Jersey was no exception to this rule. It had 13,000 "Stop Street" signs of which several hundred were misused.

I mention this fact at this time because I think it illustrates one of the State's gravest responsibilities with regard to the cause of uniformity. These incorrectly used signals and signs reflect the fact that, without some firm restraint, everyone is disposed to put into effect his own idea of what is best for traffic. Now, the ideas of some municipal authorities might be excellent while those of a neighboring community would be little short of absurd.

The State which does not recognize this fact and set up the necessary restraints is not meeting its responsibility to the cause of uniformity which is so vital to social well-being.

It is perfectly possible, however, for the State to overstep itself in this direction, even when its intentions are the best in the world. Our New Jersey traffic act contains provisions that prevent this unhappy eventuality. While it is specified that the State shall make the basic regulations and that these shall not be subject to modification by municipal ordinance, exceptions are made with regard to:

Limiting the use of streets to certain classes of vehicles.

Designation of one-way streets.

Regulation of public hacks and designation of hack-stands and auto bus stops or stations.

Regulation of street cars.

Special regulations governing the passage or stopping of traffic at congested corners or other designated points.

Regulations governing parking on streets.

Now these are largely municipal traffic matters, but it is provided that enactments relating to them must be submitted to the New Jersey Traffic Commission for approval. Should the Commission disapprove of the ordinance, the municipality is granted the right of appeal to the Supreme Court of the State.

Such a law, even with this limitation upon the State agency, gives the State sufficient latitude to meet its responsibility to the cause of uniformity of regulations within its borders.

When it has established a standard with regard to the traffic regulations of the municipalities over which it has jurisdiction, the State has taken a definitely progressive step. It has assured that the Trenton motorist, for instance, will think and act like the Camden driver when he meets the latter in his home town. But it still has not met its full responsibility to the cause of uniform traffic regulations. There remains the task of making both municipal and State regulations conform to a national standard.

Some may be tempted to say: "Well, if it is simply a matter of 48 State Motor Vehicle agencies getting busy on the subject, why must we wait so long for uniformity?"

I believe that as broad-minded individuals, we must agree that there is an answer to that question which deserves good standing in the community of logic.

Granting that uniformity is universally desired—and we all must do so—the fact is that it has not yet been achieved. Why? Because we have not agreed upon what specific laws we shall make uniform. I know, of course, that we have had agreement in our national conferences, substantial agreement, at least. Out of those conferences, held in Washington, have come uniform and model codes. They are excellent pieces of work. But there is a disposition to make exceptions with regard to various provisions in them.

I have in mind at the moment the differences in our speed regulations. Speed limits fall into many categories instead of one. A number of states think maximum limits of any kind are obsolete and have abolished them altogether. One has a maximum of fifty miles an hour. Quite a few do agree with the forty-five mile limit suggested in the uniform code, but many states have forty mile maximum, and some thirty-five. Others have even lower stated mileages with *prima facie* causes.

Have the majority of States—of which New Jersey is one—turned their backs upon the cause of uniformity by differing with the speed limit division of the Model Code? I do not think it can be said that these States have dodged their responsibility to standardized rules, for in the main the provisions of a uniform code have been given a successful reception in the various States.

The exceptions, I believe, are significant. To me, and I am sure to many others, they mean that along with uniformity must go a degree of flexibility.

When I think of what our traffic regulations are likely to be ten or twenty years from now, it seems to me that we are doing little more now than establishing a principle that uniformity is the desirable thing. The design of automobiles and the character of our highways are bound to have a modifying effect upon our present regulations.

By giving the imagination a little rein, one can foresee the day when the rule that now is basic in traffic control may apply only on a very limited scale. I refer to the right-of-way regulation. Who knows that eventually it will not be rendered obsolete as the highway builder is given enough money to separate grades at all important points so that the paths of opposing traffic streams will never need to cross.

My point is that any uniform regulations we may propose for universal adoption will dissent in many circles if we clothe them in anything resembling finality.

No one, I believe, is more friendly to standardization of traffic codes and regulations than I am. It is a desire to see the cause advanced that prompts me to suggest that we must avoid giving the sense that we are offering something fixed and final.

I have in mind at the moment a perfect illustration of the automobile designer's ability to modify our regulations. It is provided by our State headlight laws. All our modern cars are equipped with dual beam headlights. Except in a few instances, however, our headlight laws are based upon the old type of lens which we brightened and dimmed instead of raised and lowered. Let us presume that these old laws are perfectly uniform—though they are not—and yet the designer would have rendered them obsolete.

To revert a moment to the right-of-way regulation, I think reviewing its history is profitable in indicating the need for open-mindedness on our proposed uniform regulations. The original rule was inherited from horse-and-buggy days. It was that the man on the right had the right of way. That carried over into the motor car era and went a surprisingly long time without modification, but one day the man on the right found himself confronted by a stop sign, or perhaps it was a policeman, and later a traffic light.

The rule was then radically modified. There are some people today, I understand, who are of the opinion that it might be safer, all physical factors considered, to give the motorist on the left priority at crossings.

I cite this opinion because it indicates that there exists a degree of open-mindedness—of non-conviction, one might say—that would discard any or all of our present regulations. This type of thought is not necessarily antagonistic to uniformity.

I am sure, however, that it is opposed to finality in any of the present standardization programs.

Some of the more enthusiastic proponents of universally identical traffic regulations may regard the delay of some states in enacting such rules as failure to perform an obvious duty. They are not taking into account perhaps all of the conditions that act as retarding influences.

There occurs to me the case of the rotary left turn which Washington just displaced this autumn with the more standard system. It took four years to achieve the change.

The rotary left turn was about the most non-uniform one conceivable, yet during the time I was in Washington as a member of Congress for four years I came to appreciate many virtues in it as it applied to the National Capitol. The Federal city, as you know, has exceptionally wide thoroughfares that lend themselves excellently to the unorthodox turn.

Washington motorists decided it was safe and they liked it. They continued to do so despite the flagrant confusion it wrought when the National Capitol was crowded with tourist visitors. At one time, one of the local newspapers conducted a poll to determine the city's sentiment as between the rotary and a uniform turn. Uniformity lost.

The turn, however, was doomed even then. However, it lasted two years longer and during those two years education worked a change in public opinion. This autumn Washington changed over to a much more conventional left turn method and the verdict is unanimous that it is better, much better.

However, it took time and had another and quicker procedure been followed, the result might have been less satisfactory all around. So it is, perhaps, with other isolated cases of failure to conform to the universal standard.

As a general thing, I think it may be assumed that the States are accepting their responsibility for uniformity.

From the point of view of the motor vehicle administrator, I can give you one excellent reason for their acceptance of it; namely, that uniformity holds the strongest hope for remedying a driver attitude that is altogether inimical to safety.

In New Jersey this year, we have made an analysis of our accidents to determine the proportion caused by out-of-State drivers. They have varied at different periods, naturally, reaching a maximum of approximately 20 per cent at the height of the touring season. It may be of some interest to note that in the fatal accidents involving out-of-state cars, 50 per cent were from Pennsylvania, 48 per cent from New York and the remaining 2 per cent from other States.

An analysis of these mishaps reveals that they may be attributed to some extent to the disposition of a certain class of motorists to take advantage of their ignorance of the law. They do not know the speed limit in New Jersey, so they make their own limits. They do not have exact knowledge of the other traffic laws and regulations, so they go ahead as they will, trusting that their ignorance will excuse them.

This attitude exists and persists to a much larger degree than many realize. The motor vehicle administrator knows about it, however. He is aware, too, of what a difference it would make if laws were uniform to the extent that operators, knowing them for their own state, knew them for all.

As I said at the beginning, I regard the State as the ideal agency for assuming the responsibility of making traffic regulations uniform. It is, as I see it, a two-fold responsibility. First, the various states must keep together in the enactment of regulations and, secondly, they must keep the regulations they enact as up-to-date as possible.

It can be done in many of the cases in which we are trying to provide the individual driver with the basis for a sound instinctive response to a given condition.

It has been done in many of the provisions of the Uniform Motor Vehicle Code and the Model Municipal Traffic Ordinance of the National Conference on Street and Highway Safety.

Where this has been achieved, it is the responsibility of the State to its citizens to enact and enforce the regulation. In no other way can that regulation become the basis of instinctive and safe traffic judgment by all street and highway users.

CHAIRMAN MARSH: I am sure you found this presentation of tremendous interest. I hope that it will result in a decision on the part of some of those present to start in their own communities and states to exert that influence which attendance at this Congress almost makes an obligation, to see that your states and communities fall into line.

We have had presented to us the model municipal traffic ordinance and the state's responsibility for uniformity in the code. We shall now turn to the very important question, having these codes before us, of how we are going to get them into effect. That is a real job.

Attention has been directed to publicity and legislative efforts in states which do not have the full uniform code, to the drivers' license law, as this is believed to be the part of the code which will result in the greatest reduction of accidents and will open the way to a more rapid adoption of the remainder.

Several states adopted the drivers' license law this past year. There are five of these and there are many states which already have it.

Mr. Howard D. Brown, of the Automobile Club of Michigan, who was to have presented his paper has found it impossible to be present, but I am sure he has an able alternate, one who is a veteran in the field, in Mr. H. O. Rounds, of the Automobile Club of Michigan. Mr. Rounds has been a veteran at these Congresses and he has followed the course of uniformity very closely. I take pleasure, therefore, in presenting Mr. Rounds.

How Michigan Passed the Drivers' License Law

By H. O. ROUNDS

Safety Director, the Automobile Club of Michigan, Detroit, Mich.

Michigan adopted the license law back in 1919. It was all right for that time but it became grossly inadequate for the purpose for which it was intended. In 1925 we rather anticipated the National Conference on Street and Highway Safety and called a local convention and passed what we called a state uniform traffic ordinance, which was adopted by nearly every municipality in the state of Michigan. This follows closely the lines laid down by the National Conference.

Then of course in 1926 that meeting was held and the Uniform Vehicle Code was given to us for adoption.

As quickly as we got home we started in by calling a state conference. Two hundred delegates were present, representing every interest in the state, I believe. There were political, manufacturing, municipal and state representatives, and others present. A committee was appointed to carry on the program of propaganda work throughout the state.

In the fall of 1927 a bill was presented to our state legislature. This bill never got out of the Transportation Committee, probably because we could not muster enough strength to pull it out. When he was asked why he did not bring it out the chairman of the committee replied that the bill was too long, "You can't expect us to read a bill as long as that."

Beginning once more, the state conference and other interested organizations and people started carrying on the campaign throughout the state. I made sixty talks on it before luncheon clubs. We kept at it until the meeting of the legislature in 1929. The bill this time passed the Senate but was once more killed in the Transportation Committee. Reason: Opposition from powerful interests. We knew who it was but we felt it was best not to state it.

In 1931, the Honorable Wilbur M. Brucker, then the Attorney-General of the state, became a candidate for Governor. His platform included endorsement of a drivers' license law and he promised us his support to it if he were elected.

He was elected. Immediately he instructed one of his Assistant Attorneys-General to draft a bill. This was done in cooperation with the gentleman who was supposed to present this today, Mr. Howard D. Brown, Chief Attorney of the Automobile Club of Michigan. This bill was redrafted many times before it reached the legislature, and many amendments were made after it was presented to satisfy certain interests.

It was passed by the 1931 legislature and given immediate effect, May 1, 1931. During these six years the object and intent of this bill was constantly kept before the people until the desire of the electorate for the protection such a bill would give them eventually filtered through into the minds of the legislators and resulted in the passage of this bill, which we hope to be able to get amended as time progresses to a close resemblance to the uniform code.

CHAIRMAN MARSH: We can certainly agree that it is not always as easy to do as it is to say what is well to be done. Whereas it is well known what legislation will lead us to reduce this horrible toll of accidents and to achieve better traffic conditions on our streets and highways, we have taken six years and more in many of our states to bring that about.

We have heard how certain people in Michigan worked for six years and finally achieved something which they don't feel quite satisfied with but which is a great step forward. We are now going to hear "How Kansas Passed it."

Dr. Earle G. Brown is the Secretary of the State Board of Health of the state of Kansas. He has worked in close cooperation with the Kansas Safety Council and the Kansas Department of The American Legion in promoting drivers' license legislation in Kansas. He is very familiar with what has been done and it will be a pleasure to hear from him.

How Kansas Passed the Drivers' License Law

By EARLE G. BROWN, M. D.

Secretary, Kansas State Board of Health, Topeka, Kan.

According to the National Safety Council, the saving of approximately 22,000 lives in the United States may be attributed to the functioning of efficient drivers' license laws enacted by state legislatures during the period 1916-30, inclusive. The experience in these states is that since the enactment of the law, with examination of drivers, according to the reports to the United States Bureau of the Census, there have been 29 per cent fewer automobile fatalities than there would have been if they had experienced the same percentage of increase which occurred in the non-licensed states. This difference may be accounted for in the saving of approximately 22,000 lives, and the laws had been in effect for an average of only eight years.

These data alone present logical reasons for legislatures requiring the examination and licensing of persons driving motor vehicles. It is therefore with much pleasure we report that the State of Kansas, by reason of an act of the 1931 legislature, joined the ranks of other progressive states in the conservation of human lives through the adoption of the Drivers' License Law.

Sentiment favoring the passage of such a law may be said to date from a meeting of the National Association of Utility Commissioners, held in Miami, Florida, in 1923, which meeting was attended by one of the three members of the Kansas Public Service Commission. One of the speakers at this meeting was the safety superintendent of the Atchison, Topeka and Santa Fe Railway Company, who included in his discussion much information in regard to the great loss of lives each year through automobile-train collisions. He also discussed other types of accidents

and proved to the satisfaction of the Kansas delegate that a needless waste of lives resulted from preventable accidents. Upon his return, the Kansas representative discussed with the other members of the Commission, the possibility of undertaking an organized safety campaign in the state. The safety superintendents of several railroads operating in Kansas were requested to meet with the Commission, at which meeting there was a thorough discussion of the cause and prevention of accidents. During the following two and one-half years, meetings were held with representatives of life and accident insurance companies, bus and truck companies, utilities and various types of industry, in addition to many conferences with representatives of farm organizations. Addresses were made before numerous types of organizations by members of the Commission and others interested in accident prevention. The press gave united support to the safety program; their columns being a most valuable aid in creating an accident conscious public and in crystallizing sentiment favorable to the enactment of the Drivers' License Law.

During this period those persons who had been active in the proposed safety movement, had been in constant contact with the National Safety Council and had profited through suggestions received from that organization. Consequently, the Kansas Safety Council was organized during the summer of 1926, Jesse W. Greenleaf, original sponsor of the proposed state safety program, being named as chairman.

While organized in the interest of general accident prevention, it was agreed by the members of the council that the primary objective of the organization would be the creation of sentiment favorable to the passage of the Drivers' License Law.

A state-wide rally, on call of the governor, honorable Ben S. Paulen, but under the direction of the Kansas Safety Council, was held in Topeka on September 9 and 10, 1926. Invitations were extended to mayors and other city and county officials, representatives of life and accident insurance companies, railroads, bus and truck companies, utilities and other organizations and individuals interested in accident prevention. The total registration was in excess of 700 and the expense of the meeting was met by voluntary contributions of those present. Governor Paulen was the first speaker on the program, presenting an able discussion in regard to the accident problem. The Governor also was chairman of the evening session on the first day, the principal speaker being Lewis A. DeBlois, then with the National Bureau of Casualty and Surety Underwriters. Before adjournment was made, a resolution was adopted by unanimous vote of those present, endorsing the Uniform Vehicle Code and requesting its adoption at the following session of the legislature.

Governor Paulen included specific recommendations in his message to the 1927 legislature as follows:

"In this connection, I wish to call your attention to the uniform motor-vehicle code, drafted and adopted by the National Conference of Commissioners on Uniform State Laws and approved by the American Bar Association. A uniform regulation of motor cars must come sooner or later, and since our state is among the first in the number of cars per capita, we should adopt such regulations as will be for the best interests of the public, and as this measure appears to have been prepared with special care, I trust you will give it your serious consideration." The Uniform Motor Vehicle Code was introduced at the 1927 session, passed the House by almost unanimous vote, but failed of passage in the Senate.

The following recommendation in regard to the proposed law, is from the message of Governor Clyde M. Reed at the opening of the 1929 legislature:

"I join Governor Paulen in his expression upon this matter and trust that this session will see the adoption of the Uniform Motor Vehicle Code adopted by the National Conference of Commissioners on uniform state laws, and approved by the American Bar Association."

In the 1929 legislature, however, the major program dealt with the creation of state highways and the Uniform Motor Vehicle Code was not introduced.

At the annual meeting of the Kansas American Legion in 1929, one of the projects undertaken, through action of the delegates, was the inauguration of a safety cam-

paign, Adjutant General M. R. McLean being named as the safety director. General McLean immediately made contact with the more than 300 posts in the state with the request that a Post Safety Committee be appointed. At various times, General McLean would forward to the safety chairman literature in regard to accidents and their prevention, one communication enclosed being "Suggestions for Safety First Program" prepared by the National Americanism Commission of the American Legion.

Funds for the purchase of literature were very limited, and at one time the Legion safety director secured from the railroads operating in Kansas some 20,000 booklets on the hazards of the railway grade crossing. The booklets, which were published by the American Railway Association, were imprinted with the name of the Legion department, distributed throughout the state by Legionnaires wearing Legion caps, on a pre-determined day, each man making a personal contact with a driver, to whom he gave the booklet. The effect of the distribution of these booklets was far-reaching, comments being received by the safety director from many communities where the booklets had not been distributed.

On November 21, 1930, General McLean addressed a special communication to all Legion safety directors, calling their attention to the Uniform Motor Vehicle Code, a copy of which he enclosed in his letter. He also directed their attention to a copy of a proposed resolution indorsing the code, but with a special reference to the Drivers' License Law. The Post safety directors were requested to present the resolution at an early meeting of the post and if the resolution was adopted, the legislative committee of the State Legion be immediately notified by sending them a copy. According to information received from the State Adjutant of the Legion, some 200 posts gave their approval through adoption of the resolution, while the action of the remaining approximately 100 posts is unknown. Only one post notified the State safety director that the resolution had failed of adoption.

The Kansas Chamber of Commerce also had an active part in the program through the appointment of a state committee on Highway Safety. Data are not available as to the part taken by the individual Chambers of Commerce in the interest of the Drivers' License Law. However, the Chambers of Commerce located especially in the larger cities appointed safety committees and as individual Chambers, indorsed the proposed law. In September, 1930, the safety committee of the Wichita Chamber of Commerce sponsored a safety meeting in that city which was attended by more than 150 persons. Much of the program was given over to the discussion of the Uniform Motor Vehicle Code and the proposed Drivers' License Law was given unanimous indorsement.

On January 8, 1931, the committee on Highway Safety of the Kansas Chamber of Commerce, by unanimous vote, recommended for passage the Uniform Vehicle Operator and Chauffeur License Act, as far as same was applicable in Kansas. The chairman of this particular committee advised me that in his opinion, "The indorsement of the State Chamber of Commerce of the Drivers' License bill had a favorable effect on many members of the committee of the legislature which reported the bill."

During the two years preceding the meeting of the 1931 legislature, the Kansas Safety Council requested each civic club in the state to devote at least one meeting during the year to accident prevention. Similar requests were made of various women's clubs and other organizations. Data as to the number of meetings of this type are not available, but it may be stated through the activities of the Kansas Safety Council, the American Legion and the Kansas Chamber of Commerce, that educational work in the value of accident prevention and the importance of the Drivers' License Law was carried on even in remote rural areas of the state.

The National Safety Council, since the proposed program was first undertaken, cooperated in every way possible through providing speakers and the distribution of safety literature. The railroads on various occasions have furnished speakers for safety meetings when speakers were not otherwise available.

The following extract is from the message of Governor Harry H. Woodring, in regard to the proposed Drivers' License Law at the opening session of the 1931 legislature:

"The number of fatalities and serious injuries resulting from motor-vehicle accidents in Kansas each year is appalling. This cause of death and injury takes its place with other scourges of the human race and within a few years the fatalities from this cause will exceed the total number of men killed in all the wars in which this country has engaged. Suggested remedies for this condition merit our serious and immediate consideration. Drivers' license laws have been adopted by many states in recent years and a late survey in twelve states shows a saving of about twenty-nine per cent in lives that would have been sacrificed each year in motor-vehicle accidents. The survey shows also that general traffic conditions have been vastly improved.

"I recommend that legislation be enacted requiring the licensing of all drivers of motor vehicles, examination of all new drivers and that this law be administered by a centralized state motor vehicle bureau. The expense of the administration of the law should be paid from the proceeds of a nominal annual fee paid by licensees."

The proposed law was introduced on the third day of the session, an emergency declared, the rules suspended and was advanced to second reading. The bill was given a second reading and referred to the committee of the whole. On the fifth day of the session, the bill was taken up for consideration by the committee of the whole, minor amendments were made, largely those relating to fees and the bill recommended for adoption. On the seventh day of the session, the bill passed the House of Representatives, the vote being 94 for and 20 opposed, 11 members being absent or not voting. The Senate was immediately notified that the House had adopted the bill. In the Senate the bill, as amended by the House, was referred to the judiciary committee. On the twenty-fifth day of the session, the judiciary committee reported with the recommendation that the bill be passed, and on the thirty-seventh day of the session the bill passed the Senate by a vote of twenty-seven for and none opposed, thirteen members being absent or not voting. The bill as passed was approved by the Governor on March 14, 1931, and became a law on publication of the statutes.

The law became effective on July 1, the State Vehicle Commissioner being empowered to designate the officer or officers in the various counties to accept applications from individuals making applications for a license. These applications are then forwarded by the designated officer to the State Vehicle Commissioner who issues the license. The cost of the license is but twenty-five cents, with an additional notarial fee of either twenty or twenty-five cents, making the total cost forty-five or fifty cents. In some instances organizations have provided notarial service without cost. To date approximately 650,000 applications have been received in the office of the State Vehicle Commissioner. Because of circumstances which have arisen since the law became effective, the Motor Vehicle Commissioner has denied approximately 100 licenses; four have been revoked and three suspended. Those persons who were active in the support of the Drivers' License Law are of the opinion that Kansas will join the ranks of other states and show a saving in human lives lost as a result of automobile accidents and this saving will be the direct result of the adoption and enforcement of the Drivers' License Law.

In conclusion, therefore, I would offer a statement received from Honorable J. W. Blood, Attorney at Law of Wichita, Kansas, sponsor of the bill in the 1931 legislature:

"Wish to state that as far as Kansas is concerned the work done by General McLean in the American Legion and the work done through the Kansas State Safety Council, and the work done by the Chambers of Commerce, furnished a good background for the act. The main thing was to get it into the legislature without too much opposition. There did not appear to be much argued opposi-

tion to the law, the principal opposition being among the legislators in that they did not favor any more regulatory laws than necessary. The principal arguments for the law, of course, are its tendencies to eliminate the criminally careless driver, the intoxicated driver, and the incompetent driver, and the fact that states having this law have been able to reduce mortality accidents from seventeen to twenty-five per cent, while states not having the law show a remarkable increase.

"Personally, I do not think we will get the full force of the law short of two years. It will take about two years after it is in force to begin to get the effect of it because you cannot examine everyone in putting laws into force, and cannot weed out the drunks and incompetents at once. However, the moral effect of the law will, in my judgment, immediately reduce accidents.

"I would say if you started into a state that did not have this law, that the thing to do is to organize a Safety Council and work through the American Legion and the Chambers of Commerce."

CHAIRMAN MARSH: Dr. Brown has certainly presented a clear-cut story of progress. I think you should be impressed with this: If your state has not such a law, or if your city does not have an ordinance, uniform with the Model Ordinance, you should not be discouraged by failure which occurs the first time. I am hopeful that in this audience there may be some persons who will go back to their communities resolved to take that initial step, either alone or in co-operation with associates who they know desire to see accidents reduced and traffic conditions improved.

We have some interesting points for discussion. I should like to have everyone realize first, however, two things: The National Safety Council stands ready to assist any state or any community in bringing about better standardization. It will be interesting to you to know that the Public Safety Advisory Committee is probably going to present as its primary item of procedure for the coming year just this sort of work, indicating the extent to which the staff, officers and advisors of the Council believe this uniformity to be important in bringing about the results we all so much desire.

Let us have some discussion. Does anyone wish to ask any questions?

Mrs. HAROLD F. WHITE (Chicago Woman's Club, Chicago): I should like to ask Dr. Brown if he found in Kansas that there was much opposition to the examination feature of the license law. We found that a great stumbling block in Illinois.

Dr. EARLE G. BROWN: As the law was passed, the licenses are issued from July 1 to October 1, 1931, without examination. After October 1 the examinations are in the hands of sheriffs and police officers. Apparently little consideration was given to the examinations in passing the law. At least, that wasn't the cause of the delay in having it placed in force on the books. That was apparently caused by some political work.

CHAIRMAN MARSH: I should like to ask Mr. J. S. Baker to discuss this subject of the drivers' license law. The examination feature, I know, is one of the stumbling blocks, but I am sure that Mr. Baker can open your eyes, as he has opened mine, in the matter of why we are conducting the examinations and what we can hope to accomplish through them, and also some experiences he has had in going through the examinations in several states.

An Experience in Taking Drivers' License Examinations

J. S. BAKER (National Safety Council): I had an opportunity to take the examinations in nine states that have drivers' license laws. In no case did they know that I was a representative of the National Safety Council investigating examination procedures. I went as a candidate for license, as I would in Illinois.

Without an examination the law doesn't mean much, for two reasons. It doesn't set any standards for one to reach in becoming a driver. He simply applies, (as, for instance, in Indiana) at a designated place and gets a license. It means practically nothing if that driver doesn't examine himself and prepare himself for taking the examinations. He has not made a conscious attempt to learn to drive to meet a standard.

Commissioner Stoeckel has told us that in his state (Connecticut) they have improved their examination procedure by asking each driver when he comes up for examination, "Are you sure you are ready to take this examination?" He said the effect of that change in the procedure has been quite remarkable, that previously about 25 per cent of the people were failed on first examination. That doesn't mean that they don't get a license but they have to come back and try again. That has been cut in half, he said, simply because they know that question is to be put to them before they take the examination.

An examination doesn't have to be a psychological or psychiatric test to do that. After going through a few examinations and watching the examination procedures and noticing the accident results in those states that have license laws but no examination, I am convinced that without the examination, and a pretty fair examination, the law isn't worth while; it doesn't accomplish anything.

Then, the examination in itself is a big educational measure. The driver coming up may or may not be a good driver, but he sees what he must do, what he must be taught. If the examiner is of the type such as they are for the most part in Massachusetts and some other states, he will tell you what is wrong with your driving. If you don't pass the examination he will explain to you why. When a driver is let out on the road with some good advice like that he is a better driver. We also have the tremendously misleading impression among many people in states without the drivers' license law that the examination is some sort of inquisition, that you are made to do stunts that you normally would not do in driving, that you are put through psychological tests that are not only harrowing but unnecessary, that you have to stand for physical examinations and other things that are unpleasant.

That is not the case anywhere that I know of. Most of the examinations are extremely practical. You get a physical examination that is pretty much a size-up by the examiner. If you have a hand that shakes or a leg that has a crooked foot on it, or if you don't walk right or if you can't read a simple eye test, then the examiner goes further with you or he sends you to a superior officer of the department who determines whether you will be a safe driver for yourself and for other people.

The driving test is entirely practical. You are required to do certain right turns and left turns, drive up a hill and back down to find out whether you can shift gears well or not—in short, just how you drive. That is the most important part of the test, because after all, you are being examined to learn whether you can drive.

The license examination works this way: The person comes up and tries to take the examination. He is failed. He sees what is required of him and he goes back and does some serious practicing. When he comes up again he is a lot better driver. A woman, for example, presents herself for examination. She drives only when her husband will not handle the car. That means that possibly she drives once or twice a month. That isn't enough driving to keep her in practice. She is not a good driver. She probably never will be one without more training than driving once a month would give her. The examination stumps her, and rather than prepare to drive properly, she contents herself with not being permitted to drive those few times when her husband is not with her.

W. E. FELLER (Director of Safety Activities, Westchester Lighting Company, Mt. Vernon, N. Y.): What subsequent examination is given to the driver as to his continued mental or physical ability to drive safely? For example, I may take

the examination and pass but two or three years hence I may be totally unfit to drive because of my physical or mental condition.

MR. BAKER: As a rule that is provided for in this way: The law reads that the license will be good for one, two or three years and may then be reissued without examination at the discretion of the examiner. But if the commissioner wishes to do so he may re-examine. On the applicant's blank for renewal he must state that he is still in condition to drive. It would be impracticable to re-examine all the drivers, although it would be desirable. I believe it is Maryland now which requires an annual appearance of each driver over a certain age, so the driver who is approaching senility won't carry on too long without supervision.

If a man's driving habits come to the point where he begins to have any serious accidents, that is reported to the department. He can be watched rather carefully from that standpoint and asked to come up for examination. I know of no other way to get at the person who for some reason or other fails mentally or physically after the examination and during the period of license.

CHAIRMAN MARSH: The question of re-examination is one which is so far ahead of what we have in most states that although it has a very important bearing upon the problem and would be of great value in many cases, I think we must direct the majority of our attention to getting examinations in more states and then to improving their practicability.

F. C. BERRY (Mgr., Safety Dept., Automobile Club of Minneapolis, Minneapolis, Minn.): It has seemed to me that many of our most flagrant violators could pass the examination with the greatest facility. They are thoroughly competent, both physically and mentally. As a matter of fact, I think it is the driver with the "I don't care" attitude who is the most flagrant violator we have. Of course, in dealing with them the license law depends upon conviction, and presumably in a court of record, for certain serious offenses. I am wondering what success has been had in securing revocation of licenses of that type of driver.

CHAIRMAN MARSH: I can say that there is an increasing amount of license revocation and suspension in the states which are the most progressive in that line. In Pennsylvania, in the last legislative session there was inserted a section which permits the commissioner to go into the records of persons who are violators or who have had accidents, and make such further examinations and investigations as may be necessary to determine whether he should actually take action in those cases. The mere examination does not solve the entire problem, but it certainly does go a considerable way. It has an educational value and a practical value.

ST. MAYER (President, Automobile Club of Illinois, Chicago): Indiana now has the drivers' license law but it doesn't mean anything. I know that up to this year the Michigan law didn't mean anything. All of those states that have not adopted the drivers' license law are cursed because of the ignorance of the legislators. I want to suggest to the National Safety Council that it secure figures from those states that now have the drivers' license law and send information and literature to state senators and representatives, in those states that have not adopted such a law.

When the legislatures are in session these men have so much work to perform that all the literature we try to send at that time is wasted. The time to educate them is during the twelve months of the year. We could send it twice a month or once a month and keep on pounding into their heads what a drivers' license law will really mean. If we do that I think we are going to get somewhere.

T. E. FOWLER (Lieutenant of Police, Memphis, Tenn.): Suppose we have a man who is crippled and isn't fit to drive an automobile. He is a taxpayer. He wants to operate an automobile. He comes before the examining board and is told

he can't have a driver's license. Suppose he demands that he be given permission to drive. What procedure would you take to keep him off the highways?

CHAIRMAN MARSH: Of course, there are heavy penalties for driving without a license once the license law has been made operative. However, as with any other law, there are some people who successfully evade that law. In this case, if the individual runs into an accident it is always the practice for the officer to ask to see his first driver's license. Whereas it may be possible to evade the law, it is not very easy and it is not done very much. You will be able to control the individual by the fact that you can impose penalties and he will find it disadvantageous to be without that license.

J. H. LINDLER (Oshkosh, Wisconsin): Assuming now that we have all of our drivers passing properly a comprehensive examination, what is going to stop a continuance of the accidents? What is the reason for the existence of accidents on our streets and highways? Is there any fundamental reason for their occurrence?

CHAIRMAN MARSH: The gentleman has asked a question which, with difficulty, might be answered in a complete session of the Congress and we have attempted to cover that in the subject matter presented. The facts show that about a 30 per cent reduction in accidents is had in states with the drivers' license law, comparing them with states that do not have such a law.

There are many causes of accidents. Bad highway design is an important cause. Some motor vehicles fail, not very many in these days. But to get it all down quickly, it is well realized by those who are making the most intensive study of the problem that in the great majority of cases the cause lies within the individual driver himself, that human factor. The attack upon that human factor is one which the public safety officials of the National Safety Council are especially directing their attention to. I am going to ask Mr. Baker, who has been most active in that phase of the work of the National Safety Council, if he will state a little bit of what he sees in the future in answer to this very interesting question raised.

MR. BAKER: The problem resolves itself into one of how the drivers' license law reduces accidents. We know that it does. We know that in the states where they have the drivers' license law and examination the accidents have come down. Those are facts. I can only say that, aside from keeping out a certain number of obviously incompetent drivers, it is a matter of education. There is the mental uncertainty of the people driving, and it is an important factor. It is the most important factor in the accident, the failure of the individual to come through when he gets in a bad situation. The licensing sets up some standards in which these men must qualify. If they are turned down the first time they do some serious practicing. There is hanging over them all the time not only the fear that they will have their licenses taken away but the difficulties they will get into without having licenses. If they get into accidents and cannot produce driver's licenses the evidence is all against them.

ALEXANDER K. GAGE (Ass't. Prosecuting Attorney for Wayne County, Detroit, Mich.): A lot of people have an idea that the driving of an automobile is an inherent right. The gentleman from Tennessee asked what we are going to do with people who are taxpayers and think they have a right to drive automobiles on our streets and highways. The fact that you have a license law in your statutes, whether it be adequate or inadequate, is convincing proof that it is not a right but a privilege.

CHAIRMAN MARSH: Mr. Liegler asked a very broad question, the answer to which I told him the whole Council was working upon. I pointed out that a great part of the problem certainly related to the driver himself, and I thought it would be of interest to him, Mr. Williams, if you outlined what we are doing to delve into that field.

S. J. WILLIAMS (National Safety Council): This is a very large and complicated subject but to put this into a few words, all of our studies of accident causes on the highways—statistical, psychological and everything else—point to one thing. The big element in preventing highway accidents is to have some kind of effective control over the driver. We know that in a commercial fleet we can very greatly reduce the number of accidents. We can reduce them to a very low rate by exercising control over the driver, by training him, by supervising him, and by insisting that he shall not have accidents. The records of these big companies show that almost any driver can avoid accidents if he wants to. The great problem today is how to exercise the same sort of control over the private driver.

Again, without stopping to give you the proof, all of the evidence shows that the only way we can control our private driver at all effectively is through a state drivers' license law. The present state license laws will not control the private driver perfectly, of course. You are all familiar with our studies which indicate about a 29 or 30 per cent differential in favor of the licensed states. All of the discussions this week in our various committees have indicated that we must first have a license law as the one means of exercising control, and then we must build up and perfect the administration of that license law so as to make the control as effective and complete as possible.

If you have the license law, therefore, the next step is: What sort of examinations shall be given? What sort of control shall be exercised to get the best results? Very interesting work is going on in Massachusetts and Connecticut at this time in studying drivers and their accidents from the standpoint of the psychologist, to try to find out why certain drivers have more than their share of accidents or have accidents at all, to try to find out how that tendency can be corrected. If it appears that the tendency cannot be corrected, then take that driver off the highway by taking away his license.

That is a general outline of the program of control over the private driver as we see it. Get a license law and then develop scientifically and through experience, and psychological, statistical and other studies, the best means of administering that law.

Our Public Safety Advisory Committee meeting Tuesday evening reaffirmed its previous position to work for these license laws and decided that more control through license laws was probably the most important thing that the National Safety Council could work for at this time in the public safety field. We are hoping to make use of the experience that we have gained during the past year in license law campaigns. We have had experience in twenty-eight states in which we have tried to help the people pass a license law this present year. Five were successful. We haven't the money (and I don't think we would want to do it) to send lobbyists into every state capitol to work for a bill. That is a job of the local organizations. It is a job of the local safety organizations, the local chambers of commerce, motor clubs, women's organizations, public utilities, industries and everybody else who wants to save life. It is our job to show them how they can do it. We are going into that as much as we can. We are going to keep in touch with the departments administering the license laws where they now have them and try to carry back information from one to another, especially to assist the departments in the new states which are just starting to administer the law for the first time, so as to make sure that they get the best results from those laws.

CHAIRMAN MARSH: This ends the sessions for this year. We are not able from now on until next year to have the quick response which we can get in these meetings to questions we have in our minds, but I want to assure you that the National Safety Council, through its staff, stands ready to perform as perfectly

as may be done by correspondence and visits the same service which we get much more effectively here where we get all points brought out.

The Street and Highway Traffic Section has completed its sessions for this year. I hope that everyone will go on through the year with a greater enthusiasm so that next year we will have an even better meeting than before.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Traffic School

*Under Auspices of the Engineering Committee
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Tuesday Morning Session
October 13, 1931

What Has Parking Limitation Accomplished?

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The automobile's rapid development has outstripped the facilities for its use and has almost brought us to the ridiculous point where stopping a car is even more annoying than running it. Certainly there is no phase of the traffic problem which has caused more friction than the storage problem. It is the traffic subject which is constantly in the minds of the "city fathers", the business men, the engineer, and the individual motorist. The old story of the farmer who bought a car, started it, and drove around and around yelling for help because he could not stop it, has certainly been brought up to date. There are many cities today where a man could buy a car in the downtown district and have an equally difficult time stopping it.

Place of Parking in the Traffic Picture: There are three separate phases in the use of an automobile. Facilities must be provided for its movement, its loading and unloading, and its storage. While it is obvious that unless a car can be parked it is useless, still it must be admitted that this phase must give way to the more important phases of movement and loading and unloading whenever a conflict arises. In the past this "giving way" has been disproportionately unpopular because the emphasis has been upon the "restriction" with little or no compensation by way of providing facilities. The motorist himself has gotten into the wrong frame of mind by expecting to park at any time or place which he desires without regard to the rights of others or stopping to view the whole situation. This attitude must be changed and the parking of cars allocated to its proper place in the traffic picture if anything is to be accomplished.

Parking and Safety

Of the two generally accepted public rights, safety and convenience, the former must be conceded to be the more important. Thus it follows that wherever parking, by its location or manner, interferes with the safe operation of motor vehicles and causes accidents, it should be prohibited. In this regard, engineers are on the safest possible ground, for more support can be gained for safety than for convenience.

Let us analyze the disease and see where the parking germ is apt to cause an unhealthy condition.

Adjacent to Intersections: One of the most important factors in providing safety at the intersection is the visibility which the motorist is afforded as he approaches. It is obvious that the safe speed of approach is absolutely limited by the amount of visibility. The motorist must be able to see a vehicle coming from the cross street and from that point and time be able to stop before reaching the center of the intersection if he is to avoid a collision. If he cannot see an approaching vehicle until he is within 50 feet of the intersection and he is travelling at a rate of speed which requires 75 feet in which to stop, a collision is practically inevitable.

While some may say that the speed of approach can be regulated by law and enforcement, our modern speeds are so high that a minimum or marginal speed of approach results, below which all the law and enforcement in the world will prove ineffective. Motorists who are accustomed to driving 25, 30 or 35 miles per hour, even on city streets are not likely to slow down to 10 or 15 miles per hour at every intersection.

In business or residential areas the ultimate limitation on visibility at the intersection will be the buildings or other "fixed obstructions." There is no advantage in prohibiting parking farther back from the intersection than the line of sight permitted by the fixed obstruction. The rule then should be to prohibit parking back from the intersection a sufficient distance to prevent interference with the maximum line of sight permitted by the fixed obstruction on the corner of the intersection.

If vehicles are parked too close to the intersection they also hide pedestrians about to cross the street. The pedestrian never has a better chance to be run over than when he jumps out from behind the parked car.

Narrowing the Roadway: Streets and highways have improved so much that the motorist no longer expects to find any roadway so narrow that he cannot pass another moving vehicle safely. In fact there are exceedingly few such narrow roadways to be found today. However, not infrequently motorists are permitted to park on streets so narrow that their parking reduces the width available for travel to a point where the passage of two vehicles in opposite directions at the same time is impossible. This creates a condition for which the driver of the moving vehicle is not prepared and accidents frequently result. The rule should be that parking should be prohibited wherever it restricts the space available for moving traffic below that necessary for free way simultaneous movement, usually 20 feet. On most streets it is still possible to permit parking on one side.

Double Line Parking: Whenever a vehicle parks in the second line from the curb it blocks a lane which the moving vehicle is accustomed to using. A moving vehicle may have been using this lane for several blocks and when the driver unexpectedly finds his passage blocked he is unprepared and accidents frequently occur because of his inability to stop or because he is forced to turn sharply to the left and consequently crashes into the adjacent lane of moving vehicles. The rule should be that double line parking should not be permitted at any time or place. Double line parking usually indicates the need for loading zones or for a regulation permitting a more frequent turnover of parkers, or for better enforcement.

Angle Parking: Parking at an angle to the curb is usually more hazardous than parking parallel to it. The act of getting into and out of a space frequently takes more room, and less visibility is available to the driver. The rule should be that angle

parking should only be permitted on streets of sufficient width to permit two lanes in each direction, and only where the stalls have been marked off by lines. Under no condition should a vehicle be permitted to park with one end sticking out into the moving lane. This would cause the same type of accident as would a car parked in double line.

On Travelable Portion of Highway: On rural highways there is a considerable tendency for motorists to park on the improved surface rather than on the shoulder or entirely off the road. This again reduces the width available for travel, presents an unexpected obstruction to the approaching motorist, and is apt to cause accidents. The rule should be that parking should be prohibited on the improved or travelable portion of the highway.

Adjacent to Curves or Hills: Parking on the improved or travelable portion of the highway is particularly dangerous when it occurs immediately adjacent to curves or hills where it obscures the visibility or where the parked car itself is hidden. The motorist who comes around a curve or over a hill and suddenly finds a parked car partially in his way is apt to discover it too late to avoid an accident. On curves a row of parked cars is quite apt to reduce the visibility and thus restrict passing movements which might otherwise be safe. The rule should be that parking should be prohibited immediately adjacent to hills or curves whenever it reduces the maximum visibility permitted by the fixed obstructions.

Parking Opposite Street Car Tracks: Unfortunately most streets were not designed for street car tracks or lanes of uniform width. Thus parking opposite street car tracks leaves a space between the rails and the parking which is inadequate for moving traffic. Even though a vehicle can get through a six or seven foot opening the margin of safety is exceedingly small and the slightest miscalculation will cause an accident. It is recommended that parking be prohibited opposite street car tracks unless a full 10 foot lane is available for moving traffic between the rail and the parked cars. In any case so many accidents are apt to occur because of vehicles trying to pull away from the curb and forcing moving vehicles into the street car that parking can justifiably be prohibited even though a suitable lane is available. There is no more effective trap for the motorist than to tempt him to enter a narrow lane between a moving street car and parked vehicles. The street car can't move over and a parked car may pull out at any time.

Adjacent to Schools: A great proportion of accidents to children of school age are caused by children jumping out from behind parked cars. Since school yards are frequently play-grounds and children will chase balls into the street, or will cross in the middle of the block, the only sure way to remove the hazard is to remove the visual obstruction. It is recommended that parking be prohibited on the school side of streets immediately adjacent to schools and that such areas be designated as loading zones. This prohibited parking will serve to attract the attention of motorists and give them a much clearer vision of the children. I believe this plan has already been used in St. Paul.

Accidents Caused by Parking and Their Reduction by Limitation: Since certain parking causes accidents it naturally follows that the removal of that parking automatically prevents the accidents due to that specific cause. Unfortunately most of the available accident records do not cover this particular cause of accidents, and "before and after" studies or analyses are very scarce. However, the two large tables on page 86 show a few examples of the number of accidents in which parking is involved and cases where such accidents have been reduced.

Reduction of Accidents by "No-Parking Regulation: On the following page are given a few examples of where "no-parking" regulations have not only reduced congestion but accidents as well.

Chicago: The prohibition of parking in the Loop District of Chicago not only speeded up traffic but reduced accidents by 10 per cent over a five months period.

Pedestrians Stepping from Behind Parked Vehicles
The following sample states show the seriousness of this type of accident:

STATE	All Accidents	All Fatalities	Collision Between Auto and Pedestrians		Pedestrians Stepping from Behind Parked Cars		Pedestrians Hit by Vehicles Backing from the Curb		Adult Pedestrians Stepping from Behind Parked Cars (% of all Ped. Acci.)	Children Stepping from Behind Parked Cars (% of all Child. Acci.)
			No.	(% of all Fatalities)	No.	(% of all Ped. Acci.)	No.	(% of Ped. Fatalities)		
Kansas	1930		113	26%	9	8%	4	3.5%	19%	33.5%
New Jersey, May, 1931		434	862	15.8%	116	13.4%			16.3%	35.3%
Connecticut	1929			17.3%					18.6%	39.1%
Rhode Island	1929	4826		4.9%					26.4%	45.7%
	1930									

Parked or Standing Vehicles

The following are a few examples of accidents due to parking:

STATE	Total Accidents	Collision with Parked Cars		Caused by Careless Position in which Cars were Parked (% of All Acci.)	Double Parking or Stopping in Prohibited Areas (% of All Accidents)	Obstruction to View
		No.	% of Total			
Missouri	May, 1926 to Nov., 1930	829	2.48%	.109%	.95%	7.52% 10.7%
Quebec	1929	40,438	7.5%			
Oregon	1930	9,340	8.7%			

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Kansas City: Following the installation of a no-parking regulation covering the central business district the speed of all vehicles was increased 25 per cent and accidents were reduced from 40 to 60 per cent.

Entering or Leaving a Parking Space: The following indicate the accidents caused by motorists entering or leaving a parking space:

	Total Accidents	Accidents Analyzed	Caused by Entering a Parking Space	Caused by Leaving a Parking Space
Massachusetts 1930	36,301	4,987	.13%	.27%
Rhode Island 1929				1.07%
1930				.51%

New York's Accidents Due to Parking: The following gives some idea of New York's parking accident problem:

	1929		1930		1931 (6 Mos.)	
	Killed	Injured	Killed	Injured	Killed	Injured
Pedestrians coming from behind Parked Auto	15	399	22	539	6	309
Collision with Parked Auto	9	477	7	220	5	37

While there are not many facts available, there are enough to indicate that parking in many instances does have a definite effect upon accidents and that by prohibiting it where it does constitute a hazard the number of accidents can be reduced.

Parking and Congestion

Let us now consider the effect of parking upon congestion, rather loosely defined as the restriction of speed of movement below that usually maintained by contemporary street users.

Vehicles Entering Central Business Districts: In order to measure the relative seriousness of the congestion problem it is necessary to determine the number of automobiles and other vehicles entering the central business district and to relate it to the population, area of the district, and available parking at the curb and in garages and parking lots. TABLE I indicates the number of vehicles entering the business districts of 10 large cities. From this table it can be seen that the automobile enters different central business districts in different numbers, and carries varying proportions of the population into that area. The outstanding fact is that there are tremendous volumes of vehicles entering business districts daily and that the provisions for their movements, loading and unloading, and parking must be done on a very large scale.

Parking Facilities in Central Business Districts: Now, in view of this great number of vehicles entering the central business districts, let us consider the amount of parking space available for their use. TABLE II shows the parking capacity of the central business districts of 13 large cities, classified according to curb space, garage space, and parking lot space. A glance at this table showing capacity, and a quick comparison of it with table I, shows the futility under modern conditions of attempting to park all these cars at the curb. Even an exceedingly rapid turnover would not come anywhere near it. This is important because it definitely removes the curb space as a complete remedy for the parking problem. There is no case where the number of cars which can be stored at the curb comes anywhere near the capacity of the garages and lots in that same area. Having shown that the curb

space is of relatively small importance in supplying the demand for parking, let us now consider just how much of it the city can afford to give to its residents and what part must be reserved for the movement of vehicles.

TABLE I

Table Showing the Number of Vehicles Entering the Central Business District of 10 Large Cities From 7 a. m. to 7 p. m.

NAME OF CITY	Total Vehicles (Excluding Buses)	Passenger Automobiles	Percent of City's Population Entering (Excluding Pedestrians)		Percent of Passenger Vehicles Registered Entering
			By All Vehicles	By Pass Autos.	
Chicago	142,290 (e)	113,331 (f)	28.0	6.2	28.2
Philadelphia	117,995	79,315	36.0	6.7	34.3 (a)
Detroit	111,508	82,439	34.2	10.1	24.3 (a)
St. Louis	66,103 (s)	48,895	27.3	9.4	33.1 (b)
Baltimore	92,038 (g)	64,667	37.0	12.9	
Boston	89,801 (g)	65,656 (f&g)	72.2	16.4	65.7 (b)
Pittsburgh	50,186 (s)	39,477 (s)	48.8	11.0	22.0 (a)
San Francisco	78,426 (g&h)	58,482 (g)	55.9	14.3	54.9
Washington	152,051 (s)	130,893 (f&s)	72.2	46.6	90.3 (b)
Kansas City	84,470	69,775	58.8	27.9	80.2 (a)

NOTE: Pedestrians are not included in the above.

(a) County registration (g) Computed from 1/2 entering and leaving
(b) Estimated registration (h) Not including taxis.
(c) Includes horse-drawn (i) Adjusted for 7 a. m. to 7 p. m.
(f) Includes taxis

When should Parking be Prohibited: Parking is not a "right", it is a privilege, and it should only be granted when it does not conflict with the movement of the vehicle or its loading and unloading. If parking is permitted on both sides of the street, only a certain amount of space is left for travel. In most streets this means that half the width is used for travel and half for parking. As long as half the street can carry the load of movement and the other half the loading and unloading and parking everything is satisfactory. Usually, however, two factors step in to spoil this picture. In the first place, the flow of traffic is greater than the width available for movement (with parking) can carry. In the second place, the demand for loading and unloading becomes so great that the commercial vehicles are forced to double park, an action which cuts out another lane of movement. Usually, parking will have to give way to loading and unloading, long before it has to for movement.

Measuring the Demand for Parking Prohibition: The amount of traffic which enters the central business district can be compared to a reservoir of water. The

TABLE II
Table Showing the Parking Capacities of Central Business Districts of 13 Large Cities, Classified According to Curb Space, Garages and Lots

CITY	Approx. Year of Survey	Area of Business District	Total Capacity of Curb Space, No. of Automobiles	No. of Autos which can Park at Curb Under Existing Parking Regulations	Per Cent. Restricted	Capacity of Garages, No. of Automobiles	Capacity of "Lots," No. of Automobiles
Chicago	1930	0.85 sq. mi.	4,500 (a)	0	100	12,041	8,140
Philadelphia	1928	2.04	—	—	—	—	10,528
Detroit	1926	0.67	10,477	3,753	64.2	5,735	7,660
Los Angeles	1930	—	8,250	4,060	50.8	—	—
St. Louis	1930	0.99	—	1,699	—	14,417	2,057
Baltimore	1930	0.49	9,330	5,624	39.7	—	—
Boston	1927	0.88	5,964	3,233	46.0	14,106	3,340
Pittsburgh	1927	0.28	4,916	1,416	71.2	3,900	3,470
San Francisco	1930	—	5,323	2,242	57.9	4,810	1,156
Washington	1930	1.5	16,507	10,415	36.9	4,078	743
Kansas City	1930	0.38	8,409	4,315	48.7	7,622	7,543
Seattle	1931	—	1,470	1,100	25.2	475	355
Des Moines	1931	—	—	2,440	—	2,734	2,722

(a) Estimated.

TABLE III
Table Showing Actual Examples of Increased Facility of Vehicles due to "No-Parking" Regulations
B—Before, A—After, I—Increase.

CITY	Previous Regulation	New Regulation	Speed in Miles Per Hour					Saving in Time		Notes
			A	B	I	A	B	Street Cars	Vehicles	
1919 Olive St., St. Louis	No parking 8:30-9:30 and 4:30-5:30	Added no parking 9:30-10:30, making it from 8:30 to 10:30.	5.3	4.4	1.9%	4.4	4.0	41.200	41.200	Passengers entered and left on these streets. If each passenger walked 1/4 of the round trip, it would take 400 hours a day between 9:30 and 4:30, 7 hours.
Chicago	1 hour parking	No parking 7 a. m. to 6 p. m. except Sundays and 20 days.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
1928	1 hour parking	No parking 7 a. m. to 6 p. m. except Sundays and 20 days.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
1929	1 hour parking	No parking 7:30-9:30 and 4:30-5:30, except on Fayette St. and Lexington St.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
New York	1 hour parking	No parking 7:30-9:30 and 4:30-5:30, except on Fayette St. and Lexington St.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
Baltimore	1 hour parking	No parking 7:30-9:30 and 4:30-5:30, except on Fayette St. and Lexington St.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
1921	1 hour parking	No parking 7 a. m. to 6 p. m.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
New York	1 hour parking	No parking 7 a. m. to 6 p. m.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
New York	1 hour parking	No parking 7 a. m. to 6 p. m.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
Newark	1 hour parking	No parking 7 a. m. to 6 p. m.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.
St. Paul	1 hour parking	No parking 7 a. m. to 6 p. m.	5.9	7.0	16%	5.9	7.0	18%	18%	In addition the number of vehicles entering increased 11%, passenger cars 33%, Auto-rickshaws 11%, and Auto regulation increased 11%.

streets are the pipes which carry it away. Now if the amount of water becomes too great to pass through the existing pipes, you must either add more pipes or increase the size of the existing ones. In most cities the building of new streets is not economically possible. Therefore it becomes necessary, when the traffic flow becomes too heavy, to take back the privilege of parking and utilize that space for travel. It is suggested to the engineers that they measure the actual capacity of any street in question and then measure the demand—the number of vehicles which must get through there during a given period. If the capacity meets the demand then parking can remain, but if the demand exceeds the supply, then parking must go. If parking prohibitions were based upon "demand facts" of this kind there would be much less objection and opposition to it, as well as fewer cases of prohibiting parking where there is no need for it.

Before and After Studies: There is nothing more pitiful than a battle of opinions in Aldermanic Chambers over whether or not a "no-parking" regulation has improved the situation or made it worse. No parking regulation should be installed unless the traffic authority is prepared, and has the facilities to make an adequate study before and after to prove beyond a doubt the effect of the change. Unless this is done the man with the loudest voice or the one who can get the greater number of persons to the "hearing" will win his case regardless of the merits of it.

"No Parking" Has Reduced Delay: A study of Table III is enough to indicate the reduction of delay which has been brought about by the use of the "no-parking" regulation.

From the examples in Table III it is obvious that the introduction of "no-parking" regulations has increased the facility of street cars, busses, and private passenger automobiles. The figures shown are not in a refined shape and there is indicated a need for further and more comprehensive studies. No attempt is to be made in this paper to indicate the economic savings which have resulted. A casual glance indicates that they would be substantial.

Parking and Business

Perhaps the greatest objectors to the "no-parking" regulation have been the business men, and particularly the retail store owners. These groups have defeated "no-parking" regulations wherever possible, yet have acknowledged the decentralization which has begun by opening up branch stores outside the central business district. In several instances where "no-parking" regulations have been put in over their heads they have later indicated that no damage had been done to their business by erecting additions to their stores.

Patrons Arriving by Automobile: The average merchant objector at first placed himself in an awkward position by estimating that about half of his patrons came to the district in automobiles and that most of these parked at the curb. The Traffic Engineer's answer to this was to have fact-finding checks made. In fact in many instances he met the merchant more than half way and had the stores themselves make the check. A glance at TABLE IV shows the exposition of this once popular myth. It is believed that with these facts in mind the merchant will be more inclined to base his judgment upon facts and that his general attitude toward the traffic problem will be excellent. Table IV also shows a marked difference in cities indicating that each has different problems and that their solutions are not necessarily identical.

Who Does the Parking: In considering the effect of a "no-parking" regulation upon the various business houses the character of the person who parks must be considered. Unless he is a shopper, his prohibition cannot hurt the merchant. A study in Baltimore in 1928 analyzed 1,301 individual vehicles which were parked for more than four hours. It has found that 541 were business and professional men. TABLE V shows the classification of these owners. This indicates that a good many of the business men and their employees were deliberately competing with their

TABLE IV

Table Showing Percent of Patrons Arriving at Central District Business Houses by Various Modes of Transportation

CITY	From Curb Parked Automobiles	From Automobiles, Chauffeur Driven and Parked in Garages and Lots	Total From Automobiles	Pedestrians	From Public Vehicles
Chicago (a)	1.6	6.4	8.0	(c)	92.0
Pittsburgh	2.6	11.5	14.1	7.1	78.8
Boston	7.7	6.6	14.3	23.7	62.0
Philadelphia	9.0	8.3	17.3	14.1	68.6
Detroit	10.4	8.7	19.1	(c)	80.9
San Francisco	11.1	6.9	18.0	21.8	60.2
Kansas City, Mo.	10.9	21.7	32.6	5.5	61.9
Washington (b)	18.8	12.8	31.6	11.2	57.2

(a) Before prohibition of parking in loop.

(b) Percentage of total number of taxis—not patrons.

(c) Not counted.

Sources of Data: Chicago Street Traffic Survey, 1926, p. 159; Pittsburgh Central Business District Street Traffic Survey Part II, 1927, pp. 23-24, and Part I, Table J-G; Street Traffic Control Problem of Boston, 1928, p. 189; Philadelphia Traffic Survey, Report No. 2, 1929, p. 35; Detroit Traffic Survey Bureau Report, Part I, 1927, p. 8; Street Traffic Control Problem of San Francisco, 1927, p. 100; A Traffic Control Plan for Kansas City, 1926, p. 246; Parking and Garage Problem of the Central Business District of Washington, 1930, p. 47.

Excerpt from pages 15 and 16 of the "Parked Vehicle Survey" made in Baltimore in May, 1928, report dated August 31, 1928.

TABLE V

Table Showing the Non-Shopping Character of 541 Parking Regulation Violators

121	Executives, bankers and merchants
63	lawyers
56	salesmen
54	clerks
25	insurance agents
15	real estate agents
10	doctors
9	dentists
6	newspaper editors and employees
182	various occupations

541

patrons for curb space. TABLE VI shows how far these competitors were willing to walk from their parked cars to their businesses. A parking study in Washington showed that a large per cent of the long time parkers parked at 8, 8:30, or 9:00, before the stores opened.

There were 1,301 individual vehicles parked illegally more than 4 hours. 226 were

the occupants of all day prohibited parking spaces, while the remaining 1,075 were the occupants, with three exceptions, of two-hour parking spaces. These vehicles were identified by their registration plates and the business addresses of their owners were recorded, insofar as possible. It was found that 541 of these violators were people more or less active in the business and professional life of the city.

TABLE VI

Table Showing the Distance From the Point of Storage to the Business Address of the Owners was Found For 541 Vehicles

Distance, Blocks	No. of Vehicles	Per Cent	Accumulated Per Cent
Less than 1	204	37.6	37.6
Between 1 & 2	149	27.6	65.2
Between 2 & 3	49	9.1	74.3
Between 3 & 4	32	5.9	80.2
Between 4 & 5	32	5.9	86.1
Between 5 & 6	21	3.9	90.0
Between 6 & 7	15	2.8	92.8
Between 7 & 8	13	2.4	95.2
More than 8	26	4.8	100.0

From the above table it is apparent that the majority of these vehicles were stored in the public street at the point most convenient to the owners. This group of parkers showed a most flagrant disregard for the parking laws as well as a lack of public spirit and regard for the rights of others.

August 31, 1928.

Traffic Dept. United Ry. & Elec. Co., Baltimore, Md.

This favors a conclusion that they were not shoppers. A merchant can hardly be against a parking restriction on the grounds that it interferes with business if he himself as well as his employees are going to compete with his patrons for curb space.

Average Shopping Time: When the one-hour regulation was first introduced it was claimed that the shopper needed to have more time. Since then studies have indicated that considerably less time is needed. This naturally leads to the introduction of shorter time restrictions. Obviously the shorter the time which can efficiently be used the greater the potential turnover and the greater the number of persons who can be accommodated.

Effect of "No-Parking" on Business: In the last analysis it is the amount of business which the store does which is the true measure of the effect of a "no-parking" regulation. Let us consider a few cities where it has been tried.

Chicago: After the "no-parking" ordinance covering the entire "Loop" had been in force one year the following pertinent facts were discovered. (1) A prominent high-class restaurant was then planning an additional store, although the management had bitterly opposed the ordinance. (2) Three candy companies added 6 stores to their string during the year. (3) Two men's furnishing stores added three new locations. (4) A women's apparel company increased its shops from four to twelve during the same period. (5) A drug store chain added four places of business to the district within the year. (6) New office buildings continued to be built at a very rapid rate. (7) The property owner who made the most outstanding complaint against the enactment of the ordinance was building an addition to one of his buildings within the area. (8) The only merchant who continued to object had a store whose business and profit continued to climb.

Thus it is evident that in Chicago the "no-parking" ordinance had not decreased business. In fact the figures tend to show that it had improved it.

Baltimore: When a "no-parking" ordinance had been put into effect on two important streets a study was made of 15 representative establishments from 9 a. m. to 6 p. m. for a week before and two weeks afterward. Ten days after the regulation went into effect the study showed a weighted average of increase of 25 per cent in store patronage. A later count showed an increase of 5 per cent in spite of inclement weather for three of the days. Obviously "no-parking" had not ruined business in Baltimore.

These two examples tend to show that accessibility is a greater contributor to business than is the small amount of space at the curb available for parking. Let us now consider the attitude of merchants toward "no-parking" in a city where it has not yet been tried, to see what future exists for this regulation.

Los Angeles: The merchants' attitude toward "no-parking" for the central business district in Los Angeles might best be stated as "Let Well Enough Alone", as indicated by the Downtown Business Men's Association and the Retail Dry Goods Merchants' Association in their expression of being satisfied with existing regulations. Even this is not significant, for by a process of elimination only 49.2 per cent of the curb space is available for 45 minutes parking and "no-parking" is in effect over the entire district from 4:00 p. m. to 6:00 p. m. In contrast to the above groups, the Central Business District Association takes a definite stand in favor of no parking. A petition was circulated among the property owners and was signed 100 per cent for "no-parking." The petition circulated among the occupants of the ground floor showed 99 per cent to be in favor of "no-parking." Ninety per cent of the members of the Business Owners and Managers Association are in favor of "no-parking" from 7 a. m. to 6 p. m.

It is quite apparent that it is but a matter of time when a "no-parking" ordinance will be put into effect.

Conclusion: The conclusion, based on the facts previously discussed, would seem to be that the prohibition of parking over certain areas has been proved a success and that its use will continue to spread. It has been shown that the per cent of store patrons that come from vehicles parked at the curb is much smaller than the merchants originally estimated. It has been shown that the available space for parking is frequently used by business owners and their employees in direct competition with their customers. It is also known that the average shopping time is fairly short, probably around a half hour. However, the facts also show that there is a considerable variation in cities and that no regulation should be put in without an adequate study to show the facts. The art of parking surveys has progressed and it is anticipated that parking regulations will be more accurately applied to conditions, even though the restrictions continue to be stronger.

CHAIRMAN GOODRICH: Is there any legal aspect to the parking problem.

MR. HALSEY: There have been court decisions to show that parking is not a right but a privilege and also secondary to vehicular movement. Where movement is needed parking may be restricted.

MR. EATON: will you explain how to cut out all-day parking?

R. W. EATON (Traffic Engineer, Providence, R. I.): In Providence, close to the business district, is an aristocratic residential area. Residents complained that streets were blocked from early till late, and demanded a one-hour limit, that being the only kind they knew to cure the all-day parker. It seemed very costly to patrol about fourteen miles of street in the district limit; furthermore it would make offenders of those who have a right there (for instance, guests at social affairs), the very people whom we should accommodate.

Our present plan is to prohibit all parking from eight to ten which would be a check on the all-day parker and would enable one motorcycle officer to carry out enforcement over a large street mileage. It would injure few and help those who have a legitimate complaint.

E. W. BROWN (Ass't Sup't, Metropolitan Police, Washington, D. C.): Early this year we put a similar restriction in our business district from eight to nine-thirty which is very satisfactory in dealing with the all-day parker.

We have also a restriction on the traffic arteries to the business area from eight to nine-thirty on one side and from four to six on the other.

Experience shows that in an area where we get reasonable compliance with an hour-and-a-half or two-hour rule, we have less congestion because we have little double parking which accompanies the overtime parking. I believe overtime parking contributes to congestion and frequently causes accidents.

MR. HALSEY: Most studies indicate that the double parker is frequently a commercial vehicle, which shows a demand for loading zones rather than a change in the time limit.

MR. BROWN: We have loading zones but our trouble is with the private motorist who wants to shop and double parks for a few minutes, thus tying up a line of traffic.

MR. HALSEY: Then enforcement of the double parking regulation is more important than enforcement of over time parking because by blocking a lane the former causes more trouble than the latter.

O. A. PEARSON (Chairman, Street Traffic Comm., City Council, Minneapolis, Minn.): In Minneapolis, to eliminate double parking, we are experimenting with loading zones 175 or 200 feet apart in which we allow five-minute parking. The officer issues a tag at the end of fifteen minutes.

How long are the Washington loading zones Mr. Brown?

MR. BROWN: It depends on the particular business in the area. Sometimes they are eight or ten feet long, but one is a whole square which is used by wholesalers.

HAWLEY S. SIMPSON (Research Engineer, American Electric Railway Association, New York City): Disagreeing with Mr. Halsey, I believe that overtime parking is the cause of double parking and parking in prohibited zones. In Detroit only twenty per cent of the downtown parkers parked more than an hour, but they used sixty per cent of the street space and compelled others to double park, park near fire plugs, in loading zones, or in some other prohibited areas. If the long-time parker had been kept out there would have been space for everybody who wanted to park for a short time. To verify this conclusion I secured figures for Kansas City which proved to be almost identical; approximately twenty per cent of the motorists used sixty per cent of the street space.

CHAIRMAN GOODRICH: I made a survey in about twenty cities and found none where, if parking had been limited to thirty minutes or an hour, there would have been need for more space, even in the congested section.

BURTON W. MARSH (Traffic Engineer, Philadelphia, Penna.): Those who permit merchants to issue courtesy cars may think it a good idea, but though the merchant may say he will collect them and limit the number issued he loses some which reappear later in other places. The abuse grows. People go into a store, get the cards, and then park wherever they please. The whole practice is a special privilege idea, much to be avoided.

Another phase of parking which has not been discussed is the relation of enforcement to observance. In most cities with reasonable regulations it is with difficulty that calculated results can be secured.

Philadelphia, among other cities, is "tagging" successful. It is unpopular, but effective, especially on the many one-way streets with tracks in the center. I have been astounded to note how clear the left-hand side is during the peak and most other periods. Even those who have loading to do, clear out during the peak period, though legally they do not have to.

Most engineers who study the problem believe that we must gradually reduce or eliminate parking in business districts of large cities, yet in Philadelphia the result of our parking study was to relax restriction, because a blanket restriction,

not in accord with needs had been in effect. We developed some rough but valuable measuring sticks for parking restrictions:

1. We attempted to calculate how much flow would require one lane, how much two lanes, etc. We applied this measure to the whole district block by block for different periods of the day.

2. We evaluated loading requirements, and, if fifty per cent of the curb space was used for loading for any considerable time, we considered that no-parking regulations would be warranted.

3. A "time barrier," usually an important artery makes reservoir space needed on cross streets to store vehicles waiting for a gap in traffic or a change of the signal. Parking had to be regulated to provide such reservoir space.

4. We also eliminated parking which created slow speed zones where accurate time studies indicated their presence.

5. If studies show slight differences in restrictions for different blocks, there would be variegated restrictions over the district which would confuse the public. Therefore, we "smoothed out" the restrictions to give fairly uniform regulation.

F. C. LYNCH (Manager, Kansas City Safety Council, Kansas City, Mo.): In Kansas City, a new regulation providing generous loading zones but little parking space pleased the merchants because they could say they had one-hour parking; though fewer cars could legally be parked in certain blocks than under the old "no-parking" plan. We pointed out that under the present scheme parking facilities are nowhere nearly equal to what we had before, but they said, "We don't care whether there are facilities to park or not so long as the prospective customer feels that he can still park downtown. If he thinks he can not park, he will go to some suburban center where parking is permitted."

We found no merchant who would not agree that double parking must absolutely be eliminated but they could not see the sense of establishing terminal facilities for vehicles which, without parking restrictions, become double parkers.

We have a situation in Kansas City under which there is no fixing of tickets, believe it or not! There is a Republican police chief, appointed by the Governor, and a Democratic administration of the traffic court. We had reached the point where all Republicans were getting tickets fixed by the police department, and all Democrats by the court when they finally agreed, "If you will play square we will play square." I have actually seen our big political boss in Kansas City give his personal check to pay for the parking ticket of a friend to whom he was obligated.

With such a situation it is becoming a community habit to observe limited parking regulations. When people know that they will have to pay you do not have to spend so much time in giving them tickets. Hence, it doesn't take nearly as many officers to enforce the limited parking provisions as it did when we were fixing tickets at the rate of 25,000 or 30,000 a year.

We have officers who do nothing but run down those who have had a couple of tickets and give bad addresses. They hunt them up and bring them in, quite a contrast to three years ago when I found 43,000 tickets unpaid at one time. Now you cannot find any.

CHARLES GREENWOOD (Inspector of Traffic, Toronto Police Dep't., Toronto, Ontario, Canada): On May first this year we inaugurated no-parking from seven-thirty to nine-thirty; the results are highly creditable. Before issuing the order, we put up signs, district by district and the next morning we put out enough officers to enforce it. They allowed nobody to park. Everybody is now observing the regulation and the results are felt all through the twenty-four hours of the day. It practically eliminated the double parker. Now when you drive downtown from nine-thirty until four-thirty you can almost always find a place to park for thirty minutes or long enough to conduct your business and get out. From four-thirty to six, and from twelve to two on Saturday, the no-parking provision goes into effect again. We make them observe it by putting out as many patrols as necessary.

R. W. EATON (Providence, R. I.): We considered similar prohibition of downtown parking, but until I knew more of the people who park there I did not feel like imposing such a restriction. Consequently, last spring we made an extensive parking survey to get the history of every driver through the whole day,—where he worked, how long he was there, when he came out. By that means we found that those who parked from eight to nine, were using more street surface more than the rest, but not so much more that they were outstanding. If they are on legitimate business (and it is reasonable to assume that they are) why should we disturb them, unless they are *all-day* parkers? If enforcement is what it ought to be, why should that regulation be necessary? The important thing is freedom of traffic flow downtown in the morning. If people are not down town between eight and nine to park all day or for longer than necessary to conduct their business, should we require them to stay out except when street space is needed for moving traffic.

MR. HALSEY: The traffic departments should have courses in diplomacy. Frequently, they go at things from the engineering angle and do not solicit the support of merchants. Would it not be better if the traffic engineer tried to work with them from the beginning? The merchant has to be shown the facts: you can get him to help more if you show them to him.

MR. SIMPSON: The only way to secure the cooperation of merchants is to scare them. Draw up a parking regulation so strict that they cannot bear even to think about it. They will counter and you can compromise to get what you want. We started with a 15-minute period, for example, and the merchants raised it to thirty minutes and were satisfied.

ADJOURNMENT

Wednesday Morning Session
October 14, 1931

Accident Clinic

By HAWLEY S. SIMPSON

Research Engineer, American Electric Railway Association, New York City

I shall talk about specific accident-prone intersections; analyze the general causes of accidents at those points, and, with your assistance, determine, if possible, proper remedies to be applied. We may not be able, with the information available to determine the most appropriate remedy, but at least it will be possible to indicate in some detail the methods by which accident-prone intersections may be analyzed.

What is an accident-prone intersection? It is one of extra hazard where more than the normal number of accidents occur. But we may ask: what is the normal number of accidents which should occur at an intersection? No one knows!

Let us take a city in which there are 1000 identical intersections. Every condition at any of the 1000 is identical with those at all of the other 999. There is the same degree of vision, the same pavement width, the same character of pavement, the same kind of signals and the same traffic volume.

If there were such a community, accidents would still occur more frequently in some places than in others. There would be some intersections which would have no accidents, some which would have one accident, and still others which would have two, three, four and five accidents, if it is assumed that accidents are distributed solely by the law of chance.

Table I shows the probable distribution of accidents at 1000 intersections assuming that the intersections are all alike and that accidents occur by chance alone. The first column shows the number of accidents, and the second, third and fourth columns show the probable number of intersections which would experience the number of accidents indicated in the first column, if the total number of accidents were 1000, 2000 and 3000, respectively.

Table I—"Probable" Distribution of Accidents at 1000 Intersections

Chance Number of Intersections Having the Number of Accidents Shown in First Column When the Total Number of Accidents is

No. of Accidents	1000	2000	3000
0	366	134	49
1	370	271	149
2	185	272	224
3	61	181	225
4	15	90	170
5	3	36	101
6	0	12	50
7		3	21
8		1	7
9		0	3
10			1
11			0

An investigation of the place of occurrence of more than 7000 accidents in East Orange, Irvington, Montclair and Bloomfield, New Jersey in the years 1928, 1929 and 1930 was conducted under the direction of Wm. A. Stickel, Engineer of Essex County, N. J., to secure actual data for comparison with the preceding table. The survey showed that the distribution was *not* similar to that shown in Table I.

Only about 60 per cent of the intersections at which it is "probable" that accidents would occur, actually experienced accidents. Analysis showed further that the number of accidents actually occurring at a certain percentage of the intersections was more than twice the "chance" number.

A special analysis of the high-accident group was made and it was found that from 3.5 per cent to 13.5 per cent of the total number of intersections actually had more than 5 accidents when the "chance" range was from 0.0 per cent to 3.0 per cent.

To me the wide difference in these figures is convincing proof that the special individual characteristics of different intersections have been responsible for much of their accident-proneness. The real question is: Can we deal with these factors, so modifying or even eliminating them, that the tendency to accident-proneness may be lessened?

Returning to discuss intersections which have more than 5 accidents per year, it was found that no more than 14 per cent are in this class. This is a small percentage of the total and one might ask whether it is significant. It certainly is because a large percentage of all accidents take place at the intersections within this group as shown in Table II.

Table II.—Analysis of Intersections having had more than Five Accidents (Five New Jersey Cities—1928, 1929, 1930)

City	Per Cent of Intersections Having more than Five Accidents per Year	Per Cent of Accidents Occurring at Intersections Having More Than Five Accidents per Year
Bloomfield	2.5%	39.4%
Montclair	4.1%	40.2%
Irvington	3.5%	33.2%
East Orange	11.3%	60.9%

You will remember that Dr. Bingham said yesterday that five per cent of the drivers cause 35 per cent of the accidents.

Today we have discovered another equally valuable fact; that 3 to 10 per cent of the intersections are the scene of 35 to 60 per cent of the accidents. Dr. Bingham suggested that instead of dissipating our educational efforts over all drivers we should pick out the really bad ones and give them intensive courses in safe driving practices.

Similarly, it is suggested by engineers studying the traffic problem that this same line of attack can be pursued with respect to accident-prone intersections. Efforts should be concentrated upon the small group of intersections having a large number of accidents. Thus we have the opportunity of reducing the accident toll more appreciably than by any other method of attack.

Having attempted to show that the intersection characteristics have an important influence on the accident record, we must, next know what the most important of these characteristics are which should be investigated.

With the helpful cooperation of Peter J. Stupka, Accident Analysis Engineer Traffic Engineering Bureau, Philadelphia, the accompanying tabulation has been prepared. (See page 100.) On it is listed the different things about which detailed information is desirable or necessary before the accident study is begun.

It is not enough to go out to the intersection and give it a casual inspection. *We must first know the facts*; how accidents have occurred, how many there have been, what are the traffic volumes, how good is the vision? With this information in hand, as well as data on all other salient matters indicated in the immediately preceding table, real progress in accident prevention can be made.

Information Needed in the Preparation of Collision Diagrams and the Analysis of Hazardous Intersections

- | | |
|--|---|
| I. PHYSICAL CHARACTERISTICS
1. Street Widths
2. Pavement Widths
3. Sidewalk Widths
4. Curb Radii
5. Street Grades
6. Pavement Surfaces
7. Location and Character of all Obstructions to:
a. Vehicle Movement
b. Pedestrian Movement
c. Vision | III. TRAFFIC CHARACTERISTICS
1. Vehicle Traffic
a. Daily Traffic Volume
b. A. M. & P. M. Peak Traffic Volume
c. Week-end Traffic Volume
d. Turning Movements
e. Street Car and Bus Volume
f. Approach Speeds |
| II. GENERAL CHARACTERISTICS
1. Character of District
2. Character of Buildings at Intersections
3. Existing Traffic Regulations
4. Location of Lines and Stops of:
a. Street Cars
b. Buses
5. Location of Taxicab Stands | IV. ACCIDENT CHARACTERISTICS
1. For each accident show:
a. Degree of seriousness
b. Direction of Travel of Vehicles
c. Direction of Pedestrian Travel
d. Speed of Vehicle Travel
e. Time of Occurrence
f. Weather
g. Condition of Street Surface
h. Brief Summary of Other Pertinent Data |

A number of collision diagrams have been presented. We shall try to determine what has caused the accidents at these points. I shall present the problem showing what has happened, and then ask you to suggest a solution.

Fig. 1. Is an intersection in Pittsburgh. Baum Blvd. is a heavily traveled street, with about six moving lanes of traffic. Melvale Ave. has about four moving lanes of traffic, of which two are occupied by street car tracks. The traffic volumes at this intersection from four-thirty to six p. m. are as follows. 1122 cars moved eastward. Of these, some turned left and some right, but the volume was practically negligible. 1142 cars moved west. Moving south, there were 235 cars, and moving north, 105 cars. That is a total of 2604 cars through this intersection in an hour and a half, an average in excess of 1723 cars per hour, which may be conceded to be fairly heavy traffic.

From January 1, 1928 to February 12, 1930, a period of 25 months, there had been 18 reported accidents, an average of about 9 accidents each year.

On the diagram are shown some of the details of these accidents: the direction of vehicle travel at the time of accident, and in addition the time of day at which each accident occurred.

You will note that the majority of the accidents have been right-angle collision accidents, with a scattering of side swipes, pedestrian accidents, and rear-end collisions. Summarized, there have been 5 right-angle collisions; 2 rear-end collisions; 5 collisions involving cutting in; one collision caused by skidding; 5 pedestrian accidents, and one left turn accident.

It is obvious that traffic movement is disorganized. What can be done at this intersection to reorganize the traffic to reduce right-angle collisions, collisions between pedestrians and vehicles, left-turn collisions perhaps, rear-end collisions

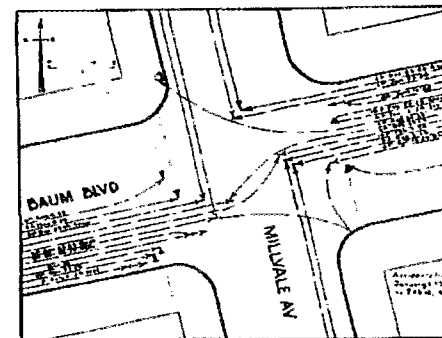


Figure 1

perhaps, and collisions due to motorists skidding or moving in directions which are unexpected by the motorist coming from the opposite direction?

Has anyone a suggestion? Remember, there are almost 1750 cars per hour passing through this intersection. The Massachusetts traffic code states that when 500 vehicles per hour pass through an intersection and when one-quarter come from the side streets, a study of the advantages of a traffic signal installation may profitably be made. The New Jersey traffic code uses as its standard 1000 cars instead of 500.

Here we have 1750 cars, approximately, per hour, but only about 13 per cent come from the cross streets. Does it fall into the classification that I have just mentioned, or does it not? Do you think a traffic signal would be warranted, considering the very light traffic on the two cross streets?

CHAIRMAN GOODRICH: Put up a stop sign at the cross streets.

MR. SIMPSON: There are more than 1300 cars per hour moving on Baum Blvd. How many opportunities would be presented for the cross street motorists to enter this fairly heavy traffic if they first had to come to a stop?

CHAIRMAN GOODRICH: Very few.

MR. SIMPSON: Is there another answer?

E. W. BROWN (Asst. Supt., Metropolitan Police, Washington, D. C.): Install signals properly timed to take care of the volume of traffic on both the main artery and the cross street.

R. W. EATON (Traffic Engineer, Providence, R. I.): It seems to me that we ought to know something about whether there is heavy pedestrian traffic at the intersection.

MR. SIMPSON: I am very glad you brought that point up because, as you will note on the memorandum of required information that this is one of the items about which we must have information before an intelligent analysis can be made. In this particular instance I have no information whatsoever as to the pedestrian volume. Mr. Marsh, can you tell us something regarding the pedestrian traffic at this intersection?

MR. MARSH (Philadelphia, Penna.): I would say it is fairly light.

MR. EATON: I think under those circumstances that a traffic-actuated signal should

be used there. I think it would reasonably well take care of a moderate volume of pedestrian traffic.

CHAIRMAN GOODRICH: There were two rear-end collisions there as I remember it; would the traffic light stop those?

Mr. SIMPSON: No; the traffic light would probably cause more rear-end collisions immediately after the signal is installed but it would tend to reduce the greater number of right-angle collisions, which are undoubtedly more serious.

Mr. EATON: I would expect that the rear-end collisions, for a time at least, would be increased in number by the signal installation, but I do not think they would affect the general situation much.

Mr. SIMPSON: The point was brought out at one of the meetings of the Institute of Traffic Engineers that rear-end collisions often mounted to a rather high total immediately following the installation of traffic signals, but rapidly dropped off as motorists became acquainted with the fact of the signal.

Time will not permit us to discuss this particular diagram longer. The solution as suggested by several of the speakers; the installation of a traffic signal is what was actually done. The signal is a pre-timed or fixed time traffic signal in a flexible, progressive system. In the eighteen months after the signal was put in there were only two reported accidents; one rear-end collision and one right angle collision occurring at six a. m.; probably when the signal was on flashing operation.

We now have another intersection, also from Pittsburgh. These two cases were selected for a particular purpose. The one we have just discussed shows the proper application of a traffic signal, followed by an actual reduction in the accident toll. On the other hand, the one we are about to discuss is one where there are traffic signals in operation but which has had a very large number of accidents.

There has been, at this intersection, a total of 35 accidents in three years and eight months, about ten accidents per year. See Figure 2.

The traffic volume here is somewhat lighter than at the point we have just been discussing equaling 3728 cars in two and one-half hours or about 1,500 per hour. There is an exit from the park into Forbes St., which latter carries two lines of car tracks, and crosses another fairly heavily traveled street, Bigelow Boulevard. Bigelow Boulevard is a one-way street south-bound south of Forbes St. The signal is a two-period fixed-time light, not connected with other signals. Traffic on Forbes Street moves east and west during one period and the traffic coming out of Bigelow Boulevard moves on the other period. In addition, traffic coming from the park moves north into Bigelow Boulevard, or turns right or left into Forbes Street at the same time traffic is moving on Bigelow Boulevard. The traffic turning left from the park is not very heavy; only about 60 cars an hour. The idea is that this small number can weave through the somewhat heavier traffic coming from Bigelow Boulevard. The left turning cars are called upon to cross the path of cars coming from Bigelow Boulevard. Obviously, it would be possible, if all drivers moved with appropriate caution, for 60 cars to feed through 320 cars an hour, but such apparently is not the case. As you look at the angle with which cars enter the intersection from the park, it is obvious that their speed of operation is likely to be higher than a safe speed at this particular intersection. In my opinion the reason that so many motorists coming from the park have collided with those from Bigelow Boulevard is because the speed of approach is too high for the conditions.

The number of accidents involving these left turning cars is 18 out of a total of 35; yet, only about four per cent of all the traffic at this intersection comes from the park and turns left.

Is there anyone who believes he sees how such a situation could be corrected, either by a change in type of traffic signal, by a change in layout of the intersection or by other means?

J. V. RYAN (Captain of Traffic, Richmond, Virginia): I would suggest that the left turn be cut out.

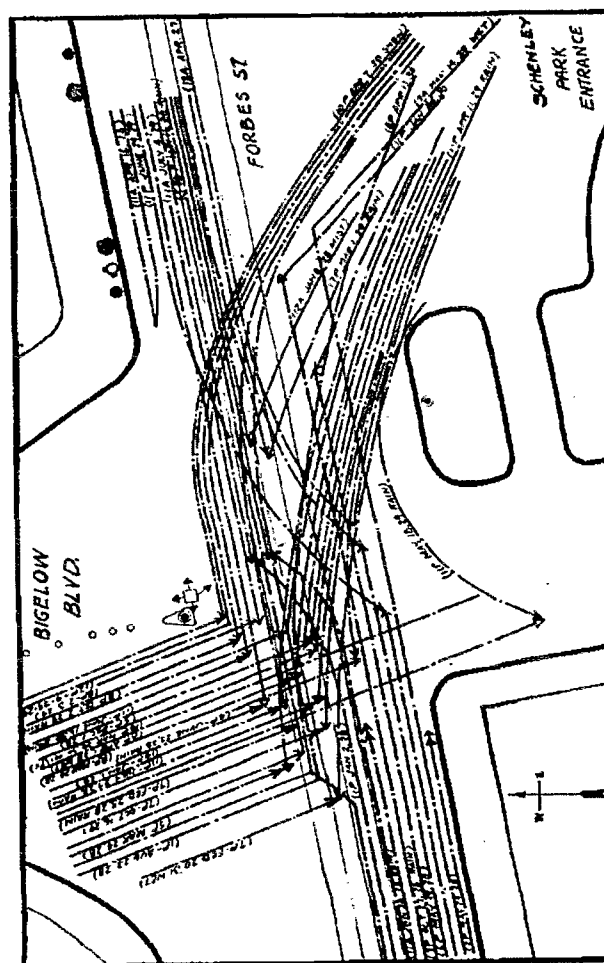


Figure 2

CHAIRMAN GOODRICH: Do you mean to take them across Forbes Street and then permit them to turn on the north side of the signal.

Mr. RYAN: No; let them go directly into Bigelow Boulevard and turn left at the first street north of Forbes Street.

D. M. McNEIL (Ass't Traffic Engineer, Pittsburgh): The street you suggest is not adequate to take care of the additional traffic.

CHAIRMAN GOODRICH: Why not put in a large traffic circle? Let the car tracks go straight through, but require all vehicular traffic to pass around it? You might have to cut back the curbs at the southwest corner if this were done.

Mr. McNEIL (Pittsburgh): That is one possibility. However, we can not take any of the corner off as you suggest as the new University of Pittsburgh building is at that point. We do not believe it wise to put in a three-street control because of the traffic density.

Mr. EATON: Would it not be possible to delay that left turn movement until the cars from Bigelow Boulevard pass through the intersection. It is the left turning cars passing through the middle of the traffic platoon on Bigelow Boulevard which cause the collisions now.

CHAIRMAN GOODRICH: How would you delay the traffic?

Mr. EATON: By placing a signal so as to hold traffic from the park in a storage space on Forbes Street and releasing it at the end of the signal interval on Bigelow Boulevard, or, on the other hand an illuminated sign might be used to inform the motorist that he cannot turn left so long as Bigelow Avenue traffic has the green.

CHAIRMAN GOODRICH: Has anybody else a suggestion to make?

OTTO K. JELINEK (Traffic Engineer, South Park Commission, Chicago): Is the signal light right in the center of those three drives?

Mr. McNEIL: The signal is on a street light post which is on the island. The island existed before the signal was installed.

Mr. JELINEK: I believe one of the troubles is that the signal light cannot be seen. Perhaps it is too far away, from the intersection. If you had separate signals on the curbs I believe it would solve much of your trouble.

This intersection is typical of a great many intersections in the South Park System. We find that a light in the center of the intersection is not practicable. Therefore it would be better if you had separate signals at proper heights, so that the motorist would see the signals at some distance before reaching the intersection.

LEON R. BROWN (Chairman, Traffic Committee, Rochester Engineering Society, Rochester, N. Y.): There is a possibility that the accidents are being caused by the high speed of cars coming out from the park. Perhaps that situation could be improved by making those cars come to a full stop before entering the intersection.

Mr. McNEIL: I doubt whether those accidents are caused largely on account of speeding. I think they were caused partially by speeding and partially because of the lack of courtesy on the part of drivers coming from Bigelow Boulevard in not permitting the motorists from the park to execute the left turn.

Mr. SIMPSON: In addition to speed and lack of courtesy, undoubtedly the angle at which cars from the park meet these from Bigelow Boulevard has something to do with the situation.

J. W. A. BOLLONG (Traffic Engineer, Seattle, Wash.): Is there a lens on the southerly side of that pedestal signal on the island pointing toward the park?

Mr. McNEIL (Pittsburgh): There is.

Mr. BOLLONG: I would suggest that a signal be installed directly to the north of the park exit on the north curb of Forbes Street, and that the left turn traffic be made to come to a stop in Forbes Street facing west and proceed only when traffic is again permitted to move on Forbes Street.

Mr. SIMPSON: There have been two suggestions for improving the situation. Mr. Eaton suggested that traffic from the park be held by the use of a signal opposite the park exit and permitted to cross Bigelow Boulevard traffic at the end of the

period of green on Bigelow Boulevard. In other words, the front of the traffic platoon will reach the intersection at the time the end of the procession on Bigelow Boulevard has passed.

Mr. Bollong has suggested that the traffic from the park be held at the park exit and allowed to enter Forbes Street in advance of the traffic on Forbes Street. Either of these two suggestions might be applicable. There is no material difference between them.

CHAIRMAN GOODRICH: At one intersection we studied some years ago where there was an offset very much like this, except that there was no continuation of Bigelow Boulevard south of Forbes Street. Putting in two lights was suggested, one opposite the park entrance and one opposite Bigelow Boulevard. Traffic from the park and traffic moving west on Forbes Street would move on one portion of the cycle and traffic from Bigelow Boulevard and that east bound on Forbes Street would move on the other portion. That would eliminate entirely all conflicting traffic so far as I can see. In this particular case a similar plan could be used by blocking off the park entrance opposite Bigelow Boulevard and making traffic come in through the exit and then right turn around the little island and back into the park entrance.

Mr. BROWN: We have a somewhat similar situation where we have just installed a traffic actuated signal. I was wondering if that wouldn't be possible here.

We seldom use the center of the street for signal lights. I would be interested to know if signal lights could not be placed at the southwest and northeast corners, with a special left-turn movement for traffic coming out of this park, at the same time holding the other traffic.

We have just installed a traffic actuated signal at an intersection with a special left-turn indication. To operate successfully the traffic must be lanced; the left turn vehicles must move only in the center and get their left turn signal at the same time the red light stops the other traffic. I think it could be worked out very satisfactorily.

Mr. McNEIL: That would result in a three-period control. We hesitate to do that here except as a last resource because of the delay which might result on account of the heavy traffic volume.

Mr. BROWN: This is similar to the one we had at Wisconsin and Massachusetts Avenues in Washington. We were able to put in a left-turn and hold back the other traffic successfully.

Mr. SIMPSON: I am of the opinion that the suggestions made by Messrs. Bollong and Eaton are practicable. The traffic can be reorganized and lanced so that it leaves the park at right angles to Forbes Street. An additional signal will be placed directly to the north. Vehicles from the park can be allowed to enter Forbes Street while traffic on the latter street is held by the red, and then turn left until stopped by the existing signal. It is thus obvious that the traffic from Schenley Park will be under positive control and can proceed ahead of the traffic on Forbes Street when released by the green signal.

Are there any other suggestions better than the ones that have been made?

W. B. POWELL (Consulting Engineer, Buffalo, N. Y.): In the discussion we have omitted several accidents; the left turns into Bigelow Boulevard and Schenley Park. It looks to me like a four-cycle operation rather than a three-cycle operation.

Mr. SIMPSON: I doubt whether four-cycle operation is what is needed, because it would tend to congest traffic for the convenience of the very small percentage of left turning cars. If two additional periods are inserted in the system, the added delays to through traffic will tend to create impatience on the part of the motorists. The suggestion you have made would undoubtedly prevent left turn accidents, but the point I want to make is the impatience of the motorists at the extra delay involved might encourage other accidents of equal severity.

Mr. POWELL: The fact is that everybody in this discussion has disregarded the left turn accidents on the diagram, which are collisions of vehicles on Forbes Street

with left turning movements not coming out of the park. I think some consideration should be given to that problem.

Mr. SIMPSON: I believe the most important thing to do just is to clear up the situation with respect to the left turns from the park. After that is done and the results determined it may be found that there are other modifications in the type of signal operation which ought to be undertaken.

Mr. BROWN: I believe many accidents are due to wild driving. It might be that a policeman would have a very good effect.

(Two other collision diagrams, one at Kensington Ave. and Torsdale Ave. in Philadelphia and the other on the Boston to Worcester, Mass., highway were similarly discussed before adjournment at nine-thirty o'clock.)

ADJOURNMENT

Thursday Morning Session
October 15, 1931

Training of Traffic Officers

By EDWARD A. MITTE

Director of Traffic, Detroit Police Department, Detroit, Mich.

Proper training of traffic officers should not be neglected by any Police Department, although there is no doubt that the widespread use of automatic signals has caused neglect in the attention that should be given to this training.

The subject should be divided into two parts; first, the selection of men for traffic duty; and, second, the training to be given them. Selection is more important than training, as it is very easy to make a good patrolman with very little training into an "A 1" Traffic Officer; whereas no amount of training can make a good and efficient officer from poor material. I will cite the methods as followed by the Detroit Police Department which I have found to be most efficient:

(1) Men are selected in two ways; first, from the large number of applications always on file in the Traffic Division from officers doing patrol duty in the Precincts and second by lieutenants and sergeants of the Traffic Division who visit the Precinct Stations at roll call and note the badge number of desirable looking men. These badge numbers are afterward checked at Police Headquarters in the records and the name of the officer ascertained and his record looked up.

(2) The applicant should be of good physical appearance, straight, and not stoop-shouldered, neat about his clothing, clean shaven, no stomach, and of military bearing, not slovenly in walk or movements, and not less than 5 feet 11 inches in height. An officer's good appearance always commands admiration and respect on a corner.

(3) The applicant should be of even temperment and slow to anger, always in control of himself and of any situation that may arise. He will find himself the target for abuse and criticism from the motoring public, and in the business center of any city, where a crowd soon gathers, it is absolutely necessary that the Officer has control of himself and he then can easily command the respect of the crowd. What he needs mostly is what is commonly known as good "horse sense" and good judgment.

(4) Every effort should be made to obtain men of good education, if possible men who have had some high school education or who have attended a business school after finishing the grammar grades, or who have otherwise obtained an education that gives them a good command of the English language, as the language of the officer and his tone of voice have much to do in forming the opinion of the public, and especially of visitors, as to what calibre of men you are selecting for your Police Department. As you know, it is not so much what the officer says as the way he says it that the public resents and takes offense at.

I look forward to a time in the near future when a standard of education will be set for all applicants for the Police Departments, as well as a good physical examination and a good reputation; and when this is done a better class of men will be available to select from and the intelligence of your traffic officers will be raised.

Due to the good salary paid the Detroit police officers in the last few years, we have been fortunate in having a good class of candidates to select from. Young men of good education and intelligence are now being attracted to the Police Department. The police business is getting to be recognized now not as a job, but as a profession.

(5) In judging men for the Traffic Division, his family life should be considered, as it is very important. If the man is married and has children, and his family life

is pleasant, he will be more than likely to report for duty in a pleasant frame of mind. On the other hand, if his family life is unpleasant, more than likely the Officer will report for duty with a grouse on, and will take it out on the motoring public or any other person who happens to cross his path. Married men with happy families are not so apt to pay attention to the wiles and smiles of the lady motorist and cause trouble for himself and his department. In selecting single men for the Traffic Squad much care should be exercised. Single men of good reputation and habits only should be selected. No man should be selected who has the reputation of being what is commonly known as a "skirt chaser," for he will soon bring discredit on his department by spending more time with the ladies than he devotes to the business assigned to him.

(6) The length of service that an officer has seen is important, and should be considered. No man should be considered for the Traffic Squad who has not been a regular patrolman for two years or more, as he requires that length of service to give him the necessary confidence and poise to make a good officer; and after being transferred for traffic duty, he should be put on a thirty-day probationary period for observation by the lieutenants and sergeants of the Traffic Squad, and if their reports are unfavorable, he should be immediately sent back to the Precinct for patrol duty, as an undesirable officer can cause the director of traffic a lot of grief in the way of complaints from the public.

(7) The most important consideration of all in selecting men for the Traffic Division, and especially the Motorcycle Division, is the reputation the applicant bears for truth and honesty. It is important that he be truthful in the giving of testimony, in the prosecution of his cases in court, and not inclined to stretch his testimony just a little to secure a conviction. This point should be impressed upon the new officer. The officer should be honest and above-board in his dealings with the public. He should be above the promiscuous giving out of violation tickets for a record, which act gives the public the impression that the Traffic Squad is on a production basis. The officer should be instructed that if a motorist commits a flagrant violation or it appears that the violation was intentional, then by all means the Officer should give him a ticket. If it appears that the motorist thinks himself smart and tries to put something over, he should be given a ticket. On the other hand, if the officer sees a violation was unavoidable, unintentional, or done through ignorance, he should then show his good training by calling it to the attention of the motorist in a pleasant manner and not issue a ticket. The officer should not attempt to hold an open session of court on the highway, haul out the motorist to his humiliation. An end should be put to the so-called "hard boiled" traffic cop. The officer should be honest in making out the violation ticket and so instructed; and not make any change in the ticket without notifying his superior officer.

With the aid of a strong magnifying glass, we have been able to detect a number of tickets where an erasure was made and a serious violation changed to a minor one. These were all investigated, and if proof was evident of money having passed, the officer was dismissed from the department. In other cases we found that the change was made through friendship of a motorist with some other police officer, or the officer allowed his sympathy to sway him when the motorist gave him a hard-luck story. These officers were disciplined.

(8) The importance of being courteous to all motorists and to the public should be impressed upon every Officer. The Detroit Police Department demands that the Officers be courteous; and if we find after complaints that an officer is not, he is transferred from the Traffic Division. I note all of the larger police departments throughout the country are impressing the importance of courtesy on their traffic officers, as it attracts the motorist from afar and means increased business for the merchants.

All traffic officers should be instructed in the proper manner of giving signals and directing traffic, and they should be uniform throughout the department. Other-

wise, the public becomes confused. Clownish actions and signals on the part of a traffic officer makes him appear ridiculous, and they should not be tolerated.

The officer should be instructed as to his position when directing traffic, and stand in a straight and military manner; and if he is operating a hand-traffic light, he should not lounge and hang onto the semaphore; neither should he chew gum or tobacco while on duty.

All traffic officers should write and turn in to their superior officers at least once a week a section of the traffic code, as only in this way can they become familiar with traffic regulations. If it is left to the officer to read, he neglects it; and we have found that by setting a lesson for one day a week and having each officer submit it in writing for correction that it is the most effective way of checking to see that our officers become more familiar with the traffic regulations.

To cause the officers to become better acquainted with the location of public buildings, large office buildings and manufacturing plants, five minutes should be devoted at each roll call to questioning different officers as to the location of some building or manufacturing plant and the street car or bus line to reach there.

All traffic officers owe a responsibility to the public for their conduct, and they should set an example to the motoring public when they themselves are operating a motor vehicle, especially in uniform.

(9) There was a lack of uniformity in the signals given by men in the different Police Precincts not attached to the Traffic Division, these men are assigned to intersection duty during rush hours, and to "school traffic" duty.

To correct their signals, sergeants and lieutenants from the Traffic Squad were assigned to visit precinct stations at roll call and instruct the officers. Instruction was also given as to what they must do in case of a fire, explosion, or other emergency that obstructed the street. In other words, they were told that they were not mere spectators, but police officers, there for a purpose. Much good has been accomplished from these instructions.

There has been established in the Detroit Police Department a school of instructions for all police officers. One class for lieutenants, one for sergeants, one for patrolmen and a special course for traffic officers and motorcycle officers.

The class for motorcycle and traffic officers consists of eight sessions of two hours each. The course of lectures covers traffic engineering problems, synchronization of lights, traffic survey, the accident problem, Detroit traffic ordinances, state traffic laws, traffic problems, practice in directing traffic, the regulation and control of public vehicles, enforcement, court procedure and courtesy.

For the motorcycle division, in addition to the above, a lecture will be given by a representative of one of the large motorcycle agencies on the care, mechanism and control of motorcycles.

CHAIRMAN GOODRICH: I should like to ask those of you who have such schools how they compare, so far as time is concerned, with the Detroit work.

GEORGE J. KUCH (Captain, Highway Patrol, Department of Highways, St. Paul, Minn.): Ours is different from that described because it is a state highway patrol. We give the men three months training before they enter the service. In Minnesota winter traffic is very light, so we put the men back in training for two weeks. Our training of course is more severe at that time because the men are enrolled the same as in the Army.

CHARLES GREENWOOD (Inspector of Traffic, Toronto, Ontario, Canada): In Toronto, out of a department of 1000 men we have 101 devoted to traffic, directly under me. They are divided into two sections. One we call the central traffic squad; the other is assigned to outlying portions of the city. We have the right to go into any police precinct and pick any man whom we think is especially desirable or adaptable to that particular phase of work.

After the men are selected, they are first given instruction in their own particular departments. In the motorcycle force, for instance, the officers are given a month's

training with regard to any equipment such as motorcycles or brake-testing equipment. If they make good they become regular members of the traffic squad. If not, they are returned to the status of ordinary patrolmen.

From then on they are carefully watched. Any man who lacks courtesy has no place on any traffic squad.

In Toronto we have a special squad we call the motor vehicle examining squad. Since the first of April, we have examined 150,000 motor vehicles in Toronto.

Each of the men in these squads is equipped with a motorcycle. They ride day or night, 365 days a year, in rain or snow. The duties of the other men are mainly in handling traffic, school children, and other matters pertaining to the safe use of streets.

In 1929 we had 71 motor vehicle fatalities. In 1930 there were 42. This year, we shall have a reduction but not so large.

The traffic problem is the greatest problem that any police department in any city has to face today. Some cities have a big criminal docket, but no matter where you go, you will find that deaths by automobiles are more numerous than those by gun or other criminal means.

J. T. HART (Captain of Traffic Police, Minneapolis): Are the salaries for traffic men greater than for ordinary patrolmen?

E. A. MITRE (Director of Traffic, Detroit Police Department): They rate the same, a full-paid patrolman draws \$2550 a year, but we traffic men work only seven hours a day. In the afternoon they are supposed to work from two to eleven, but every three days some of the men get through at seven o'clock and have the evening off. When a man gets into the traffic division he considers it promotion.

MR. HART: Do motorcycle officers riding all winter, rain or snow, use sidecars? Does sickness result from exposure?

MR. GREENWOOD: They use sidecars when there is any danger on account of weather conditions. We also provide the men with sheepskin lined clothing, furlined caps, leggings, everything that we think is conducive to good health and we have very little sickness.

E. W. BROWN (Ass't Supt., Metropolitan Police, Washington, D. C.): We have a course of training covering a three-month period for all members of the department. During that period we have certain hours each day devoted to traffic training. Our men are put on probation for a period of one year. We do not take motorcycle men until they have served this probation period, and then only after very careful investigation as to the qualifications. We do, however, take new men, after a three-month period, and put them on traffic duty at intersections regulating traffic.

We utilize our motorcycle men, as in Toronto, twenty-four hours a day, 365 days a year. Each motorcycle is equipped with a sidecar. If a man is not suitable for traffic work, he goes back to patrol duty.

On account of the hazards of traffic work on motorcycles, we pay additional compensation to regularly assigned motorcycle men and prefer to have them apply for such assignments themselves rather than select them from the precincts.

As a rule, of course, we go very carefully into their qualifications to see if they are adapted to police work. We insist on courtesy. When we get a complaint from a visitor that an officer has been discourteous, we discipline that officer severely. I think courtesy is one of the most important assets to the traffic officer.

Of course, you must continue training all the time. Changes in regulations necessitate instruction in proper enforcement.

As in Detroit, we try to send officials of the traffic bureau to the precincts to talk to the men who do traffic duty only in rush hours.

Uniformity in traffic signals is one of the greatest aids to the motorist. The traffic officers should have the same arm signals in every part of the city, so that wherever you drive you will have no difficulty in understanding what the officer intends.

Our motorcycle squad was once divided among the precincts for about ten months,

but the precinct commanders never liked it, and seemed to pay no attention to the motorcycle men. At the end of this ten-month trial we had to put them back in the central bureau. We find it works better.

RAY ARNOLD (Lieutenant of Traffic, Police Dept., Wichita, Kansas): Our town is small compared to most of those we have heard from. The traffic squad consists of corner men and motorcycle men, all working out of one station.

In the past year we have attempted to cut speeding. But the town isn't so large that people have to hurry much and our limit is 25 miles per hour. As a general practice, we allow up to 35 miles before an arrest is made. In 1929 there were only about 1500 arrests for speeding in Wichita, and in 1930 there were about 2300 such arrests.

Our accidents fell about 33 per cent from 1929 to 1930. We feel that much of that reduction in the number of injury accidents has come from reducing our speed rate. We have continued that this year and our accident rate is still falling and our fatal accidents this year are more than 50 per cent less than this time last year.

CHAIRMAN GOODRICH: Mr. Lyon, would you tell us what you do with the State Police in Michigan?

L. A. LYON (Deputy Supt., Michigan State Police): We school all new men before they begin active service and all of our old men each winter for a week or ten days. We have found that we can teach a man more in a week after he has had some experience than we can in two or three months when he has not. He seems to understand more of what we are talking about.

We also bring in the District Commanders about four times a year for a little intensive training.

In dealing with criminals, an officer can be a little rough and nobody will criticize him, but when dealing with traffic violators he may be criticized for lack of courtesy. From the time our men enter school until they leave the department, courtesy is pounded into them. We must have the cooperation of the motoring public, and there is no better way to get it than through the ordinary traffic man, who is contacting thousands of motorists every day.

CHAIRMAN GOODRICH: Can you train men to get the characteristics which you desire? Or must you select your men?

MR. GREENWOOD: It is wise selection in the first place, for you have to get the raw material to work on. The training of the men gives them the atmosphere. By training a man to become a really high-class traffic man, you do not destroy his efficiency as a policeman.

MR. MITRE: I agree with Inspector Greenwood. Only last week in Detroit three traffic officers received meritorious mention for capture of some holdup men.

RAY SPRAGUE (Captain, Police Dept., Grand Rapids, Mich): We have about 250 men and I might say that it is in the traffic department that you find most of the men who can be promoted to sergeants. It does make better men out of them.

Our patrolmen are all instructed in how to make out accident reports on cards furnished them. Moreover it is a city ordinance, that everyone must report an accident no matter how minor it may be. Our accident reports are filed by location and also by name so we can get any information we may want.

When we get an accident report from the police or a citizen, we have our investigators look into it. If there is an apparent violation, we call the driver in for a hearing before the accident board, consisting of two police captains and one assistant city attorney. They go over the accident and if the violation is serious enough, we send the man to police court. Lesser cases go to the traffic bureau and often no action is taken at all. The accident board acts as a clearing house for the city attorney's office. There are three sides to each accident; your side, my side, and the right side. If you go to the city attorney's office and ask for a warrant for some violator at whom you are angry, you don't get it; you are referred to the accident board, which reviews the case and acts like a grand jury.

It isn't very often that people go to court if they go over the case with the city attorney. He asks questions and finds out what chances there are for conviction.

O. A. PEARSON (Chairman, Street Traffic Comm., City Council, Minneapolis): We have in Minneapolis 55 radio-equipped cars and 22 motorcycles doing street duty. The radio-equipped cars are cruising about the districts in which they are quartered, and the motorcycle squads radiate from central headquarters. Which is the better for correcting traffic violations, motorcycle men or cruising cars?

MR. MITTE: Motorcycle men are on the streets to give tickets to violators. Cruising cars are out there to catch criminals but at the same time they should be instructed to watch for violators of traffic regulations as well. There is no reason why a man in a scout car should be there for just one purpose, to ride around looking for criminals.

MR. LYON: We work on the theory that if the motorcycle officer is out on the street or highway and in plain sight, people will not violate the traffic rules.

F. C. LYNN (Mgr., Kansas City Safety Council, Kansas City, Mo.): It was brought out in the paper which was read that police officers must be courteous to visitors, but it has been the experience in Kansas City that, although visitors from the farms are law-abiding, the fellows who want all the courtesies are traveling men from Cleveland, Detroit, St. Louis, or some other place who whimper, "We don't know anything about the rules here. We live in Detroit."

These people demand courtesies and they know that they can get them because the police are taught to be courteous to the "strangers." I think courtesy is a fine thing, but the idea of letting thousands of traveling men, and boomers running around in \$35 cars hunting for jobs, be extended courtesies simply because they have out of state license plates is ridiculous.

LEON R. BROWN (Chairman, Traffic Committee, Rochester Engineering Society, Rochester, N. Y.): We recently put all of the traffic police under the central bureau and now most of the promotions are made from the traffic bureau.

MICHAEL MCCARTHY (Captain, Police Dep't., Syracuse, N. Y.): Our motorcycle men at headquarters work under a lieutenant. The precinct captain can work his motorcycle men any way he wants to because the motorcycle men who work out of headquarters do not go into the districts of the precinct captains except on emergency call.

I should like to ask Inspector Mitte why he has set a height for the traffic man.

MR. MITTE: The short man does not look well on the corner; the taller man does. People look up to the latter more and respect him more.

JOSEPH B. DREWNIAK (Deputy Inspector, Police Dep't., Milwaukee, Wis.): In Milwaukee, the traffic men have a certain day of the week to attend training school.

Every district has charge of its own traffic, in so far as ordinary violations are concerned.

In Milwaukee we believe that excessive speed is always dangerous. Just as soon as people throughout the country understand that unlimited speed has to be abolished, so soon you will lower the death rate.

BURTON W. MARSH (Traffic Engineer, Philadelphia): Philadelphia has rather recently instituted a police training school under the leadership of a director who feels he is going to put the school across. Traffic men are trained in the school.

We hope to have an accident investigation squad tried out this year.

Personally, I should also like to see Philadelphia do as Toronto does in the matter of brakes, but so far we have not been able to accomplish it.

ROBERT C. DEMAROFF (Safety Director, Police Dep't., Flint, Michigan): We start school about the first of September and quit on the first of June, so we are maintaining about the same schedule that the average public school does. We believe that the police officer should be trained so that he will not spend 75 per cent of his time on 25 per cent of the violations.

We put the men into school for two hours each week. In the second week we ask them to write out personal opinions about three assigned subjects. Then we make a resumé of the whole thing at the end of the year and we have some pretty interesting information in our library.

J. V. RYAN (Captain of Traffic, Police Dep't., Richmond, Va.): We have about thirty-five men on the traffic squad. I have nothing to say about their selection, but have to make the best of it.

We try to practice courtesy, but our trouble is with drunken drivers. Most of all accidents are laid to speeding.

ADJOURNMENT

Friday Morning Session
October 16, 1931

Discussion on Traffic Signals and Accidents

Led by **ERNEST P. GOODRICH**
President, Institute of Traffic Engineers, New York City

CHAIRMAN GOODRICH: This subject of signals and accidents has been the matter of some analysis in various parts of the country by different groups. The National Safety Council has done considerable work through its staff and I am going to ask Mr. Baker to describe briefly the methods and the results.

J. S. BAKER (Assistant Traffic Engineer, National Safety Council, Chicago): Last year the National Safety Council staff investigated the effect of automatic traffic signals on accidents.

This investigation had to be based on such data as could be obtained; at present that is the limiting factor in answering the question: do traffic signals reduce accidents?

We went to police departments to find out how many accidents occurred at certain intersections before and after they were signalized, but police department records are usually in no condition to yield such information. There were, however, some places where we found what we needed and we finally got reports on about 600 intersections.

Then we investigated conditions at each intersection to see that nothing but signals had influenced conditions. Among the Chicago data, for example, that necessitated throwing out more than a quarter of the intersections, and from Detroit about 30 per cent, all because of things like changes in street layout, at or about the time the signal was installed.

Among the remaining data there were many intersections which had had one accident before and no accidents afterward, none before and one afterward, or no accidents either before or after; such data cannot be used because it will not permit ratios to be figured. This was particularly true of Chicago data, of which another 40 per cent had to be discarded for this reason. Finally we had to guard against the situations where a police officer had been on duty before the signal was installed and taken off after, because with an officer at the intersection there will be more complete reporting of accidents than without.

I have pointed out these things to indicate the difficulties in making such a study under present conditions.

Finally, after we had collected the intersection data, and thrown out all that we had suspected of being unreliable we had left figures for 354 intersections which we corrected for the change in the accident rate of each city as a whole for the corresponding period.

Then the biggest part of the job was over and we felt ready to draw conclusions. We started by plotting in a distribution curve the percentage increase or decrease in accidents against the number of intersections. The mean of this distribution came at about a 20 per cent reduction; but there were some intersections at which the accidents increased as much as thirteen times, and some had only a tenth as many as previously. Hence you cannot be sure that by installing a signal, accidents will be reduced. 219 intersections, or 62 per cent of the total, showed reductions.

We found that simple intersections were improved more by automatic traffic signals than the complicated intersections.

We also found that the intersections in business districts were less benefited than those in good residential districts.

CHAIRMAN GOODRICH: Philadelphia has made a similar study. Mr. Stupka, will you tell us what the result was.

PETER J. STUPKA (Accident Analysis Engineer, Philadelphia): On intersections

where we could make a check of results one year before and one year after, we found much the same as Mr. Baker did. 34 per cent of the intersections showed an increase in accidents after signalizing, 12 per cent showed no change, while the remainder, 54 per cent, showed a reduction.

CHAIRMAN GOODRICH: At the Wednesday morning Traffic School, Mr. Simpson pointed out that there was a certain incidence of accidents by pure chance, but he showed that in actual experience many "high accident" intersections experienced far more accidents than they could be expected to on the basis of chance alone.

Now the question arises as to whether the signal itself causes the difference. It may be the type of intersection, it may be the type of traffic or it may be other things. Let us examine why at locations of the same type and design, there might have been an increase in the number of accidents.

A signal must be easy to interpret or people won't obey it. Some very complicated signals which have been tested out in the past have been abandoned because the majority of the people did not understand them. The three-light signal is most common but some communities have a two-light signal and in Paris they have only one light. How far to reduce the number of lights to get the best indication as well take actual research to find out.

There are also questions of custom involved. If a signal is suddenly put at an intersection through which many drivers have been accustomed to pass daily without reference to a signal, some of them are going to be plowing up the thoroughfare, just as they did in the past, forgetting all about the new signal. That is probably the cause of an increase in the number of rear-end collisions after the installation of certain signals. However, rear-end collisions decrease with time.

Law observance is also important. In some communities people ignore the stop signs, slow signs, and signals.

Another element is the question of enforcement. In Washington people obey the signals with an officer nowhere in sight. Can Inspector Brown tell us how that is accomplished?

E. W. BROWN (Ass't. Sup't., Metropolitan Police, Washington, D. C.): It was a matter of enforcement and education. After signals were installed we stationed men at the intersections at different periods to obtain a fairly good general observance, but we still have with us, and always will, the motorist who tries to cheat. The same thing applies to stop signs. We have made arrests, (we have to sometimes) but it is more a matter of education. We have to convince the motorist that signals and stop signs are for his good.

CHAIRMAN GOODRICH: The location of the signal is, of course, easiest to discuss and it is perhaps most obvious in many of its opportunities for trouble or improvement.

At a simple intersection there are, as you know, many varieties of installation and location. In center locations, the signals are overhead or on a pedestal. Those of you who have gathered statistics or used your eyes know how many of those pedestals have been knocked out. The desirability of the pedestal installation is questionable and seems likely to become obsolete in the future.

The center overhead installation is cheap, but it isn't so easy to repair or to replace lights. Obviously, it has to be put high and as the motorist comes up to the intersection he usually loses sight of it unless he has a ball-bearing neck.

I had an experience not long ago with a signal on a pole close to the side of the road, at the right far corner of a four-lane highway. I was in the lane nearest the curb. A car was following and slowly overtaking me. I reached the intersection just in time to stop as the signal changed, but the man at my left went right through and there was a near collision with a car coming from the side street. The signal was obscured by my car and he was traveling at just the right speed to keep it so. The signal was improperly located, perhaps.

It is a problem where to locate a signal at any intersection.

The far right-hand side, as a signal location has the advantage of visibility for a

greater distance, both vertically and horizontally, but it has the disadvantage, of not being at the point at which you must stop.

It seems to me personally that the left-hand far side would be better than the right-hand far side, but the left hand far side to one man means the right-hand near side to one on the other street. The far side left is obviously distant for the man who looks diagonally across.

I think we must do some intensive research to determine what the values are of these various kinds of installations before we can determine whether or not they are worth the money involved.

OTTO K. JELINEK (Traffic Engineer, South Park Commission, Chicago): What type of accidents are decreased or increased by signals.

CHAIRMAN GOODRICH: We must differentiate in our accident analysis as to the seriousness of the accident. We must know the amount and type of traffic on the street. There are probably twenty-five different items which must be included if we are going to make a proper analysis of the problem.

MR. BAKER: In general, the right-angle collision is the one most prevented by signals. They may or may not be serious, depending on conditions. The rear-end collisions are increased, usually occurring in greatest numbers immediately after the installation of the signal and before people become thoroughly familiar with the fact that it is there. Turning accidents will also often increase, where there is a heavy left turning movement which is concentrated in part of the cycle when it must pass through the traffic on the other side of the street.

CHAIRMAN GOODRICH: We should study each intersection, watch the traffic, and analyze the character of near accidents to prevent them from becoming real ones.

BURTON W. MARSH (Traffic Engineer, City of Philadelphia, Pa.): A number of the collision diagrams of Philadelphia shows an increase in pedestrian accidents. We believe this points out very effectively the hazards of jay walking which is increased by the driver at right angles having a green signal to come on.

(Mr. Marsh, as Vice Chairman of the Street and Highway Traffic Section took the chair at the close of the meeting.)

VICE CHAIRMAN MARSH: Is there a motion to be made before the School?

MR. BROWN: I move that this Traffic School extend to Mr. Goodrich, our chairman, a rising vote of thanks for the very able, thorough and patient manner in which he has presided during the Congress.

(The motion was seconded, put to a vote unanimously carried.)

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Child Education Section

Officers 1930-31

Chairman, DR. RANDALL J. CONDON, Friendship, Maine.

Vice-Chairman, DR. THOMAS W. GOSLING, Akron, O.

Secretary, IDABELLE STEVENSON, National Safety Council, New York City.

Wednesday Morning Session October 14, 1931

DR. THOMAS W. GOSLING, Chairman
Superintendent of Schools, Akron, O.

The first session of the Child Education Section convened with Dr. Thomas W. Gosling presiding.

CHAIRMAN GOSLING: Ladies and gentlemen, I bid you a very hearty welcome to this first meeting of the new Child Education Section. It is a great satisfaction to see so many of you here and to know the reason for your coming. Miss Stevenson has explained to me that the establishment of this section gives very great delight to headquarters, because from now on it will be possible for the National Safety Council to work with the schools instead of working for them. That is a very hopeful change, I think.

Albert W. Whitney, Vice-President in Charge of Education of the National Safety Council, is our first speaker this morning.

The Problem of Safety Brought Up to Date

By ALBERT W. WHITNEY

Vice-President in Charge of Education, National Safety Council, New York City

It seems to fall upon me to trace the history of Safety Education up to the present time, and perhaps make a forecast of what we are coming to. I can remember, and doubtless some of you who are here will remember how, back about the time of the St. Louis meeting (that was in 1918) and perhaps even before that, we were feeling our way toward safety work in the schools. We knew that education was the pathway to almost everything that was good, that safety was primarily an attitude of mind and therefore teachable, and that therefore safety should be brought into the educational system. We had very vague ideas, however, as to how the job of teaching safety could be carried out. At first we hardly saw beyond the possibility of getting policemen in to talk to the children. This contact between the child and the policeman is a very valuable one, but safety education has now gone far beyond the idea of the policeman as a teacher.

The war had an important influence upon the problem. The war situation with its exigencies opened the schools to many subjects, such as thrift, which had never re-

ceived explicit attention before. An opening had therefore been made for such subjects as safety, but on the other hand organizations that had special doctrines to put over were not slow to perceive the opportunity, and the schools had already been besieged by so many people who wanted to make use of the schools for propaganda purposes that superintendents had become very wary, particularly in view of the great pressure upon the curriculum from the more regular subjects. The war had done another thing in showing that the best way to teach thrift and such subjects was not by means of special courses but by correlating the work with the regular curriculum.

Superintendent Maddox of the St. Louis schools, at the time of our St. Louis meeting became sufficiently interested in the problem to assign it to Dr. Payne, who was then at the head of the St. Louis training school, the Harris College for Teachers. Dr. Payne, who had recently had experience with the school situation that had been produced by the war, applied the same methods to the problem of safety, and worked out a systematic plan of correlation which was undoubtedly the first thoroughly organized piece of school safety work, although not by any means the first piece of safety work actually done in the schools.

The resistance from school administrators was very great, not so much because of any dislike of the subject as because of the already great pressure upon the curriculum, and their distaste under the circumstances for the effort that was necessary to prepare the way for something new. The Education Division found it necessary and expedient to organize demonstration centers, a single school in a community or region which would undertake to try the subject out for a few months and then throw its classes open for a day or two at the end of that period to visiting parents and teachers from other schools. I can remember that it was a matter of great congratulation when the number of such demonstration centers got up to forty.

A picturesque undertaking that had an important influence in the early days of the movement should be referred to—the play "Adventure, A Drama of Life and Chance", that was given at the Buffalo meeting in 1923. The reasoning back of this play was this: we cannot make the subject of safety stick in the schools unless it has genuine educational value. But we have no time to try it out at length in the schools themselves; let us therefore give a safety play. If safety has educational value it will have, undoubtedly, dramatic value, and conversely if it has dramatic value it will undoubtedly have educational value. So after Percy Mackaye, Charles Rann Kennedy and Professor Baker had been interviewed and all had thought well of the project Thomas Wood Stevens, the pageant-writer, was engaged to write a play. It was enacted three times at the Buffalo meeting by a cast of sixty-one brought up from the dramatic department of Carnegie Institute, at Pittsburgh. I will not recount the difficulties, but I will admit that those who were responsible for it would not have had the temerity to try anything so ambitious if it had then been realized what was ahead of them. Nevertheless the play did do exactly what it was intended to do. It did prove that the theme of safety could be introduced in such a way as to have an intellectual interest. That was all that was necessary. It showed that there was real bone and sinew in the subject and that it was something that was worthy of genuine thought and feeling, and could properly take its place in the school curriculum with no fear that it would not prove to have real substance.

It was probably the giving of this play that was responsible for an invitation from one of the educational leaders of the country, Professor Stephen Duggan, now one of our advisory committee, for the Education Division to present the subject at a dinner meeting at the Faculty Club of Columbia University. At this meeting, at which there were about thirty persons present, including some of the most distinguished educators from Teachers College and the New York city school system, the basis was laid for the succeeding work and it was made certain that it would be possible to get together a sponsoring committee of the best people of the educational world. The movement from the start has had the support of such people as Professor Judd of the University of Chicago, Professor Rugg of Teachers College, and Dr. McAndrew. The subject has proved to have not only dramatic value but educa-

tional value, and today it has as secure a place in the curriculum as any subject—more secure than that of many subjects that have been very respectable subjects, which are slipping. The demonstration schools have long ago been abandoned and many school systems such as that of Springfield, Massachusetts, which was perhaps the leader, have incorporated the subject by correlation throughout the curriculum so thoroughly that it has become almost an integral part of the educational system.

The problem in the field work of the Education Division for some years has been not so much the planting of safety education as getting the right type of work done, for the subject can be taught very badly as well as very satisfactorily. Our field problem is now more the keeping up of contacts with other organizations and bodies who are helping to do the work.

There has never been any doubt in the minds of those who have been working with safety education that it would have an effect upon the accident rate. In fact it was this faith in its value that accounts for no particular effort being made to prove its value by statistics. It came therefore as an actual surprise only a year or so ago to find that statistics were available in the Bureau of Census and elsewhere that seemed conclusively to prove that safety education had been having a tremendous effect. You are all doubtless aware of these reports, but as a matter of record I shall repeat them here, particularly as you may not have the most recent figures.

What the figures show, and figures from many sources in a great many parts of the country show almost the same thing, is that there is a remarkable difference in trend between the accidental deaths of adults and the accidental deaths of children. Since 1922, the year when organized efforts to introduce safety education into the schools were begun, there has been a 38 per cent increase in the accidental fatalities of adults. During this same period, in spite of an increase in the number of children and a very great increase in hazards, there has been a 2.3 per cent decrease in the accidental deaths of children. The corresponding figures for traffic accidents are still more striking. Figures compiled by the National Safety Council covering the years 1927 to 1930, in a population of apparently about forty-five millions, show a 28 per cent increase in automobile fatalities for adults, a 10 per cent decrease for children of pre-school age and a 19 per cent decrease for children of school age.

The question very properly arises as to whether these striking differences are due to education. They may be due on the one hand to non-educational forces, such as police protection and on the other hand they may be due to the keenness and ability of the children to learn for themselves. No educator that I have talked to, however, has believed that children without instruction would have attained these results, and certainly any non-educational influences such as police protection cannot have operated much more favorably for children than for adults, so it seems probable that this difference between the accident experience for children and adults is to be considered for the most part as a real accomplishment of education. The difference between the figures I have given you from 1922 to the present time, representing 38 per cent increase for adults and 2.3 per cent decrease for children, means a saving of over 7,500 children's lives every year, or otherwise expressed it is still more striking—if adults had shown the same percentage decrease in accidents as children there would be 23,000 fewer adults killed each year than is now the case. Had children followed the same percentage increase as adults there would every year be 7,500 children killed that are not now being killed.

While safety education work to be done properly undoubtedly requires the thorough incorporation of safety throughout the entire curriculum, there have been somewhat detached parts of the child safety movement that have also been of importance. Much the most significant of these has been the school boy patrol. There is probably no other way in which children have been brought into a participation in the work of the community in such a vital and useful manner. The patrols are performing a notable service in an eminently satisfactory manner, as is shown by the very few deaths of children near schools at which patrols are operating. This is of great value to the

community, and in many communities is given ample official recognition: on the other hand it is of the greatest value to the patrol boys themselves in making them feel that they are performing a community service. Through the help of the motor clubs and other organizations, school boy patrols are now established in over 800 cities. Other activities such as essay contests have served to initiate an interest in safety among children. Such activities, however, have not much permanent value unless they can be followed up through work regularly organized as part of the curriculum.

You will have observed that the meeting today is held under the newly organized Child Education Section rather than the Education Division as heretofore. The Education Division is a staff organization; the Child Education Section, like any other of the National Safety Council Sections, is made up of members, that is, in this case, presumably of educators themselves. The formation of the Child Education Section is an attempt to solve a problem that has not been satisfactorily solved up to the present time, namely, how to provide a forum where teachers of safety themselves could get together and discuss their problems. We have tried two plans—first, of bringing safety to the teachers, and second, of bringing the teachers to safety. The first plan has involved holding meetings on safety in connection with general meetings of educational people. The two great national meetings of educators are the meeting during the summer of the National Education Association and the meeting during the winter of the Department of Superintendence. From our point of view the second of these meetings is the more important, and we have tried various plans in connection with this meeting. It is so large, however, that it is impossible for all the subjects to get an adequate chance for a hearing. We have had meetings of various kinds in connection with the meetings of the Department of Superintendence, in some cases being actively on the program, in other years through breakfast and luncheon meetings. We were on the program of the Washington meeting in a very important way, when the Year Book on safety education was presented. This, however, was an exceptional occurrence. There has been such a tremendous number of things going on that we have never had very satisfactory results.

A better plan, instead of bringing safety to a meeting of teachers is to bring teachers to a meeting on safety—namely, this annual congress. This has the great advantage that teachers are thereby brought into an atmosphere that is charged with safety and they will be able to do far more than attend the meetings on safety education; they will be able to get the background of fact and feeling that belongs to the whole safety movement and that permeates the congress.

There are serious difficulties in this plan, however. The meeting comes so early in the school year that it is very difficult for educators, who are in the midst of their organizational problems, to get away. Furthermore, up to the present time there has not seemed to be a large enough body of educators who were concerned with the actual technique of teaching safety to make a satisfactory working section. We are watching these meetings today and tomorrow therefore with great interest, to see whether the time has come when a forum for the discussion of the technique of safety education can be successfully established and maintained. If safety education is to be carried on satisfactorily in the schools there should unquestionably be a forum of this kind. Teachers of health, teachers of modern languages, kindergarten teachers, teachers of physical education, all have their meetings for the discussion of their problems. Teachers of safety education should have their meetings similarly.

We believe the time has now come when this thing can be done successfully in the field of safety. It will not, however, take care of itself. It needs hard work to make it a success. The Education Division is prepared to do its best to make the enterprise successful—the determining factor will not be the Education Division but the educators themselves.

We have been fortunate in the officers of the new section and in the membership of the committees as well. We feel particularly pleased and proud to have the section start off with two people at the head of it such as Dr. Condon and Dr. Gosling. I am sure I can say that both of them are thoroughly and genuinely interested in the

subject and in the undertaking. I made a trip to Friendship, Maine, to talk the whole thing over with Dr. Condon, and found him in his charming home on one of the most beautiful parts of the Maine coast. We sat on the balcony of a log cabin that contains his study, looking through a grove of moss-covered spruces to the bay where his father, a sea captain, used to anchor his vessel. If we could all retire to as beautiful and busy a life as Dr. Condon's we all ought to retire at once.

Dr. Condon is genuinely interested. His knowledge of the sea (he was master of a ship himself for a number of years when he was a young man) has given him a keen and deep feeling for the safety problem. It was he, when he was president of the Department of Superintendence, who made a place for us on the program, which was perhaps the most satisfactory of such meetings that we have had. Dr. Condon's only question has been whether it was right for him to accept the chairmanship when he had retired to such a very busy life. He is out west at the present time delivering addresses on illiteracy. He deeply regretted not being able to be here, but I can assure you that he is thoroughly interested in what we are doing here today, and we can depend upon him not only for sympathetic interest but for hard work up to the ability of an already very full life.

We are equally fortunate in being able to obtain Dr. Gosling as vice chairman. We discovered many years ago when he was at Madison that he was interested in safety. We have had him on our programs on various occasions, for instance at the meeting at Louisville, and he is one of these who have had an insight into the real meaning of the movement and its possibilities.

With regard to the future of the safety education movement itself I have only the brightest anticipations. The time has long gone by when we needed the assurance given by "Adventure, A Pageant-Drama of Life and Chance" that the subject had educational value. We know it now by actual experience in the schools themselves. The time has also gone by when we need to speculate on whether safety education will produce results. It is producing results which constitute perhaps the most remarkable statistical showing of results in any field of education.

Furthermore, we are exactly in the line of progress of the new education. The outstanding problem of today is to bring education out of the school room and into the world, to get our education not second hand but from life itself. Can there be a more perfect field in which the young child can be brought into contact with life itself? There are many interesting problems still to be solved. The great mass of schools are still doing inadequate work in the safety field, or none at all. We still have much to do in developing the technique of safety education, we have hardly begun to get a foothold in the secondary schools, and as for adults, they at present seem hopeless—they may entirely disappear before they begin to learn to take care of themselves. All these things are problems for the new Education Section.

CHAIRMAN GOSLING: We are obliged to Mr. Whitney for this very full and satisfying account of the origin and development of this movement. I have no doubt there are others in the room who are equally enthusiastic about the school patrol. In Akron last year there was not a single fatality to a school child throughout the school year in the vicinity of a school. There were fatalities after school hours, on Saturdays and in the evenings, but at no time going or coming.

I have been much interested in a statement, made to me a long time ago, about the folk origin of the story of Little Red Riding Hood. Its origin cannot be traced; it is too remote; but it is supposed to have originated at the time when it was necessary to give children instructions to avoid the danger of wolves. We have passed by that time now and need another folk story, and perhaps this Section will be instrumental in eliciting a story which will be a modern version of Little Red Riding Hood.

We are exceedingly fortunate in having with us today Dr. H. E. Barnard, director of the White House Conference on Child Health and Protection, who will now speak to us.

How Can We Apply The Safety Recommendations of The White House Conference on Child Health and Protection to The Schools?

DR. H. E. BARNARD

Director, White House Conference on Child Health and Protection,
Washington, D. C.

Of course it is a pleasure to be with you, but more than that I consider it a great opportunity to be able to discuss with men and women, most of whom, I think, are engaged in educational work, some of the studies undertaken by the White House Conference Committee, and some of the things we must do in the coming months to translate the findings of the Conference into results which will be helpful to the children to today and tomorrow.

I was very glad to hear Dr. Whitney say as he was closing that we must bring safety education out of the schools into life itself. That is the thing we all recognize as the important factor, and in writing the Children's Charter there was built in that great document—I have often said the greatest document since the Declaration of Independence—several paragraphs devoted to safety education. I know you are all interested in the work of the National Safety Council and realize that the White House Conference recognizes these elements of safety as of major importance.

There are eighteen rights to which every child is entitled; three have to do with education. Although many of you have had a part in drafting reports and in the preparation of vital statistics, it may not be amiss to read again these paragraphs which relate especially to the education of every child. We are getting a new viewpoint in these latter years as to what education really is, and Section Ten expresses it in this way:

"For every child an education which, through the discovery and development of his individual abilities, prepares him for life; and through training and vocational guidance prepares him for a living which will yield him the maximum of satisfaction."

And Section Eleven still further discusses the education of the child in these words: "For every child such teaching and training as will prepare him for successful parenthood, homemaking, and the rights of citizenship; and, for parents, supplementary training to fit them to deal wisely with the problems of parenthood."

One of the major results of the White House Conference is the development of the idea that we must educate parents for parenthood. Before many years our school-houses will be using their rooms for the education of parents, just as they are now using them and the teachers for the education of the children of those parents.

But Section Twelve of the Charter is the section in which you are keenly interested. It is written for you. I might almost say that it must have been written by this great organization, for it reads:

"For every child education for safety and protection against accidents to which modern conditions subject him—those to which he is directly exposed and those which, through loss or maiming of his parents, affect him indirectly."

I wish that Section Twelve were written in large letters on a chart here before us, that you might see it and remember it and fit it to your work in your schools and in your school systems and in your organized efforts for the safety of the public and especially the children.

The reports of the White House Conference Studies are now coming off the press. I heard this morning from Washington that the report of the group of which Dr. Berry of Columbus, Ohio, was chairman would be off the press within a few days; the report which deals with the education of all children, particularly the 10 per cent of children who are not now adequately educated—all children, deaf or blind, feeble minded, or maimed by accident or disease. You as educators will be interested in

that report because it shows the next step which must be taken; the step that carries education to the child in the home. I received word this morning from Battle Creek announcing the dedication of the Kellogg School, which has been built for ALL the children of the community, having special classrooms which will be presided over by teachers who will give special education to children needing that sort of educational care.

The White House Conference gave a great deal of attention to the subject of safety education. The report will shortly be out and of course you will want to have it. It is a complete analysis of the present situation with respect to education in safety. I have an abstract which is much too long to give this morning, but I can touch rapidly on some of the high spots in it. Of course from the data Dr. Whitney gave you, you realize the nature of the safety problems which confront us as the conditions in the world change; for instance, in the matter of traffic control. And by the way, it seems to me that these boys who are in charge of patrols outside of school rooms are getting a finer education for life in that work than ever can be given them inside the school room—an education which is of immense value to them and to the community. I am always proud of the children I see around the school house directing traffic. They are an object lesson to the police and to other officials.

I am just back from a round of state conferences. I was in Oklahoma City where the State of Oklahoma was holding its White House follow-up conference. I had the pleasure of saying to the Governor of Oklahoma that that was the most important conference held there since the convention which drafted the state constitution, because at that conference were all the forces of the state interested in children, medical organizations, educational organizations, social agencies, and scattered throughout the group were leaders in parent-teacher movements who are doing such marvelous work throughout the country. They had come in from every community throughout the state. From there I went to Columbia, Missouri, where I attended the Parent-Teacher Association of men and women—mostly women—who are interested in bringing the school and the home closer together, and there again I said that I believe one of the outstanding jobs which the Association had to do in every town and city was to see to it that the community gave more attention to the development of playgrounds for its children, and to recognize that those playgrounds were as important as the school houses themselves. The old days of education for eight or nine months of the year, which stopped short during the summer months, are entirely out of date. Education must go on for twelve months of the year; the greater part of self-reliance is built up in education outside the school room, given to children on the playground by trained workers, instructors in the art of play, as carefully trained and selected as are teachers in the schools themselves. And I think we can count on these great organizations of parent-teacher associations—with a membership of nearly two millions—to co-operate with us by arousing public interest in more and better playgrounds. Throughout the country the swimming pool has become an adjunct to the playground, and of course education in safety in the water is as necessary to the child as safety in the school room.

I like very much the wording of the report which says—"The education of children to face dangers that cannot or should not be avoided is an important part of safety education," and the report says that the larger part of this task must be assumed by the school. Children are in school only about 15 per cent of the time. The rest of the time they are asleep or at play or at work, and in that 15 per cent of time in which they are in school, we have to educate them for safety, as Section Twelve of the Charter sets out, and it must be done, as I see it, as a part of all school activity.

Education in safety can be written into every part of the school curriculum, without additional burden to the teacher, if only the teacher herself is taught the necessity of such education, and we know that she will find a way in every class room to bring the importance of safety to the foreground in her work. This is mentioned in the abstract—"such training as will enable the teacher to stress the importance"—

"no subject can find a permanent place in the schools which is deficient in educational value."

I have not had an opportunity to study this thoroughly, because it is only a part of one volume, and I shall not take time to discuss the cost of neglecting the child. The White House Conference report discusses 43,000,000 children, the approximate number of children in this country between the age of birth and 18 years. I think we may safely assume that 25,000,000 to 30,000,000 are in the schools, receiving education in safety in a more or less adequate fashion, depending as I say upon several conditions: first, the reaction of the community to the idea of safety education, and the seriousness with which parents and teachers cooperate in education for safety. In the past few months I have visited some forty states, talking with governors concerning the organization of follow-up work of the White House Conference. I know a lot about governors. I know whether they are politically minded or socially minded. I know whether they are timid and hesitant and fearful, or men who are certain of the position they occupy. I found only one governor in the country who is not interested in children and in doing whatever he can for children. I believe the other governors are interested in the development in the State Department of Education of the sort of education which fits the child for life. I have met a lot of superintendents of schools, too, for wherever we can we talk first with the governor then with the cabinet officers—not the state treasurer or state auditor. I look upon them as bookkeepers. They have nothing to do but collect money and pay it out. I look upon the commissioner of education, the commissioner of public welfare and those men as the cabinet-officers, the important men, the men who will see that the state goes forward or stands still in development of social or economic life. I want to repeat that I met but one man who took the position that his duty was to do only what he was told by the statute books. In every other case the state superintendents were forward looking men who were not hampered by the statutes laid down years ago for teaching and for education, and it seems to me that among the real educators this business of education of children in safety ranks side by side with education for life itself.

I am supposed to lead this symposium and not take up all the time in discussing the subject of education for safety. There is so much in this report that I cannot go on with it. I prefer to leave to you the further discussion of the subject. I am sure a number of you will have something to contribute which will supplement what I have said, and which perhaps out of this work will bring some new ideas to the front.

Thank you for the opportunity you have given me to talk at random.

E. G. KNOX (French & Hecht Company, Springfield, Ohio): I suppose you may wonder why I am interested in child education. One reason is that the superintendent of our firm has been appointed to the school board at Springfield, Ohio. He is very much interested in safety, and feels that the place to begin to teach safety is with the children. Then when they get into industry and into citizenship they will have had that background of safety education and can avoid the hazards to which they are exposed in industry. I promised him I would bring back all the information I could get regarding safety, for school children as well as industry, so that we could start in with an organized safety program, by that I mean when children start to school or before. I believe this child education movement is one of the greatest movements started in the National Safety Council.

ALBERT W. WHITNEY (National Safety Council, New York): I would like to ask Dr. Barnard if he can tell us specifically what we should do to make sure that safety is given adequate consideration at these state conferences.

DR. BARNARD: My suggestion would be that as the planning committees are organized by the Executive Committee of the follow-up conferences, in each case one of your selected members be made a member, along with the Parent-Teachers, Red Cross, Boy and Girl Scouts, etc. That gets you into an important place in the picture, and I think having reached the planning committee you can then develop with the chairman of the conference, a program as a working basis.

MR. WHITNEY: Can you take us a little further? What ought we to do to see that such a person is put on the committee?

DR. BARNARD: That is largely a matter of stepping forward and holding up your hand. Obviously in the organization of this committee groups are going to be left out simply because it does not occur to the organizers that they have a place in the picture.

F. W. RODENHEBER (Manager, Louisville Safety Council, Louisville, Kentucky): There have been sixteen state conferences. We circularized all of the secretaries of the state conferences to find out just exactly what has been done with reference to safety. We had a safety meeting organized for the Kentucky State Conference and wished to have a measuring stick as to what some of the other states have been doing. I am sorry to say that the replies we received indicated that most of the secretaries did not know what we were talking about, in spite of the paragraph in the report relating to safety education. If this has already happened with the sixteen conferences that have been held, we are going to be left out of the picture entirely, unless we step in and hold up our hands as Dr. Barnard said.

One of the things we want to do is to plan a program. I think we should first find out just exactly what we can do. It is up to us to make ourselves as strong as we can. If we are negligent, as it seems to me we have been because safety has not been a prominent feature of these sixteen conferences, I think it is our fault. Something should be done now, because if it is not done before the program is outlined we never will get our place.

DR. BARNARD: There will be a very important White House Conference held in Chicago on the 30th and 31st of this month. The Chairman of the Chicago Conference is Superintendent Bogan who is on your program, and I know he will be glad to give all the assistance and information he can.

I think, Mr. Rodenheber, you must have added together those states which have had conferences and those which are planning them, because up to this time there have been nine.

MARION L. TELFORD (Field Secretary, Education Division, National Safety Council, Associate Chairman, Safety Committee, National Congress of Parents and Teachers): I add the latter title because it is in connection with the Parent-Teacher group that I wish to speak. We have been making an effort to use the State Parent-Teacher group as one channel to get into the state conferences. I had an opportunity at the National meeting in Arizona recently to talk with a member from Washington and asked her when the Washington meeting was to be held. It was on October 10. It was impossible for me to be there, but it was possible to make up for her a brief outline of legislative phases and other things important from the standpoint of education. This was turned over to the state president and it was our understanding that she would turn it over to the conference. It is our effort to get someone within a state interested in seeing that safety has representation at the conference, and my opinion is that this is an appropriate channel.

PERKINS PREWITT (Manager Safety Council, Birmingham, Alabama): I would like to ask Dr. Barnard if in interviewing forty governors he learned what states have laws requiring the teaching of safety in schools, if any.

DR. BARNARD: I cannot answer that question. I did not go into any specific questions with the governors.

MR. PREWITT: Would that be a good thing to do in the various states?

DR. BARNARD: Was that information gathered by the committees making reports, Mr. Whitney?

MR. WHITNEY: I do not think so. We have not thought favorably of such laws. I know that a study was made some years ago of the laws with regard to com-

pulsory subjects and it was found that a large percentage of them were not observed. Safety should not be forced. It should be there because it belongs there.

MISS TELFORD: In speaking of the plans of the Washington conference we did think of legislation requiring instruction in the schools—not so far as the curriculum is concerned, but along the line of state wide restriction of the use of fireworks.

CHAIRMAN GOSLING: I am glad to hear you say that you do not approve of legislation, Mr. Whitney. As a school man I should have felt a good deal of opposition toward having the curriculum made by legislators.

HERBERT J. STACK (National Bureau of Casualty and Surety Underwriters, New York): I think it would be an excellent plan to work out in some way or other a list of people in different states. I was at the White House Conference and also at the New Jersey Conference. Of the nine I think we were well taken care of in New Jersey and Utah. I would be in favor of having two or three persons in every state whom we could think of as our representatives. I lectured this summer in forty-two states. Some, Tennessee for instance, are in fine shape so far as interest is concerned; in others there is no interest.

CHAIRMAN GOSLING: One thing has remained in my mind as a result of the remarks of Dr. Barnard and Mr. Whitney. We need to have an integration of the forces working for the welfare of the child. The school is only a part of his education; perhaps some would say only a small part. Consequently those who are interested in child welfare must be interested in play, playgrounds and recreation centers, the work of the Red Cross, service organizations of all kinds, boy patrols. If we are going to do our most effective work I think we shall best do it in collaboration with other groups, giving them the stimulus of our efforts and receiving strength from them. I have no particular formula to offer for such a program, but I feel that it could be worked out.

GEORGE MASSLICH (School Principal, Chicago, Illinois): I have been interested in safety education in the schools since Dr. Payne visited us ten years ago. It seems to me as I talk to various people in the school system here and elsewhere about school safety, that many of us have not advanced beyond the stage of looking out for an automobile. We have not that delightful philosophy of Dr. Whitney's, and we need someone all over the country to shout that from the housetops. We need to bring before every teacher in the United States a conception of safety education, not as an adjunct to health education, but really an essential element to living. We are living in an adventurous age. The philosophy, even among the teachers, is still back in the first stages.

J. A. YORGER (Public Safety Adviser, St. Louis, Mo.): Mr. Whitney has struck the keynote. In the first place, in getting into the schools you will find a lot of opposition. We have had this experience, as Mr. Whitney knows. If you attempt to bring safety to the schools simply to protect the child from accidents, you will have a job on your hands. In our schools a representative from each room attends the general meeting, and when he gets back to his own class he has to get up and give a talk about that meeting. Just a short time ago a superintendent stated that he knew of no way to teach the children the lesson in citizenship they are learning in this way. They look upon the safety factor as secondary and realize the value of the training the child is getting. It is surprising to see children from the second or eighth grade who are really in a position to get up and talk before the class. During fire prevention week the youngsters made talks before clubs and organizations. The schools realize the value of it and this method has their approval.

OLIVE MCCORMICK (Girl Scouts of America, New York): The Girl Scouts are co-operating with the Safety Council. We can supplement the education given in the schools, because our activities are entirely free time activities. We do not want to repeat anything that is done in the school system, and so we try to put

it over through play and other forms of activity which take care of the children in their free time.

CAPTAIN F. C. MILLS (Boy Scouts, New York): We have a splendid opportunity in the Boy Scouts to supplement the work done in the schools; besides our merit badges we have our first aid training, and life saving, and we are following a general program of safety from the time the boy becomes a tenderfoot until he leaves at about 17 years of age. We have discovered as a result of very careful checking of accidents over the last seven years, that there is a very definite relationship between health and the safety of the child. Almost all cases of fatalities occurring in the water have been traced back to a defective physical condition. We are now bending our efforts toward physical examinations supplementing those of the schools.

That fact that accidents are closely related to health is a rather startling thing to us, and we are inclined to believe it is true not only of the water but has a great deal to do with other accidents. A rather striking example occurred this year. A man who had recently had a physical examination went down in the water with an epileptic fit. He was brought out after three minutes and resuscitated. No one knew he was subject to these seizures. Every boy attending camp has a physical examination as a matter of routine, but we are requiring a health history based upon information furnished by the parents. In Chicago with 11,000 boys attending camp, each boy has an examination based on this history.

ROSE WICKER (Director of Curriculum, Kansas City, Mo.): I wish more teachers could come to this meeting. The schools are doing a pretty good job. If you look over the curriculum today, no matter what the subject may be that is outlined, you will find many features relating to safety.

I was glad to hear what Dr. Barnard had to say, and to know what the Parent-Teachers are doing. I would like to give one little illustration of what they are doing in safety education at home. They put out a little P.T.A. bulletin every month. In the September bulletin came a list of instructions for young mothers who are sending their children to school for the first time: "Accompany your little child to school for several days or a week or two if necessary, and observe the safety precautions you would want your little child to observe." I believe that is a wonderful thing.

Safety education is a co-operative work. The more closely we can work together the better. We are not closely enough affiliated with other organizations in the community at this time and I think we should find out and know definitely what other organizations there are in the community with which we can work.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

High Schools

DR. HERBERT J. STACK, Chairman

National Bureau of Casualty and Surety Underwriters, New York City

The group session of the Child Education Section, Group 1-High Schools, convened with Dr. Herbert J. Stack presiding.

CHAIRMAN STACK: This afternoon's meeting is intended apparently to be a discussion. That will mean that until we have here 100 per cent pupil participation it isn't going to be very socialized.

We have been troubled, and the problem has been a very serious one, as to just what form safety education is to take in high schools. The local Safety Council Managers have found that it has been comparatively easy to get safety into the elementary schools, but in the secondary schools you can readily see what some of these difficulties are. But we believe that safety education has a real place in the high school.

The large number of driving accidents, the large number of street and highway accidents, the fact that the children are beginning to drive motor vehicles—all of these lend themselves to our feeling that safety does have an important place in the high school. We should like to have you give testimony, give evidence, and give your reactions as to just what can be done, and also what has been done in the schools of which you know.

We hope to get out of this some plans which may be applicable to the high school situation in general. I have put a little outline on the board. The subjects are: (1) What shall the high school program include? (2) Safety teaching through the existing curriculum. (3) Safety teaching through newer subjects. (4) Safety in the physical education program. (5) Safety in extra-curricular activities through assemblies, clubs, home rooms, and student activities.

Let us open this discussion by having you tell us in a few words things which you think could be done. Mr. S. L. Bacon is principal of the Evanston High School and I am sure that he is one of the frontier thinkers in the high school field. Mr. Bacon, could you give us some suggestions that you might have to offer about any subject which concerns yourself?

S. L. BACON: The high school curriculum, as Dr. Stack intimated, is somewhat the same as the elementary one. We have fixed subjects that we have to cover. For instance, in chemistry we must do so many experiments in order to qualify for college entrance. If I may I will just run through very rapidly some of the things that seem to me possible in connection with the teaching of safety and which to some extent we have attempted to follow. I shall attempt to point out in our work in Evanston, first of all, three or four subjects that lend themselves very nicely to any sort of safety content. One of those is civics. The whole subject of civics is very valuable, and it covers subjects apart from the more machinery of government. We used to think of it in this way, but in the last ten years civics has become a matter of character and conduct. With that interpretation of the course, you can readily see how it offers great chance indeed for such things as preventing accidents and taking care of one's body in the finest and best way.

I think we are going to make safety material a very definite part of our civics' content in the next few years. It seems to me that safety education offers more opportunities than any other subject in what we might call the purely informational content of business, social, home, and economic life.

Any good high school course of home economics will include home nursing of some kind. We do that in our own school. But after all it is not required and only a few girls get it as an elective subject. We have to look farther than that in order to cover the general situation.

Another subject which treats in certain ways, but again is limited, is general science. Another subject is physiology. Naturally this will be somewhat limited. The next subject that I would like to mention is physical education.

We are thinking of physical education, today, in a much larger way than we used to think of it; it really is covering the whole of one's personality. Physical education develops mental health and does good to the whole physical and mental being. In our own school we teach resuscitation methods in class. We have a whole class learning the Schaefer method at one time. We also have the rudiments of First Aid. When that was broached many said, "You can't teach it that way. That is individual. You have to take two or three youngsters at a time." We teach fifty or sixty at a time. That overcomes the very great objection of the time element which educators naturally first think of. In our own school we are organizing a health course and in this we are including prevention of accidents general and specific, and we are attempting to acquaint the youngsters with all that is being done in the safety education field and in the world.

I am interested in a text book in which we are devoting a great deal of space to that sort of thing. It is specifically designed for physical education and health and not just a course in safety education. That is how much I think it ought to be worked into that field.

Those are the two great field divisions. You should get the special content worked out into the field so that they will not be duplicated. A semester's work in connection with the prevention of accidents is the sort of thing they need.

Chemistry and physics are also taught, and in the shops, of course, you teach certain methods that will reach out into the industrial world.

We are trying to carry safety work into the student activity field where there is, of course, the greater student interest. We have a safety council made up of two or three students from each home room. They are organized this year as they were last year and they have met and made some plans. We have a tremendous safety problem because we have three to five hundred cars come each day into our school yard. We have all these cars to park. We expect these youngsters to assume some of the responsibility for this work. They keep, of course, the records of the accidents that happen in the school. Each home room has two pupils designated to take care of those records and the president of the Safety Council and his secretary summarize all of those in the course of the year.

They have the fine cooperation of the Evanston Safety Council. We had the privilege of having a student represent us and meet with them. He was acknowledged by their organizations as an official representative of the school. We are beginning to plan for a drivers' school, in which the students will give a series of outside experiments under the auspices of our own safety council. There are unlimited opportunities that I could go into in more detail to show that safety can be promoted in the extra-curricular field.

WILLIAM H. BRISTOW (Assistant Director, State Department of Education, Harrisburg, Pa.): I would like to ask Mr. Bacon if he has any organization among his faculty for coordinating his safety activities.

MR. BACON: One of the home room directors is safety supervisor for the school, and he is responsible for the safety council. He meets with them and directs them in activities, etc. You must have something of this sort, of course.

MR. SHERRARD (Asst. Supt. of Schools, Pittsburgh, Pa.): Do you carry on this work in the student council?

MR. BACON: We have a specific council for safety work. We feel that we can get much better recognition of the problem and get much better results. We have a

student council, of course, but they have a lot of problems and safety would be lost among them. I think once the safety program is worked out and is running smoothly it might become a regular part of the student council, but until we get it going we feel that we can do more with it by having a separate council.

MR. BRISTOW: Have you set up the objectives for the various departments with reference to the safety program?

MR. BACON: No, we haven't done that specific thing. Of course, we have in the physical education department. We have made that a very definite part of their program. We haven't worked out the civics situation very far, but we are working on that this year. I feel that the physical education department has more chance for effective work along this line than the civics department, for civics itself is such a difficult subject.

S. J. WILLIAMS (National Safety Council, Chicago): Is there a general ideal or thesis among most physical educators that is inconsistent with the safety idea?

MR. BACON: I think the physical education people are about the same as the leaders in any specific field. They have so much to do that is traditionally important, and they create so many new things from their own field through these traditional contributions that when some other agency comes in from the outside and says they have to teach this and that naturally the welcome isn't as keen as it might be. I think the answer to that, Mr. Williams, is this: As I intimated a while ago the content on physical education work in the last ten years has undergone, in my judgment, a very great change. We have got away from the very narrow old idea of German and Swedish calisthenics which were supposed to afford muscular development, and we have got away from the content of physical education which dominated us for 30 or 40 years, and we are thinking today of physical education as the welfare of the whole personality. You simply can't escape the fact that taking care of one's self, prevention of accidents, etc., is something that has to be recognized and that new courses in physical education must be offered. The normal schools and the universities are emphasizing that sort of thing. Any school that has a physical education teacher who has received his training in the last half dozen years will realize that any new courses or ideas will be welcome even to the inclusion of safety education in the physical education course. Safety education is an even newer subject than some that have been adopted in recent years.

DR. WILLIS (Red Cross, Washington, D. C.): How much of a problem is it to get your teachers to put in safe practices, particularly the coaches of the teams?

MR. BACON: Of course, that goes right back into your very difficult problem of competition. If you eliminate winning the game at any cost, you should have little difficulty with safe practices as far as coaching is concerned.

It is all dependent upon the size of the school. If you are in a school town where the town supports the team, wants to uniform the team, and insists upon its winning, the coach sometimes will have to play a man who shouldn't play. However, the coach feels that he has to do it to protect his job.

In small town rivalry the problem is a severe one. But I think the principals of the small town schools are far different individuals from what they used to be 20 years ago. They have received more training since then, and they know the physical values that are involved. Nowadays, the principal is much more likely to say to the coach, "We don't care whether we win the game, as long as you play the boys who should be played." I think that problem is being solved more wisely all the time.

CHAIRMAN STACK: In connection with the last point, I would like to say that the latest research study of the Bureau of New York University is along this very same line. They are studying one thousand high schools in the country in twenty-two states for causes and prevention of accidents.

MR. ELSON (Gilbert, Minnesota): Other than traffic what are some of the definite responsibilities taken up by the high school?

MR. BACON: I should say that the first objective of the safety council is to gather certain information about safety. In other words, we might say that the first responsibility is to attempt to make the school conscious of safety and its importance. That means certain pieces of information which are gathered by the National Safety Council and sent to us through their literature and magazines. This makes available to the youngster such information that will make him become conscious of the problem and what it involves. That itself is a very great responsibility and if it is done well consumes, I should say, a very large part of the time of these people. Just now our student safety council is planning to make two or three investigations. It will take them about six months to complete the circle and to cover the points that they want to cover. The next year they will probably do something entirely different. Of course that information will spread into all forms of safety education. That is our main program.

FREMONT CHESTER (Rochester, N. Y.): Do you call it a Junior Safety Council?

MR. BACON: No, we call it the High School Safety Council. I don't think you should call one "junior" unless it is in a junior high school.

CHAIRMAN STACK: Mr. Bristow, I wonder if you have any particular points that you would like to make at this time regarding some particular phase of the program as you have seen it.

W. H. BRISTOW (Supt. of Education, Harrisburg, Pa.): There is just one suggestion that I might make here, and that is with reference to the physical education program.

In Pennsylvania we have definitely come to the conclusion that at the present stage, at least, we can't expect the teacher in the physical education period to carry on the safety instruction work. I know that the ideal program would be an articulating program, one in which physical education was worked out in such a way that health teaching might be more or less required, and one in which that course would be given once a week for all secondary school students. It seems to me that our problem now is finding what we ought to do, and then working out a unified system so as not to have repetition which frequently has accompanied the teaching of safety education. In other words a lot of this material has become old stuff. That is what we are attempting to do now. In the secondary school we are placing the major responsibility at this time with the health and physical education departments. We are setting up a program of training in which we expect that health instruction will be given as much attention as physical education, as far as our teachers are concerned.

CHAIRMAN STACK: Mr. Lynch, let's hear some of the things you are doing in Kansas City this year.

MR. LYNCH: We have a committee of high school principals who are working all the time on the subject of safety education in the high schools, and out of their meetings come new ideas and new adventures or new experiments which are tried out. For example we give five minute traffic lessons. The sheet which was published by the National Safety Council—a series of five minute talks on traffic—is put into the home room where the students can study it. This is done in order that every child in the school may get a better understanding of some of the fundamental principles governing traffic regulation. Following that study we take up the model traffic ordinances and study them section by section in the home room, not specifically in order to teach the child what the law is, but to try and teach the child the reasons for the law, and to give him an understanding of the reasons for these regulations. In addition to that we have this safety council idea in some of our schools. We take it as a part of the student council, because we feel that in this way it will get proper recognition. If it were organized as a separate unit many of the students in the school would tend to look upon it as a side issue and something which didn't carry the same relative importance as other items which are discussed in the student council.

Everything seems to me to be backwards when you talk about the teaching of accident prevention in the high schools. We teach first aid, but we don't teach accident prevention. Why not teach them how to prevent the accident rather than what to do after it occurs? Aren't we getting things backwards? We admit accidents are going to happen. You tell them what to do when the accident happens instead of telling them what to do to prevent it. To me there isn't anything as important in the teaching of safety to high school students as traffic regulation principles. Nowhere is he going to have conflict with his fellow members of society as often and as unfortunately as in these traffic situations. We are getting a rearrangement of our dispositions on account of motor cars, and a lot of it is due to ignorance of the basic principles under which they should be operated in relation one to another. If we can get into the high schools right now when the children are ready to go out and meet each other in that conflict, and teach them the basic principles that govern their relations one with the other, not necessarily the rules but the principles, we will begin to put the child in a position where he will make a much better citizen.

G. D. NEWTON (Travelers Ins. Co., Hartford, Conn.): We were recently wondering what classes of drivers caused the most accidents. We hear a lot about young people and how efficiently they operate cars. We went to some of the state officials in the different departments for this very reason and got the experiences of five million operators and we found that the driver under 20 years of age is causing by far a larger percentage of the accidents than any other group. We found that the next age group which was causing the most accidents was between 20 and 30. Therefore, not until a person becomes 30 years of age does he begin to produce fewer accidents. That shows that the high school student is causing more accidents than he should. He may be able to operate a car much better than his parents, but he may overestimate his ability, and he may have too much courage in passing street lights. At least there is something that is causing high school students as a class to produce more than their share of injuries and deaths.

PERKINS J. PREWITT (Birmingham Safety Council): I would like to ask what attitude you should take in teaching motor operation in a state and a city where a drivers' license is not required and where it is not against the law to drive under 16, and where large groups of high school boys and girls are driving. How could you safely conduct a safety club that way?

MRS. G. M. PELTON (Chairman, Evanston Safety Council): We have a drivers' school for the students which covers the statutes and ordinances and gives lessons in driving. It is an outgrowth of the drivers' school for women that we have in Evanston. We had 600 to 900 women registered. They went through and took the examination and about 500 passed it. We took that school into the high school and Mr. Bacon and others have been helping us to organize it. We are covering all the points that the gentleman just referred to.

MISS MARION TELFORD (Education Division of the National Safety Council): We have been confronted with this question in our field work. I think we must start our high school group off with the attitude that the state should have a drivers' license law, and get a group of supporters for the law in the high school group itself. After all, high school people have a very definite sense of pride, probably because they don't want to be out of line, and I think if they thought they were just a little out of line in their state they would get busy. Maybe your high school group will get a drivers' license law for you.

N. E. GREEN (Past Pres. of Louisville Safety Council, Louisville, Ky.): Mr. Lynch brought up a question a minute ago that I think we ought to consider. It is one that shows us that we can learn a good deal about safety from industry. He said that we have the proposition backwards, that is in the schools we teach first aid instead of teaching accident prevention. In industry we went through all of that. We had our fine hospitals. We didn't realize that we should not spend our money in building more hospitals but in educating the man about the machinery.

F. W. RONENHEBER (Louisville Safety Council, Louisville, Ky.): Mr. Green is president of the Manufacturers Company. He has not had a lost time accident in his plant for five years. That is a long time, and now that he has finished such a splendid job he has started working in our high schools and he is the one that keeps the interest in our high schools.

We have tried several things. We have broadcasted throughout the country a forty-five minute program daily for a whole semester. It was something that we tried to force on the high schools and it was accepted.

The freshman class has a forty-five minute study period on accidents and safety education. We have had specific activities but you can't call it a definite program. We have, for instance, our public speaking classes. They were required to use safety material. We took 10 or 15 of those girls on school time around to the different industries. They shut down their plants for a 15 minute mass meeting just prior to the noon hour and these girls talked to them. Of course, it was a tremendous hit the first time, but the next year we had difficulty in finding plants that would shut down. It isn't fair to ask them to go in and talk to those men on the men's time; in fact, it isn't fair to either one, and it doesn't work out.

Our supervisor of health and safety education is planning to take our traffic ordinance and rearrange it according to paragraphs that refer to pedestrians. Then the students will make a study of it.

Traffic Law as a School Textbook

H. O. ROUNDS (Director of Safety Division, Automobile Club of Michigan, Detroit, Mich.): Four years ago I made up my mind that if we could get the student in the high school to read the state traffic law, which is the basis of all ordinances, that we would at least be taking one step in the right direction. I found, however, that very few could read it and understand it. Therefore I revised it and published it in class book form. About 90 high schools and the 140 junior high schools have been supplied with large numbers of these and they are using it in certain of their classes.

CHAIRMAN STACE: I wish you would look over this program that has been worked out for organizing a high school automobile club. After we have revised this it will be sent out to schools all over the country. We should like to get comments on it, of course, before we begin to have it printed.

MR. CHARLES D. DAWSON (Grand Rapids, Mich.): We have a high school teacher and four students here, and we hoped that we could give you some of their experiences.

MISS PERRIN will tell you how she has been conducting the safety work in the Union High School.

MISS PERRIN: My work relates to safety in extra-curricular activities.

We have in the Union High School what we call the U. H. S., the Union, High Sanitation Club. Our club was a Health Club, and through Miss Telford's recommendations we changed our motto to "Safetyize and Keep Alive."

We had a number of very interesting standing committees. One of these is our statistical committee. Another is our music committee which wrote some little safety songs, one of them to the tune of "Jingle Bells," others are to the tunes of "Old Black Joe" and "Auld Lang Syne." These songs are sung on special occasions. Our music director in the Union High School teaches these songs to our group so that we can sing them when we have an assembly. We also have a broadcasting committee which broadcasts over WWOD once each month all through the winter. In order to get the safety magazine before the school we took a play out of the magazine and broadcasted it one month.

Our committees make a group of about 100 students. They are not just a little

group of people working by themselves, but they are passing their lessons over to the various departments.

We are going to have some very important meetings this winter. One is the junior and senior assembly which we are going to have the week end of the 21st of October. At that time we will get a message of safety over to 2000 pupils. Our problem is not only safety on the street, the highway, and outside, but in the home and in industry.

ADJOURNMENT

Wednesday Afternoon Session

October 14, 1931

Elementary Schools

EMMA A. SCHAD, Chairman

Supervisor of Elementary Education, Public Schools, Baltimore, Md.

The group session of the Child Education Section convened with Miss Emma A. Schad presiding.

CHAIRMAN SCHAD: The Child Education Section has been divided into two groups, Secondary and Elementary. What the National Safety Council has in mind is to get some work going on throughout the year with special committees which will probably include eight or ten people. They cannot do it all. We will have to have work going on in other sections of the country, not just depend on this small group.

Most of us feel that the physical side of safety education has been over-emphasized. When one speaks of safety education one usually thinks of boy patrols and safety councils. One man this morning told us these are wonderful training in citizenship. In Baltimore we are proud of that, but that is only one phase. Mr. Whitney expresses it so well—recognizing the qualities that make living worth while—whatever it may be, courtesy toward others, getting others' point of view.

I have prepared some points which are on these papers I shall pass about. I am going to ask you to consider these, unless you have some other phases you wish to discuss in this hour. This work represents problems we have to face in safety education.

The first question: What are the aims of Safety Education? Elementary education, science, history, all have their definite aims, but safety has not come out with a set of aims to guide people who may need help along that line.

Then the second problem: What are you going to put in your course? Are you going to stress one phase or both? How shall it be done—shall it be related to other school work, and how can the relationship remain natural? What are you thinking about in safety? You have to give every child safety education; they have to learn to help themselves. What advice are you going to give the colored child? The same as the white child? The subnormal child will get the physical side only, the child of greater mentality will get further instruction. We must also determine whether the teaching shall be direct or indirect.

After you decide on your method, you will have to come back to measurement. You can measure the moral phase but not the physical phase. You teach a child at every opportunity you have, on the playground and in the classroom, that he must not run out in the street after a ball, then after school you put him on the pavement. He is playing ball and it goes out into the street. Nine times out of ten he will go after it; his interest is in getting the ball, regardless of whether or not an automobile is coming. We must consider that sort of thing.

The other questions relate to ways of installing this teaching and keeping teachers alert. These are some of the problems I have outlined which I thought would arouse interest. Some solution is necessary to have an effective course of study, and I would like to turn the meeting over to you for discussion.

MISS ROSE WICKLEY (Director of Curriculum, Kansas City): I think this is a splendid outline which I shall use with our committee and teachers. I feel that all our courses which relate to safety should stress it in natural situations as they arise. If we are making a course of study in science or English or health, we should utilize safety in these particular subjects. But I feel safety is important enough to justify a separate bulletin in order that teachers may see its importance. When a committee of teachers make a course of study, while the committee will have the larger part of

the work to do, I think they ought to be drawing on other teaching forces as much as they can, getting suggestions from them or having them try out certain phases of material. Then when it goes into the hands of the teachers it is in a sense not just the work of a small group. I think they will be more interested in carrying out its provisions because they have had a great part in its development.

CHAIRMAN SCHAD: I believe more people now feel that safety education is not to be taught as a distinct subject, not to be given a place of its own, but embodied in every activity and every subject where it naturally comes. I believe this is the trend of thought.

B. J. ROHAN (Superintendent of Schools, Appleton, Wis.): I have never heard safety connected with the moral side before. It appeals to me. I feel however that in studying these problems we must think of them all as aiming at one thing—developing the child into a man or woman. We do not want safety to get into the rut that some other things have. Mathematics and English should be taught to develop the mind, and safety for the same reason.

CHAIRMAN SCHAD: Miss Wickey has a kindergarten course of study in which only a little section is devoted to health and safety; and yet I went through it and penciled passages on page after page which definitely related to health and safety, though not obviously so. Through this work children gain knowledge and skill and manipulation, and they also learn how to think. There are such things as keeping everything in its place and having a place for everything. As I say, you can go down page after page through the book and see that sort of thing. It is obvious that these things make for good citizenship. In this course of study the principles are given. The course allows for freedom that is so essential, and is so definite, without limiting the teacher in any way, that it is one of the best I have seen. I thought we had gone a long way in Baltimore, but we have nothing that comes up to this.

What are some of the physical problems you have in safety work, Mr. Rohan?

MR. ROHAN: I presume our city like every other one has the problem of housing the growing school population, and as it was well put by one of our aldermen, people at home will put up with all manner of inconveniences, but when it comes to the schools they demand perfection. But we must make the equipment we have solve the problem that confronts us. We have to move entire grades from one building to another, and in some cases must cross dangerous crossings. One of these is a state highway and people speed on it, the reason being that they are driving fifty miles an hour in the country and when they get in town and slow down to thirty-five or forty, they believe they are going slow. Children have been struck at this place. I have suggested stop and go lights to run during the school hours, to be turned off after school hours by the janitor. The answer I received was that if they did it there they would have to do it elsewhere. Then a policeman was suggested and he has been put there from 7:45 in the morning until 9:00, from 11:15 to 12:30, from 1:00 to 4:15, and that means he cannot do much else all day. That again is costly. That is the problem we have to face at present, and I wish I might get some solution of that.

CHAIRMAN SCHAD: I wish you might have been at the luncheon and heard Commissioner Taylor of Alabama speak. His point was that we are putting too much upon the schools and the police departments; that the home should do its part. I believe this thing is distinctly a school proposition. You have children coming back and forth four times a day, and if you can train them to observe these things you can help. We have policemen in Baltimore at every school in the city. We have them at the most dangerous intersections.

MR. ROHAN: We are trying a school patrol, patrolling from the curb, but I have always felt that the school is trying to assume too much responsibility when we attempt to do anything to control traffic.

CHAIRMAN SCHAD: Children cannot control traffic. There is the question of the time required for children to get across, and the patrol is not in a position to regulate that. Patrols have done good work, but they cannot control traffic.

W. E. MACBRAYNE (Boston, Mass.): We felt that with the hazardous months coming on we should have some organization, and we held a meeting at which the safety council, the police department and the traffic committee of the state was represented. We checked up the whole business. I had a report of five instances when there were no white lines in front of the schools. The city said there was not enough money to take care of it. These lines are there to slow up traffic when approaching a school, and the state law requires an automobile to slow down for pedestrians. If you have in addition to these white lines a boy patrol to put up his hand, you have additional protection.

MR. ROHAN: Do you have in front of any of your schools any state highways or streets where the traffic is very heavy?

MR. MACBRAYNE: We have four that have highways. One of these has two schools on it. We discussed it in the schools, and one thing we asked was what is the average speed of a car—how long will it take a car to reach a given point? When can one leave the sidewalk in safety? Our traffic officers take the kindergarten children into the street, stop an automobile and ask the driver to help. They give the children a little talk, and incidentally give little lesson to other motorists who stop to see what is going on.

We have some 600 young teachers, supervisors of playgrounds in the summer, etc., and we thought we would have them work something out. They produced a play which was very effective—the sick mother, the doctor who could find nothing wrong, and the mother's confession that she was sick because her five children played in the streets. The doctor said—"We can cure that. The prescription is that these five children must attend the nearest playground daily." When the doctor prescribed that the mother rose up immediately.

The point is that the dramatization of this idea impressed not only the children but the parents as well.

CHAIRMAN SCHAD: I would like to tell one thing we are doing. We have what is known as a "Several Routes to School Campaign." A study is made of the community and the various routes to school. The teachers work out with the parents the best way—maybe it is the longest way—by way of policemen or boy patrols, instead of cutting across the tracks, for instance. That campaign is put on every year. Every child is supposed to have his own route. We have printed some drawings the children made. In the lower grades they cannot do it, but in the intermediate grades they can. Here is a sample—"Help me to be safe. Teach me the right way to come to school." The junior high children were interested and helped work out the plans and drawings.

At a conference several years ago at one of the schools the president asked the chairman of the patrol to give a report. He said that the children followed the rules of the patrol beautifully but that the parents were jaywalkers. He added that he supposed that was all right because they were older persons. I think the president would have let it go, but a fifth grade girl questioned it. This campaign was put on through the P. T. A., to give the children a chance to explain that to the mothers.

GEORGE MASSLICH (School Principal, Chicago): I was interested in reading recently that there are certain responsibilities of the school with regard to the patrol boys at the corner. Who is responsible for injury to the patrol boy? Has the school exceeded its authority? We all ought to know what the responsibilities are.

H. K. BENNETT (Providence, Rhode Island): We put in as an experiment a course of study which was the result of about a year's study. It has been adopted officially by the board of education and is accomplishing something. I shall be glad to send a copy to anyone who may desire it.

E. P. CURRAN (Keystone Automobile Club, Philadelphia, Pa.): I have heard so

much about the physical phase of safety that I am interested in the other side. So long as this discussion had developed into a safety patrol issue, I will tell you what has been done in Pennsylvania. In 1929 the Philadelphia Board of Education disbanded all boy patrols, because they were informed that in case of injury they could be held responsible by the parents of the child. The boys were standing on the sidewalk and did not interfere with traffic, yet the board thought they could be held responsible. There was much argument for several years. The Board of Education held fast. So we felt the only thing to do was to go to the legislature and have the school code amended, whereby a board of education could appoint a patrol to stand on the sidewalk and direct the children to cross the highway.

During the two years when patrols were disbanded there were 1200 more child injuries than there had been in the two years preceding. We have organized patrols in Eastern Pennsylvania along the main highways.

ADJOURNMENT

Wednesday Afternoon Session

October 14, 1931

General Session

WILLIAM H. BRISTOW, Chairman

Deputy Superintendent of Education, Harrisburg, Pa.

The Second General Session of the Child Education Section convened with Mr. William H. Bristow presiding.

CHAIRMAN BRISTOW: I know of no one more capable of speaking on the topic of "The Place of Safety in the Progressive School" than Dr. Laura Zirbes who will present this topic.

The Place of Safety in the Progressive School

By LAURA ZIRBES

Director, University Elementary School, Ohio State University, Columbus, O.

I don't know how much familiarity the people in this meeting have with the progressive education movement, and I am, therefore, not going to assume a great deal. I will be illustrative and descriptive at the same time that I speak of safety education in the progressive school.

I don't suppose you will be inclined to like it or to like the progressive school when I say that the progressive school is a far less safe place in some ways than the traditional school is. The children *do* have access to experiences and materials that make life much more dangerous. I am not saying this so that those of you who are parents will decide not to have your children go to progressive schools and you will see why as I proceed.

You see, in order not to be dangerous the school would have to be different from modern life. And if the school were different from life the children would be behaving in school according to habits and standards which won't work in life at all.

The progressive movement thinks that the school should face life as it is, and educate children to the kind of environment in which they must live and learn. Consequently, it doesn't put dangerous things away on high shelves or surround them with taboos. It gives children access to materials and to experiences that are not selected because they are absolutely and therefore inanely safe. If you stop to think, this means that the safety education program has a much larger place in the progressive school than it has in the traditional school. It is not confined to set periods because it pervades the very life of the school and must be permitted to do so to be effective.

You are really more concerned with—adjustment to adventure, isn't it? When you are standing in a perfectly danger-proof room, as perfectly safe as a room can be made, and just talking about safety as something which you really only talk about, you do not need very much education to be preserved from harm.

Let me go into considerable detail and show you what I mean by saying that there are opportunities for learning to consider safety in life situations in a progressive school which simply cannot be expected or found in a school that is not of this type.

I have just come from Ohio State University where I happen to be director of a Progressive Laboratory School and the last thing I did there yesterday was to talk to some six year old children in the first grade who had just finished making and painting a three-shelf rack for their own rest mats. They had sawed and hammered and painted. They had done a great many things which most people would be inclined to prevent six year olds from doing in the name of safety. Most folks would

say, "We will saw the boards for it and then they won't cut their hands, and we will hold the nails for them and then they won't pound their fingers and we will see to it that they work at it one at a time and then they won't run in to each other with the tools. We won't give them paint—they would spill it."

Those children worked together, they made a shelf, they painted it, they had it about ready, and they were happy about it and nobody was hurt. And I want to tell you that record wasn't an accident! It was due to the kind of safety education which our school works at. I am almost afraid to say that our school has been going over a year and we haven't had an accident yet. Some people will tell us that we should knock on wood. We didn't use that method nor do we intend to, so you needn't recommend it. We did use an educational conscience which made us aware of safety considerations so that when children do things fraught with the possibility of danger they behave so that accidents are not likely to happen, and they behave that way because they are learning to help in that way every day. Even the little four and five year olds have access to tools, and not ten cent store tools either. Their tools are the very best kind, in fact the janitor is jealous of the children's tools. He says, "When I really want a saw that cuts, I get one of the children's." Now, of course, most accidents happen with children when they are not using good tools, and when things won't work. You will have more accidents in a poor automobile than you will in a good one; you will have more accidents with inadequate material than you will with the right material. Nothing is too good for the children to use, especially if they are going to learn to use good things and use them properly. That doesn't mean that you spend a lot of money. After all, the best is the cheapest in the end. That gives you some idea of what I mean.

By living adventurously and doing things that some people think education does not need to do, you will learn what warnings and lessons cannot teach. You could go to school and learn reading, writing, and arithmetic without hammers and saws, but you see, if you did that you would have to have a fifteen minute safety lesson once a week or so in order to ease your conscience. We think that is a very ridiculous way to take care of an important thing. The place to teach safety is on the spot when there is something going on involving safety. When a little youngster in kindergarten the other day was going to get something from a high shelf, we didn't say, "Oh no, let me do it." We said, "How are you going to get there?" We think that if you plan that carefully you can make it without any trouble." The little fellow began to think of how he could do it without trouble, and he tested the chair with his foot. He said, "Pretty wobbly, I guess I won't." He put the chair aside. He found a stool in the hall that was suitable for his purpose, and you should have seen the look on his face because he was going to do something difficult and do it without danger. He climbed up, got what he wanted, came down carefully and said, "I did it."

It is that sort of thing that we must teach children, instead of limiting learning to set lessons and thus adding more dead weight to a deadly routine found in school work. It does more. When we make life adventuresome we make it interesting. Children will not try to get bootlegged adventure by dashing across streets. Life that is denatured and over-routinized is responsible for thrill hunters. When everything is so deadly dull children look for adventure where they can find it. Not only does the progressive school afford opportunities for dealing with materials which ordinarily might be considered hazardous, but the children also get a chance to make their environment safe.

I was out on the playground the other day and three big boys were playing a game when one of them stopped and said, "Just a minute." Then he went over and picked up a piece of glass, took it and deposited it in a waste container. Nobody said a word. He just did it as a matter of course. How did it get there? He didn't know but it was his social responsibility, having seen it, to make that playground safe for others.

Some fifth grade boys were trying to find a place for the tools and saws that had been added to the supply, and there was no place to hang them. They said, "We can't leave them there. Somebody will tear his clothes on them. You know somebody will be hurt, and anyhow it's no way to leave good tools."

They decided to make a frame for them, and when that was finished one of the boys said, "Let's not put that up until we get some big person to say whether we have used good judgment." They got two of us to see where the saws were going to be and one of us said, "I was just thinking of how people go through this door when they are in a hurry." We didn't say, "No, you can't put the saws there. That is not a good place." We helped them to see how the situation would look at a time when danger might occur. One of them said, "Oh yes, it is too near to the entrance. Let's back it up into the corner. Now is it all right?" Just then one of the teachers walked over to the workbench without comment. Her hair almost caught on a saw, and one youngster said, "It is all right for us kids, but it isn't for the big people. We had better put them a little higher. Just high enough so that we can all reach them but so that nobody will get in trouble."

We think that kind of education in judgment in dealing with a problem and with a situation, is the kind that a child needs, and we believe in seeing to it that he has opportunities for meeting that sort of thing in his environment. He is learning to take care of himself and others, and that in the long run is the truly educative way of taking care of children. We let them learn to take care of themselves in other ways. For instance, our children all have the advantage of about one community study trip a week. Last week when the third grade was ready to go on the first trip of the school year, one of the persons who was expected to accompany that class failed to show up. I was just a little bit worried about letting third graders go alone in a cab with no one but the driver. One of the children said, "What is the matter, Dr. Zirbes?"

I said, "I don't like the idea of your going alone in the cab."

He said, "Don't worry, we will be responsible."

I said, "Well, I know you would if nothing happened, and I hope nothing will happen."

"I will tell you," said one of the boys, "Make the taxi driver go between the other two taxis, and I will tell him that he has to stay there. We will be responsible, but maybe he won't be."

I said I thought that was a good idea and asked the taxi man if he objected, and if there was anything else they could do to help him. He said that he didn't want to have to look around and keep the children from hanging out of the windows. I said, "That is what they meant by being responsible. They are going to mind their own business so that you can mind yours."

At that, one of the boys spoke up and said, "He doesn't know our kind of school, does he?"

I replied, "Well, don't feel sorry for him, he didn't have a chance to go to one."

So they went on their way and when they got back three of them looked me up and said, "We are back and we are all safe." They had gone to a factory where they saw a lot of machinery, and they had to be careful but during all this time they had only two adults with them. They had made the journey safely and were happy over it.

Now, you may think I am contradicting myself when I say that in some respects the progressive school is far less dangerous than the traditional school. There are usually compensations. Children who are herded together and handled in the mass lose their individual responsibility. They are looking for somebody bigger to take care of them and tell them exactly what to do. That is dangerous. You know what happens with mob-mindedness. I don't think it is safe in modern communities to handle groups of children as though they were just one mass or as though they were just puppets to be manipulated. Nor should they render blind obedience. That is dangerous. If you can handle them so that each one takes his own responsibility

he will be better able to take care of himself. If you occasionally let leaders take group responsibility it is well, too. If you are always making them march in lines to music and go down the steps with somebody watching them, and do everything simply as fractions of a mass, what are you doing to make them independent, capable citizens for the community that they have to live in whether you will it or not? They don't leave the school and go about in lines or by dozens. They can't have somebody with them wherever they go, and I think it is dangerous to have the school neglect to give them guided experiences which develop responsibility and independence.

That reminds me of another thing. Our children help themselves at lunch time, and even the six year olds carry the hot soup or cocoa to their rooms in a jar. I mean cocoa for ten children. Of course, the older children carry it for twenty, and not one jar of hot food has ever been spilled. But I tell you there is a traffic law in that hall at lunch time, and *everybody* is his own traffic cop. The children studied the situation and made the laws to control this period. Everyone knows that those who are carrying the hot food have the right of way. They know that others must stop, look and listen and go slowly. That sort of thing shows the difference in management and organization between the kind of school that takes those things away from the child and the kind that lets him learn by doing them.

You do not educate children by restrictive control which simply exacts compliance, and by ever-present external authority prevents them from breaking over. You simply keep order on a very low moral plane and fail to point the way to a higher plane. The whole thing depends on enforcement and breaks down when the force is removed. The only way you can get around this is to conceive your educational problem differently.

A school that uses mass methods of control makes children subdued, and, according to modern psychology, this is dangerous. It breeds in them fears and lack of self confidence and it makes them think poorly of themselves. One of the biggest dangers in the development of the child is the danger to mental health and not physical. The child who is repressed, the child who is made to do according to rule is either the one who when he gets out of school, breaks all bounds, or the one who is afraid to deviate, or the one who behaves because, or when, he is watched. Where discipline is rigid, self control is most likely to be lacking. Tyranny is obsolete in democratic society and dangerous in education.

A youngster told his teacher the other day that he didn't like her choice of a certain thing at all. She asked him why he didn't and he proceeded to tell her why. She had to admit that his reasons were good. That isn't rudeness, but I have been in schools where, if a child *should* talk like that once, he would never do it again. He would learn to keep his mouth shut and not make suggestions in school. Many children are in school situations which are dangerous in that they repress, restrict, and restrain the pupils while somebody is watching. The children are getting the habit of looking to see who is looking or what somebody else is doing before they do things. In its ultimate social and personal effects, this is distinctly dangerous.

The progressive school has another characteristic that I would like to call to your attention. Let me illustrate. A bottle of milk is spilled. There is no nervous exhortation. The child is helped to realize that the thing to do is to clean it up. A fish globe mysteriously cracks and broken glass, wriggling fish and water descend with a crash. An occasion for learning calm, noise, and cooperation in an emergency—an occasion to beware of splintered glass. Afterward they investigate the cause. A rabbit hutch is needed. They build it. The children learn in a way which psychology tells us is a sound, safe, and genuine way to learn. They learn by doing. They learn by actually facing situations and not simply by learning rules and having their emotions roused or repressed without legitimate outlets in activity. They learn by experiencing things in their natural setting and by having experience accompanied by the kind of guidance that gives them not only habits but initiative and insight into the reasonableness of what they do. Insight into the reasonableness of what you do comes from so living that you can infer from how you live and reason about what you do in a way which builds up sound attitudes for your own subsequent behavior.

You don't have to repeat and reiterate when life itself is so organized that these things are taken advantage of when they come up. For example, with the kindergarten children every time they cross a street, everything that is done is done so that the street crossing situation may give them all that there is in it as far as safety education and any other kind of education is involved. They don't cross and recross a street in order to learn the *how* of crossing it. They learn to cross safely as an incident in going somewhere.

The other day somebody reported to us that the Akron was going over the school. We wanted the first grade children to see this giant dirigible. We thought they needed special guidance for the sake of safety in this situation. I went into their room to tell them and very calmly I said, "I have something to tell you, but I don't know whether to or not. It might be dangerous for you. Maybe if I tell you two things it will be all right to tell you the second one. Now, you listen to both of them and then we will go outside. If you should want to look up at the sky like this, where do you suppose you had better stand? Do you think you should be on the sidewalk or in the street? You see, when we go out, you are going to want to look up at the sky."

Somebody said, "Why?"

I said, "Now listen, and I'll tell you the second thing. You know about the big new dirigible, the Akron? They say it is going right over our school in a few minutes."

One little boy said, "And when we look up at it we shouldn't go out in the street. Is that what you meant?"

"What do you think about it?" I asked.

"Well," he answered, "if I was in the street I'd have to look up and look around too. I would much rather go on the sidewalk where I could keep on looking up."

And so they went out and they all went to places where they could see and they did not go where they shouldn't, and nobody had to watch the situation. They understood. That was used as a very real safety lesson although it didn't happen on school schedule. Although it lasted only a minute in time, it will last a longer time I am sure, because the lesson was applied in action.

The other day a man from the automobile club came up to the office to see about putting up caution signs near the school. I said, "I think the boys and girls would like to see what you are doing." So while he was doing that on the street we went out by turns and looked out of the window to watch him. Do you suppose we are going to forget that those signs are there? That is the way lessons are learned in life and because that is true, we try to take a leaf from life as a lesson for the school.

We try to take advantage of the situations that come up and let the children learn as much as possible from them. Such "lessons" are always interesting. The new way of substituting life learnings for lessons gives us that freedom to mention a thing at the right time, which so many of us in progressive schools have felt the lack of. I mean that we do not simply do things when our clocks tell us to do them, neglecting all other considerations.

There is another difference between the old and the new way. Too much emphasis on habit learning makes people good animals but not very good human beings. I am saying that because I mean it that way. We do need to do certain very routine things by habit, but the habit ridden person has trouble when he is in a new place. He doesn't know how to adjust himself when he meets the novel or unexpected. We do need habits in certain phases of life, but we also need something else in our education, and that is the type of education that does not make us slaves to habit but encourages us to look at what comes up naturally—not simply perfecting our responses to things we have met before, to be done in the same way, without thinking, but giving us numerous and varied new situations to be faced as problems in ways that we have not learned in advance.

Progressive practice is characteristic of the newer type of elementary school and is becoming increasingly common in all our schools. There are many, many progressive rooms in schools which might be even more progressive if leadership just realized what the new movement means. There are many progressive public schools

all over the country and there are schools and school systems that are either wedded to what was good enough for father or not quite ready to move away from what has always been done. Then, there are schools that are trying to blaze the trail and give other people courage in doing things that are not as impossible as they seem. They are experimenting to find what can be done, in reconceiving elementary education, and living with children in a rich naturalness, taking advantage of their attitudes and respecting their individuality.

We are living in a changing world and we cannot hope to give these children habits that will protect them all their lives. They must be made sensitive to their environment, responsive to what happens and equal to new situations that are complex and full of all sorts of unpredictable possibilities. I want to tell you that teaching thus conceived isn't easier than the other job, and that explains why some people don't tackle it. It required an amount of vital concern for children that is altogether different from precedents. You can't find it in the textbooks anywhere. Nobody will tell you where you can "take" that education. You have both to have professional insight and preparedness to take advantage of situations yourself as they arise. Those of us who are in university research work along these lines and in teacher training work trying to make this type of teacher, are tackling a great work. Our children need teachers who are not mere job holders, who are not merely doing what they are trained to do in a deadly routine fashion, but people who are capable and responsible enough to live adventuresome lives with children, constantly learning to do it better through trying to accept the challenging implications of a new conception of the education and a new way of judging it.

CHAIRMAN BRISTOW: I think it is very appropriate that we should have on the program a representative of a Chicago school, and particularly fine that we should now hear from Miss Christine Bednar.

The Relationship of Safety to Health Education

By CHRISTINE BEDNAR

Principal, Parker Practice School, Chicago, Ill.

I was rather impressed with the number of times Dr. Zirbes used the word responsibility. It is the word engraved on the corner stone of our new Parker Junior High School. So perhaps Col. Parker has left with us a vestige of what he stood for.

I am to speak on the relation of Safety to Health Education. Health Education concerns itself with the development and conservation of human life through the building up of health habits, the formation of right attitudes and worthy ideals of health, and the acquisition of knowledge about health. The goal is behavior that is in accord with our present knowledge of healthful living; physical, mental, emotional and social.

In the words of Miss Stevenson "Safety Education is generally understood to mean teaching children to avoid accidents to themselves and to feel responsibility for the prevention of accidents to others. But it is more than that because safety is a fundamental condition of life and as such implies purpose, and teaching safety is teaching how to so control the factors of an environment that a purpose may be realized." So safety education aims at purposeful and healthful living whose goal again is behavior of the highest type. Safety education is, therefore, a part of what we school people term health education, which has for its goal child health and protection, with special emphasis on the protection where the very young child is concerned.

Several years ago when Chicago sent out its first draft of the course of study in health education, the committee received a letter of protest from one of our school men who objected to the inclusion of the topic of safety under health education. He had made quite a study of safety, was in fact co-author of a planbook in safety education and he felt that the subject was so important that it merited a place of its own

in the curriculum and the daily schedule. He doubtless felt that making it a part of a larger field would result in its receiving less attention than it merits, of which, of course, there may be some danger. Since, however, it is so intimately connected with health in the broader sense and since only the individual who has been able to avoid accidents successfully can in any sense be certain to profit by the other phases of health instruction, safety instruction should be tied up with and reinforced by health education and both should be tied up with and integrated with every phase of the school curriculum and with the child's life outside of the school. As educators we realize that we should stress the positive aspects of conduct if we wish to get most favorable results. Listing safety as a sub-division under health decreases the dangers of its being regarded as accident prevention only because it ties it up with the many aspects of health which we are trying to approach positively and constructively.

To me as a teacher and citizen it makes little or no difference whether Frank's absence from school is due to scarlet fever contracted while on a visit to a sick friend whom he went to see while the Board of Health placard was still on the door, or whether it is due to serious injuries resulting from an encounter with an automobile, an encounter he could have avoided had he crossed with the lights instead of against them. The first could have been avoided by knowledge of sanitation (a health measure) coupled with a desire to live up to that knowledge; the second could have been avoided by a knowledge of traffic regulations (a safety measure) coupled with a desire to live up to them. In either case Frank is paying dearly for his ignorance or lack of training and insight. His home is paying and society is paying. And Frank may continue to pay to the end of his days either by partial or total deafness left in the wake of scarlet fever or by an amputation necessitated as the result of the accident. Adequate health instruction in the school and reasonable co-operation in the home should be able to prevent either of the occurrences mentioned.

During the last two days safety experts from the various fields have been meeting in their Twentieth Annual Congress and Exposition to consider ways and means of reducing the terrific accident toll of the 99,000 lives recorded in the United States last year. And, of course, that means many more than 99,000 that will go through life maimed and crippled and with diminished vitality because they encountered hazards for which they were not prepared, or took risks they should not have attempted.

We are told that our death rate from accidents is about double that of any European country and that it is almost 25 per cent more than that of Canada. Furthermore it is on the increase, having gone from 72 per 100,000 in 1919 to 81 per 100,000 in 1929—a gain of 9 points. There is a ray of hope, however, in the fact that during the last five years of that period or from 1925 to 1929 the increase was only two and one half. During the last 17 years, or from 1913 to 1930 deaths from automobiles have increased from 4,000 to 33,000 and the estimate from quarterly reports is that it will mount to 35,000 for 1931.

It is estimated that there are 35 non-fatal accidents to every fatal accident, making a total of one and one quarter million persons injured by automobiles this year. Since life is continually becoming more complex and our civilization is becoming more mechanized and speeded up, we can expect accidents to increase unless there are forces set in motion to counteract that increase. The fact that the total mortality rate from accidents shows such slight increase, for example, but two and one half points from 1925 to 1929, would seem to indicate that something is being done to help solve the problem.

There are three directions from which we may look for help: the field of mechanics and engineering; legislation, and law enforcement and education. We know much is being done in the improvement of mechanical devices and industrial constructions of many sorts in the various fields, that laws are being enacted for the protection of workers in some of these fields. Bodies like the National Safety Council and the International Commerce Commission are working on these problems. They are succeeding if it is true that the annual toll of 30,000 deaths due to accidents in homes is 43 per cent more than the combined total of fatalities in manufacturing plants,

mines, airplanes, railroad trains, and in agriculture and public utilities. The American home should certainly be as safe a place in which to sojourn as is the industrial and manufacturing plant.

If, as has so frequently been stated, carelessness and ignorance are the most frequent causes of accidents we need more education along accident prevention lines. About 10 to 12 years ago organization for safety teaching was undertaken in some of our city schools and the movement has been growing rapidly. In 1929, 94 per cent of the 1,860 schools which replied to a questionnaire reported safety instruction in their elementary schools and two thirds of them reported having courses in their high schools. We have some rather interesting data that bear directly on this introduction of safety teaching into our schools. In the seven years from 1922 to 1928, accidental deaths of adults increased 32 per cent. During the same period deaths of children under 15 remained practically at a standstill, the increase being only one sixth of one percent. Had the increase in children's deaths kept pace with the increase in adult deaths close to 7,000 more children would have been victims of fatal accidents in 1928. Bringing the results up to date, Mr. Whitney says that there is an increase in accidental deaths of adults of 38 per cent and a decrease of 2.3 per cent for children. In other words, the results for children are getting better all the time.

If we study motor vehicle traffic accidents alone the results are even more startling and show unmistakably that safety education pays. In a comparison of the 1929 with the 1927 accident fatalities we find an increase of 24 per cent in adult fatalities as compared with a decrease of 9 per cent in those of children of school age. And bringing the results up to date, Mr. Whitney says there was a 28 per cent increase in the deaths of adults, a decrease of 10 per cent in fatalities for children of pre-school age and a decrease of 19 per cent in fatalities for children of school age. The figures are startling good. If the adult deaths had diminished at the same rate as the children's deaths there would have been 23,000 fewer adults killed. Reports from cities the size of Detroit, St. Paul, St. Louis and Louisville show decreases of from 47 to 66 per cent in fatalities due to traffic accidents to school children within the first five or six years after safety teaching was seriously undertaken.

The data I have presented come from various pamphlets issued by the National Safety Council and from recent local newspapers and much of it comes from Miss Stevenson's book on Safety Education. To many of you it may be but a repetition of what you have either known or have been hearing at this Congress but to us school people it is startling and I feel cannot but serve as a spur to more and better safety instruction in our schools and in our communities.

Wherever possible education in safety as in health should be connected up with the child's everyday experience. This is illustrated by lessons like this reading chart which I found in a first grade room yesterday. The text of the chart was this: "We went to see a stop and go sign. We saw three colors. Green says go. Orange says wait. Red says stop." Then there was an illustration in color of a stop and go sign. There is bound to be a carry-over into the child's behavior when we have instruction so vividly and so interestingly presented. And not only does the child himself get the lesson but he carries it home to his family. The illustrated notebooks that the children prepare with the aid of cut-outs obtained frequently with the help of older members of the family are very helpful. When the books are finished they are taken home so that parents can see them. They thus carry their message into the home. Posters prepared in the art classes illustrating certain phases of health and safety education are good teaching material. So also are original plays and dramatizations put on by one room for another. A play obtained in printed form and memorized may have its value, but it doesn't begin to have the value that the plays have that the children themselves write with the idea of teaching a lesson to groups less well informed than themselves. Every year we find first grade groups dramatizing traffic. The children enter into it with all seriousness and so they learn the lesson which they try to teach.

We have assemblies where the children recount their experiences and illustrate

them in various ways. Occasionally we have demonstrations by boy or girl scouts. The school bulletin board and the safety columns in the school paper are more channels for safety instruction. The school paper is mimeographed and given out to the pupils. These are all ways of emphasizing safety teaching throughout the school.

There are some things we have to teach that we cannot connect with a life experience except at second hand. The street railway sent out a film several years ago that demonstrated the correct ways of getting on and off street cars. We found this most instructive. To little children the movies are just as real as life itself. Carefully staged scenes of how to avoid or how to meet certain contingencies could be made up into teaching material both interesting and instructive.

Both safety and health if they are to be effectively taught require a more intimate knowledge of the individual child and his home environment if there is to be an adequate and satisfactory carry-over into out-of-school conduct. We all know children whose response under group suggestion in the school environment is very satisfactory, who respond just as readily to suggestions quite the opposite outside of the school group. In other words, one cannot generalize. Both safety and health are very largely individual matters.

In our school we have three very bad traffic lanes, Normal Boulevard just west of us, Marquette Road a block north, and 69th Street which has a car line with very heavy traffic just south of us. I should say that fully two-thirds of our children have to cross one of these three lanes in coming to school. We had had a great deal of trouble with the children coming to school before 8:30 and staying on the school grounds to play until after 5 o'clock, but when we talked to the parents and acquainted them with the fact that there is police protection from 8:30 to 9 and from 3 to 3:30, conditions improved. Of course we have to keep everlastingly at it. You get one group of parents educated to local conditions and they move and you have to start all over again.

Our efforts to get in touch with parents are several fold. We occasionally write letters to the homes setting forth certain points in regard to cooperation in health and safety measures. We have meetings once a month and find that parents are very much interested in seeing the work the school is doing. For the past three years we have had parent study classes and right conduct and how to secure it—in other words safety education—comes in for its share of attention in these classes.

In closing I want to say that the trouble with the average adult who has done little or no thinking upon the problem is that he seems to think that the school can teach children safety without his help. He thinks that we can teach children safety measures that they can use directly ten or fifteen years from now when they are adults. Automobiles may not be as antiquated in 1945 as the horse and buggy are today, and yet we may all be dodging airplanes then and that technic has not yet been worked out. We should try to develop right attitudes, worthy ideals and straight thinking and then behavior in adult life will take care of itself.

E. ROSS FARRA (Grand Rapids Safety Council): May I ask if you know of any study having been made indicating the percentage of lost time in the school from sickness and its relation to the lost time accident? It seems to me that would be very interesting information.

MR. SHAW (Public Schools): We haven't any statistics available but we are doing this in cooperation with the National Safety Council. We are carrying on a study of accidents reported which will eventually lead to a study of lost time from school in comparison to time lost from illness. We have statistics available for one year, our school year of ten months.

MR. FARRA (Grand Rapids Safety Council): We have the accident reporting system in Grand Rapids. Ours was one of the first cities to put it in. There isn't a word in that report that I know of about lost time from sickness. I know that in certain groups of industries there is twelve times as much lost time from sickness as from accidents. It seemed to me if we could indicate to the school authorities and to our group of women in our Home Safety Division that there was a real problem here, we might be able to work out some reports and try to correct this condition.

A. D. BATTY (Statistical Division, National Safety Council): It is true that the student accident reporting system does not attempt to cover anything but accidents. So far as I know there isn't any information available on the amount of lost time due to sickness. It may be that some schools have been keeping records and would be in a position to bring in data by grades and perhaps by types of illnesses and thereby provide a source of information such as Mr. Farra would like to get. I would like very much to see such information myself. It has been quite a task to get the schools to keep the student accident reporting system. When we get that problem solved we may turn to statistics of sickness merely as a matter of comparison with accident data.

CHAIRMAN BRISTOW: There is an Attendance Bureau in a great many cities. It has data on the number of days lost by sickness. We have in our own state such a bureau, and we could get such data for our own community. I am not sure just how generally that plan is followed out throughout the states.

Mr. FARRA: We do get it from our attendance, and we are hoping shortly to make a survey of that kind.

Dr. HERBERT J. STACK (National Bureau of Casualty and Surety Underwriters, New York City): I just want to say a word about Dr. Zirbes's talk. I think it is one of the finest things that we have ever had in any safety meeting, and I am so sorry that more of our local council people and more of our safety members were not with us here this afternoon. She painted on one side a picture of the common kind of practice in safety teaching that I see every day, and she painted on the other side a picture that we have got to go looking for. In other words, less rules, less regulations, and less of those things which haven't great educational value.

We want to get in with this thing which she talked about today—the progressive school. To me it is real education. Her talk is a wonderfully fine contribution and I hope that you people here will begin interpreting it in terms of the work which you are doing. Try more and more to get teachers with whom you can work and do the thing which she suggested.

F. W. ROMENHEBER (Louisville, Ky.): The thing for us to do is to see that this realization of safety work is expressed in the places where we came from. We may have a principal and three or four teachers who are interested, but we must see that it is taught in the school. One of the best means we have found for making people interested in this problem is through the student accident reporting system. We have been using it only since January.

A teacher collecting data with reference to the absence of her children realizes the great number that are absent. She says, "We have had one hundred days lost in this room this month. We have to do something about it." She realizes what it means.

ADJOURNMENT

Thursday Morning Session October 15, 1931

DR. THOMAS W. GOSLING, Chairman
Superintendent of Schools, Akron, O.

The next general session of the Child Education Section convened with Dr. Thomas W. Gosling presiding.

CHAIRMAN GOSLING: This session of the Child Education Section is held for the specific purpose of offering concrete material that may be used by teachers in classrooms. That will be the trend running through the talks in this morning's meeting. The first talk will be given by Mr. W. F. Campbell, Field Secretary of the Boys' Club Federation of America.

Organized Safety Activities for Boys

By WILLIAM F. CAMPBELL
Boys' Club Federation of America, New York City

The topic for this session is one which should interest parent, educator and welfare worker alike. It does not matter in which of these fields one finds specific responsibility, interest or occupation; here is a challenge in a common cause of safety.

I must say at the outset that I am not qualified to discuss this topic in an authoritative manner, since the knowledge and experience from which I must speak has been confined to work with boys. More specifically with Boys' Club activities. As a young man in my 'teens, I might have "discussed" the girl question, but the judgment of mature years imposes considerable doubt as to the probable value of what I might have said.

I will, therefore, confine my remarks more specifically to boys' activities. With your further indulgence, I shall attempt only to indicate a partial outline of organized safety activities for Boys' Clubs, and specially discuss but two or three phases of this work.

What do we mean by the phrase "Organized Safety Activities for Boys?" Does that safety relate only to physical hazards, or does it comprehend moral, social and economic safety as well? Do we visualize our program activities in terms of the slogan "Safety First", and does that slogan mean a series of prohibitions and suppressions by means of which we reduce the accident rate and at the same time remove the spirit of adventure that enriches the experiences of life?

I introduce these questions, not for the purpose of projecting an extended philosophical discussion of the topic, but simply to stimulate thought upon an interpretation of what the subject means from the Boys' Club viewpoint.

There are doubtless those among you who have not fully visualized the principles and purposes of the Boys' Club program. For the benefit of these, I will briefly state the objectives of this work and quickly visualize a Boys' Club unit in action.

The name "Boys' Club" does not mean any group of boys. It refers specifically to the plan and method of work as conducted by 253 Boys' Clubs affiliated with the Boys' Club Federation of America. There is a membership of 238,497 boys in these clubs; an average of 942 boys per unit. The number of workers, both paid and volunteer, is 11,766 persons, or 46 workers per club.

The primary objective is made clear by the Federation motto: "Character Building for Citizenship."

Boys' Clubs have met with marked success in reducing delinquency—the negative manifestation of character—in areas of unfavorable environment—the slum sections of our cities. This success is due almost wholly to the continuous influence of good

leadership through interesting daily activities that fill the danger hours after school and before bedtime, with wholesome, healthful and constructive influences.

A typical Boys' Club is housed in a building that is regarded by the boys as their property;—the club developing thereby a sense of ownership, that in turn promotes a spirit of belonging, of unity, of fair play, and of loyalty. The club attacks the dangers of bad neighborhood influences by its own weapon—the gang—a natural phenomena of youthful organization.

A typical Boys' Club may attract a daily attendance of from 200 to 3,000 different boys. Here will be found a gymnasium, shower baths, and in many cases, a swimming pool. There are rooms for quiet games, a library filled with the kind of books boys most enjoy. Yes, there are shops with tools, where they build instead of destroy. Emphasis is not upon what the boy does to the piece of wood, steel or clay, but upon what these things do to shape his character, and to equip him to meet the exigencies of life ahead.

In addition, there are the dental and medical clinics in charge of a qualified dentist and doctor. Here the individual problems of health, safety and well-being are carefully watched. Operative, surgical, dental, optical, medical and orthopedic cases are referred to cooperating agencies for treatment and correction. From the point of view of preventive work, these welfare activities of the Boys' Club have an important correlation with the problems of safety, for they definitely remove some of the hazards to which physically defective boys are predisposed. As for measurable results, there have been records where a Boys' Club unit has secured the correction of defects in over 500 boys during a single year. The Boys' Clubs of New York, the Union League Foundation for Boys' Clubs in Chicago, Detroit Boys' Club and Erie Boys' Club are a few of such organizations where these activities are being conducted.

The National Safety Council has developed street accident maps that show the geographical distribution of cases, in order that the focal points where accidents occur, may be more clearly visualized. These points are then studied and plans developed whereby such accidents may be eliminated or minimized. Such map studies represent the physical hazard of safety.

The Boys' Club Federation of America has studied the police and juvenile court records of more than 200 cities. At headquarters in New York City, are the street maps of many of these, including all the principal cities in these United States. Upon these maps have been spotted the residences of boys who, by the record of the court, have been apprehended for delinquency and crime of one kind or another. These maps indicate the focal point at which moral hazards have become so serious that the law must take a hand. In terms of this conference, these spots indicate the moral hazards of safety.

Now, what have these map studies of boy delinquency to do with the problem of accident prevention and safety? Merely this, map studies by the National Safety Council, when compared with delinquency spot maps, indicate a curious similarity. In areas of traffic and housing congestion, we find our spots.

Obviously there are areas where traffic accidents and moral hazards do not always coincide. Indications, however, seem to point to the conclusion that wherever spot maps show a serious delinquency, there also will be found a physical safety hazard as well. It follows, therefore, that delinquency and safety are very definitely correlated.

Problems of the National Safety Council and those of the Boys' Club Federation of America are quite similar in some respects, with a primary difference in emphasis on physical, moral and social safety.

Many Boys' Club units conduct first aid classes; in other safety patrols of uniformed boys, with limited police authority, guard the dangerous street intersections near the schools and club; life saving is taught at most of the 124 summer camps and in the 36 swimming pools. Time does not permit me to elaborate on all of these, but there is one program that is worthy of detailed consideration.

For a number of years the Pawtucket (Rhode Island) Boys' Club has undertaken the task of reducing the number of drowning accidents that occur in that community. It was found that approximately 8,500 boys between the ages of 8 and 18 years were residents of that city. This meant that each year 8-year old boys numbered approximately 850 individuals. If, therefore, such a number could be taught to swim properly each year, water hazards would be minimized. It was assumed that wherever there is water, there would be boys, also, and these are inseparable associates.

The daily newspaper was enlisted to cooperate with the club and a ten weeks' intensive swimming campaign was inaugurated in the Boys' Club pool. Any boy could join these swimming classes by merely clipping a coupon from the paper, and after securing the endorsement of his parents, and presenting the coupon at the club, he could become a member of one of these classes. Dressing facilities, towels, soap, showers and instruction were furnished free to all applicants who could produce the properly endorsed coupon.

Youngsters were assigned to classes with about 60 boys to the group—given a time to report daily and at the first appearance—each was given a physical examination by the club physician. Heart defects and symptoms of contagious disease were the doctor's only disqualifying conditions. Classes of instruction began at 7:45 in the morning, and followed, each 45 minutes, until two o'clock. Two instructors and six qualified life guards undertook the instruction work. Beginning with the fifth lesson, and each day thereafter, tests were made of swimming ability. As boys were able to pass qualifying tests, they were re-assigned to advanced groups. Vacancies in the beginners' classes were filled with other boys, whose names were on the waiting list, and successful swimmers were dropped when satisfactory standard tests were passed.

Several problems developed that had to be met. One of the most trying of these was the boy who came only once or twice and before actually learning to swim, dropped out. Another was the dry land swimmer, who would not get wet. Can anyone imagine a boy who does not want to learn to swim? Well, there were a number of boys in each of these groups.

It soon became evident that in spite of everything, 850 different boys could not be taught by this method, because they would not come—or they would not try. Accordingly, two girls were added to the clerical staff in the office and a series of follow-up letters inaugurated that resulted in bringing the parents to assist, by compelling regular attendance. Teaching methods were revised in the light of experience. The play element because a greater incentive, and the daring of the more forward individuals used to stimulate the timid ones in competition.

This club has never quite reached its goal of 850 boy swimmers during the ten weeks campaign. It has, however, taught approximately 1,000 swimmers a year, but a portion of these were girls, who were given a place in the safety swimming campaign.

This organization conducts extensive life-saving classes and teaches every boy the prone-pressure method of resuscitation, whether he is a qualified swimmer or not. This latter plan is followed on the theory that a rescue may be made by a poor or even a non-swimmer, and this knowledge may save a life.

I have not the latest facts at hand concerning the water facilities of this city, but you can rest assured that this type of city-wide intensive effort has reduced drowning fatalities to a minimum.

In conclusion, may I add the thought that much of our safety work is an educational process. Swimming, camping, hiking and many other physical activities are of a hazardous nature, requiring careful supervision and regulation. In our efforts to reduce the accident rate, let us weigh the slogan of "Safety First" with its suppressions and prohibitions, against the educational values that these activities teach.

CHAIRMAN GOSLING: In speaking of the manual activities of boys Mr. Campbell said that what the boy does to the thing is not so important as what the thing does to the boy. That is very important, and I believe that conception would make over a lot of our ideas if used in all its implications.

I am pleased to introduce our next speaker Captain Fred C. Mills, of the Boy Scouts of America.

Organized Safety Activities for Boys and Girls

By CAPTAIN FRED C. MILLS
Boy Scouts of America, New York City

In 1929 drowning accidents ranked third as a cause of accidental deaths in the United States. They are exceeded only by automobile accidents and falls. There has been a great decrease in drowning accidents between 1913 and 1929: probably due to a large extent to the great program of life saving which has been led by the Red Cross.

Before going into the consideration of a means of preventing drowning accidents it would probably be well for us to understand why and how they occur. Based on twenty-five years of experience and the study of many cases, it is my opinion that the greater percentage of these drowning accidents occur as the result of health conditions—bad hearts, epileptic conditions, or fainting. I know in our own organization, which has almost 900,000 members, that the accidents which occur in the water can almost invariably be traced to the physical condition of the victim. Next in sequence I think would be drowning caused by fear, or rather from exhaustion which very frequently is brought on by fear. These deaths are a result of human failure, either physical or mental. Frequently persons who are in distress become alarmed and quit. These people do not have that thing we heard about last night called "spizzerinktum," the determination to succeed. There are not very many drowning causes, I think, that would fall outside these two. There are not many cases where the water jumps up and drags a person down. Such cases are almost entirely confined to vessels going down, people being trapped in a tidal wave, or a building being washed into the sea. Most people who do drown generally swim a little, usually just enough to get themselves into trouble. Many accidents occur from abandoning boats that capsize, or from a person's inability to correct his position in the water. In cramps, of course, the principal danger is the fear which the cramp causes, which is really physical or mental failure.

In considering means of prevention, let us think first of who should be taught to swim. I was interested in Mr. Campbell's statement that every boy who took the swimming course in the Boys' Club had been given a physical examination and kept out when he could not pass it. As I said before, practically all drowning accidents in scout camps have been traced to the physical condition of the victim. Two years ago we adopted a plan of having each boy take to the examining doctor his health history filled out by his parents, telling not only the minor ailments but whether he had any serious disease and whether he was under medical care at the time. In one Chicago camp in a two weeks period eleven boys were kept from swimming because of heart conditions. In another camp this year men were exempted from physical examinations. One man went into the water and within two minutes was brought out dead. When the matter was investigated it was found that he was under the care of a physician for a heart condition, and not having the history the doctor had not caught it. In another case a man had an epileptic fit in the water and went down: however he was brought out and resuscitated. Of course neither of these men should have been permitted to swim.

People should not swim who have a sinus condition, and those who have a real fear of water should stay ashore, it seems to me, unless they go to a very excellent instructor and are determined to get over their fear. The American Medical Associa-

tion has made a request to the Boy Scouts of America that all boys who have sinus and ear trouble be kept out of the water, and certainly be kept from taking deep dives or working under water. Swimming under such conditions frequently leads to very serious trouble, and many, I believe, even result fatally.

The Red Cross a few years ago placed in its examination for a swimmer's rating a requirement to the effect that a person must go into the water feet first, then come up and level off to a swimming position. Then he must swim a certain distance, assume a standing position in the water, turn about and return to start. A great many accidents result from not knowing how to get from standing position into swimming position because most people learn to swim in shallow water. When they have sufficient confidence they decide to swim out to a float. They get half way out, it is their first experience and they begin to tighten up. They wonder if they can touch bottom, and after trying and failing, they find they cannot resume the flat swimming position and then they are in trouble. The head must be dropped forward quickly to get into a swimming position from a standing position, and many people have not learned this.

Another very important thing is to teach those that go out in boats to hang on to the boat in case of an accident. A great many people have been drowned because they deserted the boat and attempted to swim ashore. Many of you read of the case on Lake Erie where a man went out in a boat with his daughter and niece. The niece jumped overboard, the daughter jumped in to help her, then the man jumped in to aid the girls but none could swim and all drowned. Had the man known how to handle the boat he would have backed it around and rescued both children. Frequently in boat accidents the non-swimmer is saved and the swimmer is drowned. The non-swimmer stays with the boat and the swimmer leaves the boat and tries to swim to shore.

Seats should not be permitted in canoes. They should be taken out and kneeling pads put in and the children instructed how to paddle while kneeling, which is a much safer and more effective way. A canoe is not a dangerous craft if properly handled.

In cramps it is usually fright that causes the danger. Cramps usually occur in the calf, the thigh, or the side of the leg. If the person who has the cramp keeps cool and does not become frightened, he can relieve the cramped muscles by hard pinching. People subject to cramps should stay close to shore or swim with a companion. Another dangerous practice is swimming alone or swimming off shore without a boat.

Practically every boy and girl can be taught to swim, and if we do our utmost to teach them we will probably have a very much safer and healthier world. Swimming is the most popular sport in any boys' or girls' camp. It is essential to every child's happiness. That is probably becoming true in the home also. Great swimming pools are being added to recreation centers all over the country. If children are taught to swim properly when young, their fear of water will be eliminated. It becomes an element in which they are as happy as they are ashore.

Swimming, it has been said, is not natural for human beings. All our principles of self preservation are lost in the water, and we must find them anew and accustom ourselves to the different element. I believe as time goes on and we continue, as we have in the past, to build more swimming pools and make swimming available to more people, we will make the water an even more enjoyable place to be in, and year by year it will come to be understood as a source of health and pleasure, rather than shunned for its over-advertised danger.

Possibly one more point may be of interest. Recently there was formulated by a committee made up of people who had studied conditions, a set of twenty-three rules for water front planning and camp safety. These rules are available through the Boy Scouts of America, included in a book on water safety, and I shall be glad to help anyone secure this who is interested. These rules are quite a change from those

which were used in the past, and we think will do a great deal of good in safety work in this direction.

CHAIRMAN GOSLING: Our next speaker is Mr. William Prinz, of Dayton, O.

Organized Safety Activities for Boys and Girls

By WILLIAM PRINZ
Public Schools, Dayton, O.

I take it that most of those present are school people, and I have been asked to present an outline of the organization we have in Dayton for preventive work. Our efforts have been directed toward the organization of the pupils in such a way that we prevent accidents—we try to keep them from occurring.

Our new superintendent, Mr. C. V. Courter, came from Flint, Michigan. Shortly after he came he appointed a committee, which he calls the Junior Citizens League Committee. We wrote to all organizations in the country asking for any information on this work that was available, and found that at Flint and Des Moines they had very excellent organizations.

Every school has a Junior Citizens League, and every one in the school is a member. Every home room is organized, has a president, vice-president and secretary. Every home room sends its delegates to the school council. The school council elects its own president and secretary. We have one organization including the fourth, fifth and sixth grades, another including the seventh, eighth and ninth grades. We feel that the lower grades will not be capable of doing the same kind of work as the seventh, eighth and ninth are capable of doing. We have many schools which include only the first six grades and it is necessary to set up a separate organization. The school council then appoints the chairmen of the various commissions. We have six commissions which we ask them to set up, but any school is at liberty to set up any commission that is necessary. We have safety, social service, student organization, assembly—quite a number of health commissions, others health and courtesy. The only one you are interested in, I take it, is the safety commission.

The safety commission is headed by a student from the student council. That student, with the assistance of the teacher appointed by the principal, selects four other pupils from the school group, so there are at least five pupils on the safety commission headed by the teacher—who is supposed to be seen and not heard. The pupils are the workers. The teacher is there to direct as nearly as she can without talking. I want to make that point clear, because we want to throw the responsibility upon the pupils. They do the work. The purpose of the League is to teach the pupils to have the right attitude, and right habits, not only toward school life but toward community life. Our social service will reach into the community. They will have a lot to do when the community chest drive is on. We think we are going to put it over, though it will be a hard job this year.

The safety commission consisting of five pupils and the teacher, then is divided into three groups. We have the safety patrol, as I imagine most of you have, a fire prevention squad and a first aid squad. We have fifty-four boys on the safety patrol. The safety squads are on the streets co-operating with the police. They do not make arrests, they are not supposed to stop automobiles, they merely control student traffic. But if an automobile does violate any ordinance it is reported and the motorist is called before the safety director of the city.

The fire prevention squad is almost as large as the safety squad. The boys in charge of that squad select as many as are necessary to carry on the work in the building. There are boys at every door when we have fire drills. When we have an assembly we have boys at each exit. It is their duty to see that the exit lights are burning; if not, they are to report them. It is their job also to see that there are no burned out bulbs behind the signs. They are on the stage to see that nothing happens there. We use the girls to come to the lower classes and help the teachers. The

teacher precedes the pupils in fire drills, and the girls follow the class to see that they all get out. We have learned that it is the panic, the jamming, that causes loss of life. Girls are usually neglected in such campaigns but we use them.

The first aid squads are organized in the groups in the same way. We have various kinds of first aid—at home, on the streets, in the water. We call in doctors and nurses, the physical director of the Y. M. C. A., to give talks before the entire League and to tell them what to do in certain emergencies. This year we are trying to get an account of all accidents happening in the schools or on the road to and from the schools as well as in the home. It took us four months to get things down to a working basis, so there was only the latter part of last year that the Junior Citizens League was really organized in Dayton, but we are going ahead. Now the committee meets twice a month; last year we met once a week.

We tried to use the cards issued by the National Safety Council, but we felt they were too detailed, so we are getting out a simpler report and will keep track of the accidents that happen. Before the close of the year we will have a study made of all accidents and will know where emphasis must be placed next year to prevent repetition of these accidents.

Remarkable Cooperation

It is a tremendous job to keep the pupils alive and working in the organization to get all the things done that we ask them to do, but it is really remarkable the way they take hold of the organization and go about the work. I think in an organization of this kind we may have between two and three hundred pupils working, by changing the lists twice a year. The officers are elected for a semester. In some schools we will have practically all the pupils in the grades that are organized, and in the larger schools at least half.

So far as pupil government is concerned, sometimes it works, sometimes it does not, and I think it has been pretty well abandoned. This organization gives the pupils a chance to participate in the school activities as well as outside the school. We want them interested, we want to make them better citizens. We want to give them a part in the work being done throughout the city. In one school they have their own letterheads. So far as we can judge, the commissions are doing a great deal of good work. At the end of last year we asked various principals to send us a report of the work done during the year. We send out bulletins from time to time on the work of the various commissions, but each principal has the right to initiate any other organization that he or she feels is needed. The work is not the same throughout all the schools; we send out the basic bulletin and they add to it. We asked the principals for their opinion of the Junior Citizens League and we did not have a single criticism from the fifty-five schools in the city. They said the neighborhoods were better pleased, they had no trouble with property owners in the neighborhood, not nearly so much trouble with the boys and girls being on the streets, and the fire department gave us credit for having reduced false alarms in the city, by at least 50 per cent. The fire patrols are instructed to report to the chief of the fire department any persons found tampering with the fire alarm boxes.

CHAIRMAN GOSLING: Reports from the schools of accidents to pupils are placed on my desk regularly, and I find that they almost exactly coincide with the statistical reports of the Safety Council. There are more accidents occurring outside school than in school. The oddest kinds of accidents happen while they are at play—falling on broken glass, running into barbed wire fences; the accidents due to that are surprisingly numerous. If a Junior Citizens League could clear up the glass or tear down the barbed wire, our reports would be much more favorable.

Our next speaker on this subject will be Mr. F. C. Lynch, director of the Kansas City Safety Council.

Organized Safety Activity for Boys and Girls

By F. C. LYNCH

Director, Kansas City Safety Council, Kansas City, Mo.

When we bring together the children into a safety organization the child finds itself, for the first time perhaps, participating in an activity wherein consideration and self sacrifice must be made for the welfare of others in the group. Many children have been raised in an environment where most of the consideration has been given to their welfare and their happiness; thus we are liable to be confronted with a very difficult problem in convincing the child that he must not only begin to share some of the responsibility for his own individual welfare, but that it will also be necessary, in new associations, to give consideration and make personal sacrifices for the welfare of fellow members. This situation with which we are confronted when organizing our new activities compels us, in order to be successful, to analyze very carefully our objectives and employ great strategy in working out our methods. We should honestly measure our results and if improvements are not forth coming from the conditions existing, diversion should be employed in order to obtain greater progress in reaching our objectives.

Objectives

Students of the accident problem of today have given considerable publicity to the expression—"safety consciousness" and while this expression does seem to more nearly fit the ideal than does the old, original phrase—"safety first," I still fear that this will be a misleading objective for child safety organization. We are liable to confuse the expression—"safety consciousness" with the thought of self preservation and thus develop a program of teaching the child the desirability of living, whereas, most of us will agree that there is inherently within the child the instinct of self-preservation and it does not have to be developed by outside activities. A much better objective to use for planning our work for a child organization would be "hazard consciousness."

I know that many of you who have already agreed with me in substitution of the words, "hazard consciousness" for "safety consciousness" or "safety first," are also disagreeing with me in your quick application of this clause to the program because it is quite apparent that with this as the only objective in our work, we would not obtain the desired results. In order to assure you that I have not omitted any of the more essential objectives of our program, let me quickly add some other objectives, in order that we may cover the entire field before any further discussion.

To make our program complete we will have to develop skill, judgment, alertness, self-control, self-government, and self sacrifice. In order that you may more clearly understand the thought which I hope to leave with you, let us take for an example the very simple exposure to which every child is subjected. The task of going down stairs is a very good example. Every child, prior to the age when they are ready to become associated in this organized safety activity has personally experienced the hazard connected with stair ways and thus they are already "hazard conscious" in this situation. However, if it were a new adventure, we could very easily, by stories and sketches, illustrate the hazard and thus develop the "hazard consciousness."

Let us take for the meaning of the word, "skill", the knowledge of execution. You can very quickly see that the child could be taught how to walk down the stairs without ever having actually walked down a set of stairs. By drawings and by discussions the child would come to know the proper method of going down the stairs. Therein the child would be skillful. The child is entitled to its adventures, therefore, must be taught to skillfully experience them.

The child would never become possessed of proper judgment for going down the stairs until he actually had experienced this maneuver. And only after several

experiences would he be able to have sufficient judgment to insure that he could properly descend the stairs without accident. The child must develop judgment in crossing the street without being struck by an approaching motor car, without ever experiencing a failure.

The alertness of the child is a very important factor in determining the accident frequency resulting from falls on stairs. The child might be conscious of the hazard of the stairs and skillful in descending them, together with sufficient experience so that his judgment was all that could be desired, but with all of these, if the child is not alert and has his mind on something else other than the immediate task of descending the stairs, accidents are most likely to result. An actual experience will perhaps make this thought more clear. An industrial establishment found that they were having a large number of falls on a certain stairway leading from one floor to another, both of which were occupied by girls and between which there was considerable communication. An analysis of these accidents developed that there was a mirror on the wall directly in front of these stairs and it was found that the girls invariably looked into the mirror instead of at the stairs. A removal of the mirror practically eliminated the accidents. The girls were unquestionably conscious of the hazard of stairs, they were skillful and they were possessed of sufficient judgment, but their alertness factor was reduced because of the presence of the mirror and the accidents resulted.

Self control frequently is found to be an important factor in accident frequency, or perhaps I should say—lack of self control. For example, the child is descending the stairs, and could be hazard conscious, skillful, with good judgment, alert to the hazards of the stairs, but still, in the desire to quickly reach the playground, he would be deficient in self control and as a result, go down the stairs so fast that an accident would occur. Therefore, it is necessary for us to have as one of our objectives in our organized safety activities, the development of self control.

Self government is one of our objectives in this program of accident prevention work among the children and again take the example of the stairs, it might so happen that the demand would exceed the capacity of the facilities and the attempts made by the children to crowd up or down the stairs would again result in accidents. A patrol is placed at this location to prevent crowding and thus, the group is governed by one within their own organization.

The last objective of this organization was listed because we find in working out our schemes of operation, it is necessary for some of the children to give up their play time in order to protect the balance of the children while they are enjoying the games and also while going to and from their school. In the specific example of the stairway we find that it is necessary in order to prevent accidents from occurring there, to have stationed at the stairs, a school building safety patrol who is sacrificing his playtime in order to enforce and teach the objectives mentioned previously. There is a still more important significance which should be attached to this objective because those of us who have been studying accidents and analyzing causes have found that the lack of self sacrifice or rather the presence of selfishness, is unquestionably the largest problem. The discouraging part about this item is that no one has offered very good suggestions for the elimination of selfishness from the causes of accidents. Those of us who still have faith and are optimistic, believe that one of the greatest contributing factors towards the solution of this problem is found in the teaching of self sacrifice in these child safety organizations.

Methods

All of the objectives listed for the safety organization among the children cannot be reached through these organizations alone, but they are listed so that we may be aware of the things which are necessary in order to prevent accidents and thus build our program in our junior organizations so that it will contribute to the greatest possible degree towards the objectives listed.

The procedure sponsored by the Kansas City Safety Council and followed in the schools of Kansas City is to organize a Junior Safety Council in the school. This Junior Safety Council, through its bi-monthly meetings, creates a hazard consciousness among the children by taking up for discussion the student accident report cards which were filled in in the past two weeks as a result of accidents which had occurred at their school. This, of course, is supplemented by discussions of hazardous practices which are observed by the school building, playground and street patrol members.

The patrols for the buildings, playground, and streets are organized as an activity of the Junior Safety Council and the officers and members of these patrols are appointed by the officers of the Junior Safety Council. These patrols while they are on duty, tend to stimulate the alertness of the child, not only because of their presence in the immediate vicinity, but also, they stimulate this alertness factor by virtue of the fact that many of the Junior Safety Councils have offenders cited at their meetings for infractions of safe practices. Not wishing to be pointed out as a child which is conspicuous for his lack of safe practices, this tends to create within the child the factor of self control.

Self government and self sacrifice are very apparent by analyzing the organization which has just been mentioned.

Another activity conducted through the Junior Safety Councils of Kansas City is the semi-annual Home Inspection Campaigns which are conducted for the purpose of eliminating the fire and accident hazards within the home. This campaign teaches the child the necessity for the family assuming the responsibility for home accidents and home fire elimination, and it teaches self government and self sacrifice because the child is required to make the inspection of the home with the parent.

Interest in the carrying on of these activities is stimulated first, by the honor which the child enjoys as a result of occupying one of these positions on patrol or one of the officers of the Council, and it is still further stimulated by rewards to the schools for returning inspections equalling 100% of the number of children enrolled in the school. Moving picture houses and baseball managements can usually be persuaded to give free tickets to the patrol members and Junior Safety Council officers which again stimulates an interest in participating in this activity.

Results

Some of the proof of the effectiveness of these activities can be found in the records. The home fire inspection campaigns which have been conducted for several years in Kansas City show as a result of such activity, a reduction in home fire loss of five hundred thousand dollars per year and a reduction in the number of home fires of approximately 1,250 fires per year.

At the time when our child safety activity was organized there was occurring in Kansas City 14 per cent of the accident fatalities in the age group of five to fifteen and this age group carries approximately 14 per cent of the total population. As a result of this educational work, the percentage of fatalities occurring within the age group of children between five and fifteen has been reduced to 9.5 per cent. The actual reduction in fatalities from the year 1924 to 1930 was from 30 per year to 18 per year which is a reduction of 40 per cent in the fatalities occurring within this age group. In view of the fact that there are many accidental fatalities which occur to the children within this age group where the responsibility rests in no way upon the child, a better criterion of the effectiveness of this child educational work can be found in the motor vehicle pedestrian fatalities. For the first nine months of this year in Kansas City there was one fatality for every 20,544 children living in Kansas City, whereas, the entire average was one fatality for every 9,310 people. This means that these children, as a result of their Junior Safety Council activities together with the educational work done by the instructors in the class room, are twice as competent to cross the streets as is the average citizen of Kansas City.

Perhaps an even better criterion of the effectiveness of this work can be found in the records which show that in the last five years, there has been only one grade school child killed within three blocks of a school building while going to or from school.

CHAIRMAN GOSLING: Our discussion will now turn to "Source Material for Teachers" and it gives me pleasure to introduce our first speaker, Dr. Miller McClintock.

Traffic Safety

By DR. MILLER MCCLINTOCK

Director, Brskine Bureau for Street Traffic Research, Harvard University

I am scheduled to discuss sources of material for teachers in the field of traffic safety. When I think of teachers in traffic safety, I am not thinking only of those who are doing scholastic work. I am thinking of all of you who have responsibilities and duties as members of civic organizations, members of clubs, or as parents whose children attend public schools or have to cross highways. I should like to sketch in brief the problem of safety on streets and highways. You are probably familiar with this, but I would like to repeat it. It is a good way to begin a serious discussion of the problem. You know of course from the general statistics available that last year 32,000 persons lost their lives as a result of street and highway accidents. Of this number approximately 7,000 were of school age. In other words the school child fatality situation is, I think we can say without doubt, the most distressing angle of the entire safety situation. I say it is distressing for this reason. We have a particular charge in society to protect those who because of lack of judgment or maturity are unable to protect themselves upon the streets and highways.

While the child accident situation is distressing the child accident prevention situation is the most favorable of which we have a record. In the years 1927-1930 there was a substantial increase in adult fatalities—28 per cent, raising the total from about 26,000 to the 32,000. There were approximately one million serious accidents in addition to these fatalities. In this three year period there was a decrease of 19 per cent in accidents to children of school age. That is why I say the child accident prevention situation with respect to highway accidents is by far the most encouraging, in that it shows that we can by the application of preventive measures bring about a reduction in accidents.

There are two particular hopes. One is that the efficacy of the education and training may bring up a generation which is much more capable of handling itself safely, and thus taking care of other members of the same generation. The other hope is this: human nature has always shown a tremendous capacity to adjust itself to changes in environment and habit. Most of us were born before the automobile became a vehicle of great importance. Most of us had our infancy in an age when it was not so common. Children today are exposed to different environmental conditions to which they adjust themselves, not completely or perfectly, but those current adjustments which come of setting up habits and reactions in view of early experiences are occurring very rapidly, and that is why I believe we are raising what may be considered a safer generation than the one just past.

Those who are interested in traffic matters have many sources of material. Some years ago in attempting to analyze the entire safety situation in the traffic field, we said that there are three phases of this problem, three ways in which we can approach it: engineering, enforcement, and education.

Traffic engineering has made very rapid strides in the past five years. I remember that ten years ago nobody had ever heard of a traffic engineer; there never had been any, nor was there any feeling of necessity for such a person. I just came from a meeting of the Institute of Traffic Engineers—100 men employed by cities, towns and states for the purpose of making scientific analyses of the problems and relief

of traffic situations. It is rather amazing to see how out of nothing so much has come. Thus you have available in Chicago or any large city a very substantial amount of material with respect to the physical and engineering aspects of the problem. Practically all this material is susceptible of being reduced to simple terms. The Chicago situation is one of the best examples of advanced traffic engineering. In 1926 the Traffic Bureau was organized under Leslie Sorenson. Many preventive measures with which you are familiar have resulted from the engineering operations of this Bureau. There are various engineering activities in various places in the country through which material of scientific and engineering interest are available. Therefore the teacher has in this technical field a very substantial source of material.

The second of the trilogy—adequate enforcement, is of great importance. No matter how perfect the regulatory mechanism for accident prevention is, there are always to be found those who through ignorance or malice or an inherent unwillingness to be hampered by regulations, will not obey. The only mechanism in such cases is the punitive machinery which society has designed to protect itself—the police force and courts. They have probably been the weak link in the chain. You can almost say, from the experience of riding down Main Street in any town, whether the police in that town are active or not. If you see careless driving, illegal parking, etc., you may be sure that the public is not adequately disciplined. There are many instances where the police have been willing and capable in enforcing traffic laws, but they have found that the pressure brought on the courts has nullified their efforts. A summons before a court is often of no consequence. There are probably not more than four or five of the large cities in the United States today which have an effective mechanism for dealing with those who have been apprehended even in serious accidents. It is a matter of freeing the courts from the political influences which so largely nullify their efforts. You can find in various articles written about Chicago and other cities material which indicates the proper function for courts in accident procedure.

Education, the third aspect of the solution is probably the most important in the reduction of child accidents. The only important reduction we have ever been able to achieve in the national accident problem is largely due to the educational influences we have brought to bear through the public schools. The National Safety Council publishes Safety Education every month. It is the best source for teachers. It sets forth the best and approved methods in this particular field.

These three developments in accident prevention, engineering, enforcement and education, afford a very potent and enlightening trilogy, which may make it possible for children of future generations to live under far safer conditions.

CHAIRMAN GOSLING: We will now hear from Mr. L. G. Bentley of the Chesapeake and Ohio Railway Company.

Safety and the Steam Railroads

By L. G. BENTLEY

General Safety Agent, Chesapeake and Ohio Railway Company, Richmond, Va.

An adequate presentation of the subject of railway safety devices would develop into such a technical affair that it would not only encroach too greatly upon your time and mine, but it would touch only the surface of the subject and so be of little value.

I prefer, and I think it best, to speak of some of the general safety aspects on American railroads which are not regulated by safety devices but by education, influence, supervision and cooperation on the part of our railroad personnel.

The American railroads work on the principle that a careful man is the best known safety device and we have attempted successfully to create within the minds of our workmen a feeling of their responsibility for safe operation which we think has been

the means of converting railroad work from what used to be regarded as the most dangerous occupation to what is now known to be one of the safest.

The general principles which I shall attempt to bring to you are those which have under-written the admirable safety records of American railroads during the past several years.

Whether justly or not, we have grown to think of the value of the life of a man as \$10,000.00. Let's compare for a minute our attitude toward the safety of man and of a machine of the same estimated value. Let's consider first the matter of selection.

If a machine valued at \$10,000.00 is to be purchased, we would first investigate as to the dependability, the adaptability of that machine for its particular purpose, both with a view to its present service and its future service.

We have tried to impress those who employ men to use the same care in the selection of men that they would use in the selection of a machine; otherwise we would have men unfitted to the duties they are to perform and unfitted in their daily contacts with their associates, and that would be not only unsafe but unprofitable.

Then, after selection we must install. Certainly, we would not install a machine with the expectation of its 100 per cent performance without building a firm foundation, selecting its location and insuring permanency of operation. We are using the same care in installing men to see that they understand the requirements of their jobs, that they know both the safe and the unsafe way of work, that all of the dangers which will surround them are known to them, and that they are equipped to master these natural hazards of their occupations.

Then, having selected and installed our machine, we keep it well oiled, in good repair, and constantly checked to see that it functions properly, safely, economically and permanently.

We must do the same thing with our men and this we get through constant, careful, rigid supervision. It is not enough that a man be instructed how to perform his duties safely, but to check him from time to time to see that he understands, remembering that it is only human that his method of performance is going to be in accordance with his frame of mind and not that of his superior officer. Supervision then must see that the workman has the proper attitude toward his job.

We believe that definite rules and regulations of conduct are necessary for the government of our men. The first and most important rule in our Book of Operating Rules is that safety is of first importance in the performance of duty.

Another rule which is enforced most rigidly is that the use of narcotics and intoxicants is forbidden.

In its influence on the personal acts of our men, we find the following rule is recognized as a powerful influence:

"The company does not expect its employees to incur any risks whatever from which by exercise of their own judgment and personal care they can protect themselves, but enjoins them to take time to do their duty safely."

We believe there is a powerful influence for safety in the spirit of contest.

At the present time a National Safety Contest is being waged on all railroads, inspiring each to excel all other railroads in its safety performance. This has worked wonders.

The railroads are, perhaps, in better position to engage in such a contest than any other class of industry because our reports are authentic and uniform. The Government requires all railroads to make reports of all accidents and personal injuries under penalty. These requirements are carefully checked by the Interstate Commerce Commission and by officers on each railroad to see that the law is observed and the reports to the Interstate Commerce Commission are authentic.

I would not at this time bore you with a lot of statistics and shall mention only a few figures which I deem necessary to justify in your minds the extreme measures followed by the railroads of the country to promote the safety of passengers and workmen.

During the year 1907, there were more than 3,000 railway employees killed on duty;

in 1923, this toll had been reduced to 1,866 despite a tremendous increase in the number of employees engaged.

In 1930, we find that employee fatalities had again been decreased to 988, and thus far during the year 1931, only 302 railway employees have been killed in line of duty.

Even more remarkable reduction is shown in non-fatal injuries to railway employees reportable to the Interstate Commerce Commission as follows:

In 1923, 148,000 railway employees suffered accidents sufficiently severe to absent them from their duty for more than three days. Last year there were 36,000 such accidents, and up to this time in 1931 there have been but 12,945.

An extraordinary safety record was established by the railroads of the United States during the calendar year 1930. Only seven passengers lost their lives in train accidents in 1930, which was a decrease of 88 per cent over 1920.

Of the seven passenger fatalities, four resulted from a derailment due to obstruction placed on the track by persons unknown. The fifth fatality resulted from the derailment of a train by an automobile which stalled on the track after having been driven off the highway and across the station grounds. The sixth fatality resulted from a train being derailed due to the expansion of rails caused by the excessive heat last summer. The seventh fatality resulted from one train backing into another.

For each passenger killed in a train accident, the railroads carried 101,571,000 passengers. This was the best average ever attained by the railroads of the country. The number of passengers injured in train accidents in 1930 was a new low record for any year, 790 having been reported, compared with 4,253 for the year 1920, a decrease of 3,463, or 81 per cent. For every passenger injured in train accidents in 1930, the railroads carried 9,000,000, which was about twice as good a showing as in the preceding year.

This remarkable safety record in 1930 was brought about by the railroads through improvement in and better physical conditions of equipment, installation of heavier rail, constant and expensive improvement in signaling devices and operating methods, and a vigorous system of training experienced by both officers and employees to promote greater safety in every possible way.

Class I railroads of the United States in 1929 spent \$298,000,000.00 for the improvement of safety and protection of employees and the general public, and tentative reports indicate that a slightly larger sum was spent for that purpose in 1930.

In addition to seven passengers killed in train accidents, forty-three were killed in train service accidents. These accidents are almost invariably due to the acts of the passengers themselves, and not to any failure of equipment or of railway employees to safely perform their duties.

Tentative information now available enables us to classify the 43 fatal injuries to passengers in train service accidents, as follows:

Six passengers were killed who did not remain seated until train stopped and in some manner fell from moving trains. (Not in the act of alighting.)

Six passengers were killed who jumped from moving passenger trains under circumstances strongly suggesting mental derangement.

Three passengers were killed when they threw themselves or jumped in front of trains with evidence of suicidal intent.

Seventeen passengers were killed due to their own negligence when attempting to get on or off moving passenger equipment.

Ten persons killed were reported as passengers not on trains, but who were waiting to board trains or had departed from trains and, on account of their own acts, were struck by moving trains on railway property.

One passenger, standing on station platform, was struck by mail bag thrown from a passing train.

In comparison with forty-three passengers killed in train service accidents in 1930,

there were 153 killed in the same class of accidents in 1920, a decrease of 110, or 72 per cent.

There were 1,875 passengers injured in train service accidents in 1930, compared with 3,338 in 1920, a decrease of 1,463, or 44 per cent.

The remedies for these accidents are obvious and simple:

1. Never attempt to board a moving passenger train.
2. When preparing to alight, keep off platforms of passenger cars until trains stop, and never open vestibule doors.
3. When approaching passenger station premises, or leaving station premises, and while waiting for trains at passenger stations, keep off railroad tracks unless it is necessary for you to be there, when you should look in both directions before stepping on any track.
4. While waiting for trains on station platforms, remain a safe distance from all tracks.

CHAIRMAN GOSLING: Our next speaker is Mr. R. E. VERNOR, of the Western Actuarial Bureau, Chicago.

Fire Prevention

By R. E. VERNOR

Manager, Fire Prevention Department, Western Actuarial Bureau, Chicago, Ill.

My little part on this program has two sides. I am going to speak for a few moments and then show a reel of motion pictures which may interest you. This question of teaching fire prevention to children is very important. We had 329,000 dwelling fires last year. That is a real challenge to anyone interested in education. I once had a conversation with Dr. Carlton Simon Symonds, former chief psychiatrist of the N. Y. Police Dept., who said that man's indifference to fire is instinctive, and illustrated this with the thought that children like to play with matches, that certain morons become pyromaniacs. We are all attracted by a fire, and a big fire will call out thousands of people. His opinion is that when you attempt to upset human instinct it cannot be done with reason, but other instincts and emotional reactions must be employed. I have in mind a fairly good emotional reaction to a fire prevention lesson. I have a friend who has a small boy who had the habit of playing with matches. In spite of warnings the child continued playing with them. Finally the father caught the young man in the act, and said,—"All right, sonny, let's play with matches." So he brought out a large box of matches, took the boy out in the back yard and made him light each one individually, blow it out, and then break each match in two. Sonny became very tired of playing with matches, developed a decided emotional reaction and there wasn't any further trouble there.

I would like to indicate to you some of the sources of material, and some of the different methods by which fire prevention has been taught to children. So far as I have been able to ascertain there is nothing in print which has attempted to list the various sources of material or the various methods which have been employed. So I am forced to draw on my own contacts and experiences of the past few years in order to give my classifications of this subject. I have arbitrarily selected several classifications of methods of teaching—first, the class room method. There are thirteen states in the United States which require teaching of fire prevention to children in schools. Some states have devised textbooks and specific outlines. Some of these textbooks and lessons have been created by state and other authorities for school children. The National Board of Fire Underwriters has three publications available, for high schools, grade schools and schools in agricultural districts. Many local organizations have created their own material. In the Cleveland Safety Council they have a series of loose leaf lessons. The work there has been selected according to the age of the child who is to receive the instruction. I think one of the unfortunate

things in some of the teaching material is that all ages have been supposed to absorb information from one source.

Fire prevention may be taught as a separate subject or as a part of a general safety program; both methods have been used successfully. I shall say little about the lecture method. The lecture method is a very common one and my opinion is that while under certain teachers it may be made colorful and effective, it should be augmented with things more dramatic if the child mind is to be impressed. Firemen who have been trained in public speaking are doing effective work in some cities in bringing fire prevention work into the classrooms. I am aware that the contrary has been the case in some instances. The fireman is always a colorful figure and his uniform commands attention.

There are certain ideas which have been worked out which have dramatized the subject of fire prevention more clearly. The fire drill is very effective in making a child fire-conscious. I think one of the most effective methods I have seen was in Texas. A red block of wood was turned over to a boy in the school. When it was decided to have a fire drill, the principal told the boy the drill would be held some time during that day. Without telling anyone the boy took out the red block at some suitable time and concealed it somewhere in the building. The first person who saw that block turned in a fire alarm and the fire drill was held. This varies the drill and forces the children to vary the method of exit, because sometimes an exit may be blocked by the red block, which represents the fire.

Essays of course have also a great educational value. I had the rather interesting experience of being judge in one of these contests and I was amazed at the amount of material the children dug up on the question of fire prevention. In Toronto I saw a wonderful display of posters gathered from all over the country. The National Safety Congress has a very fine poster exhibit and I think every school should consider such an exhibit from time to time. Mr. Lynch gave us an idea of the value of the fire home inspection blank. Kansas City dwelling alarms have been reduced about one-half in ten years, and there is no other explanation for that.

There are a good many other sources of material available, but my time is up and I shall have to stop with reference to just one more, although I have not touched on either group school methods or group outside methods. The Eastman Kodak Company have teaching films, and one of these I shall now proceed to show. It is called "Fire Safety."

(Mr. Vernor then ran off a reel of motion pictures dealing with fire hazards.)

ADJOURNMENT

Thursday Morning Session
October 15, 1931

Vocational Schools

GORDON C. GRAHAM, Chairman
Safety Engineer, Detroit Board of Education, Detroit, Mich.

This session of the Child Education Section convened with Gordon C. Graham presiding.

CHAIRMAN GRAHAM: Vocational shop safety, as we all know, is a subject which has grown rapidly in importance in the schools in recent years, and we feel that the National Safety Council can be of great help to us in directing our efforts toward an effective method of handling school shop safety instruction. The Council can supplement much of the work that we do with many of the materials which they have, and by reason of their interest in our school shop safety movement, they are endeavoring to organize a definite committee which will be devoted to school shop safety work. There has been some work done in various cities along these lines. One of the men who has done a very outstanding piece of work comes from the same city that I do and he is largely responsible for the school shop safety activities carried on in that city.

I take a great deal of pleasure in introducing to you at this time, Mr. Earl L. Bedell, Assistant Director of Vocational Education of the Detroit Public Schools.

Preventing Tomorrow's Industrial Accidents In Today's School Shops

By EARL L. BEDELL
Assistant Director, Vocational Education, Public Schools, Detroit, Mich.

The National Safety Council has always been an object of admiration to me as a school teacher. It seems to me that this institution of safety education and safety development is an outstanding contribution to our industrial civilization. We are sometimes accused of not having a very humane industrial order, but here, at least, stands a great humane influence in industry.

It might be pertinent to stop just a moment to discuss education, because education is the purpose for which schools are organized. Anything that we put in schools is supposedly for educational purposes. It seems to me that the purpose of education is to effect a change in the individual so that he may more adequately meet the conditions under which he or she lives. I like to think of education as changing a youth, as changing his attitude toward life and his actions in life. Education prepares an individual for a more successful life.

Many old adages have been brought down to us concerning education such as "experience is the best teacher." We do learn by experience, but experience is often expensive. Now economy is the watchword. If there is a more economical method of learning than by experience, we should investigate it. That is where our problem seems to begin—to investigate the economical methods of education. When we send our youths out of school into the shops and they operate dangerous machines and have an accident, they have an experience. Though they profit by it, the price is too high. Losing a limb or finger or eye, or otherwise maiming and disabling themselves is the type of experience that we want to keep away from them.

Students of psychology say that safety or self-preservation is a native trait.

So is eating, but nevertheless it is necessary to give special attention to even this native trait if one is to survive in the civilization and social order in which we now live.

I. The Purpose of Guarding Machines in School Shops.

With these basic ideas of education in mind, I think this group will be interested in what we are doing in Detroit with safety education as an essential part of the boy's education.

I want to confine my talk for the most part to safety in the use of hazardous machinery. Ever since machines were installed as a part of industrial arts and vocational school courses in Detroit some thirty years ago, safety in their use has always been taught.

We have tried to guard the machines so that pupils will not be injured. I want to emphasize that the first purpose in guarding the machinery was to prevent the pupil from becoming injured. Only in the last five or six years have we begun to see a new purpose in guarding the machines. The new purpose is to instill correct and safe habits in the boy, so that when he goes out into the industrial world his training will carry over in safe habits firmly established.

In my attendance at Safety Council meetings in Detroit I have been impressed with the hopelessness of the job of the industrial safety engineers if the schools are going to pour into industry each year a new supply of workers untrained in safety.

II. The Way to Teach Safety.

We have used the several means in trying to teach safety. We have been a subscriber to the poster service of the National Safety Council. These posters are delivered to the shops each month. We try to put into each shop a significant poster and have found the service very valuable.

We also teach what procedure to follow in case of an accident. There are first aid kits in all our school shops. As far as possible we train each boy in the simpler forms of first aid. We have gone still further than that. As an integral part of every course of study will be found "safety precautions and procedures" which must be observed. When we teach a thing, we emphasize the safe way. We are trying to emphasize that the safe way is the right way, and that if there is any element that is not safe in an operation or process, that is the wrong way.

Incidentally, our teachers have come to feel that safety education is an integral part of the thing they teach, and not something added to it. If you have observed the schools you will realize that during the past few years we have added subjects and activities to the public school curriculum until there is no room to add anything more. It is very necessary that we who carry this safety education program into our schools shall be very certain that it is an integral part of education.

III. Safety Education Spreading in Michigan.

You will be interested, also, to know that the school shop safety education work which started in Detroit has spread throughout Michigan. We have the "Michigan Industrial Education Society" with a standing committee on safety education. We call it a research committee. The function of this committee is to investigate all the methods of instruction and the materials of instruction in their relation to safety.

This printed report is by that committee. In it you will find very definite

and concrete material. There are two parts to it. One is, "Safety Education in the School Shop" and the particular thing that is included in this is the underlying principles of safety education. Then there is an accident prevention test. Teachers, in a field as new as safety education, that is, a field that has not been crystallized into formalized instruction, are more or less floundering around looking for teaching devices; and we have, both in Detroit and in the state at large, developed tests. They are for a double purpose. If the boys and girls are tested by certain types of examinations, they become conscious of the thing we want them to learn. Also it makes it possible for the teacher to find out how effective his instruction is.

There is a very outstanding limitation to paper and pencil tests. Such tests do not test what is being done. They are mental tests. One may know what should be done, and can write it down very well on paper, but it is not done in practice. We were pleased to find one of our men in an intermediate school who did devise an activity test in safety education. A boy would be called to the teacher's desk, and a situation would be "set" to see how he would react. For example, it is a rule, if you leave a machine, it must be stopped. A messenger is sent to a boy working on a lathe to tell him to report to the instructor's desk immediately. He is under observation but he does not know it. If he comes without shutting off his machine, he does not pass the examination. The pupils soon become aware that they are being tested in unforeseen ways all the while. The effect is very satisfactory.

This instructor had a variety of ingenious devices. He sends a boy to start a machine which is out of order or jammed in some way or other. The examiners observe to find out if the boy goes over the driving mechanism and the power unit to see if the machine is ready to start. If he reacts favorably, he passes his examination.

Another teaching device that we use in Detroit is stereopticon slides. We have taken a series of pictures of accident situations in the shop. The pictures are thrown on the screen. There are small cards on which we have written a little paragraph in connection with each picture. Those of you who have read the Industrial Arts and Vocational Education Magazine have seen some of these pictures. They were printed in the form of posters. Just to illustrate—one of the pictures represents a boy with long hair leaning forward working on a vertical sensitive drill. The belt is moving in front of his head. The picture shows his hair just going under the belt to be caught in the pulley. As the picture is thrown on the screen showing that very dangerous condition the boy who has the card on which the little "sermonette" is written reads it to the class. A class discussion follows.

Those are very simple devices, but as I told you, we, as teachers, are just stumbling around looking for devices to develop a safety-consciousness in these boys, and all those devices seem to help.

IV. The Safety Engineer.

Another device that we have in all of our shops which emphasizes safety is a safety engineer. That is a very dignified position. All of our shop classes are organized to imitate an industrial organization. There is a shop superintendent and safety engineer, and there are, of course, the foremen of the different units in that shop. All have very definite duties. The safety engineer may, in a small class, carry on certain duties of his own, like operating his own machine and doing his own work, but if the class is large we feel that the safety engineer is justified in using his entire time to circulate among the boys, checking equipment and teaching safety rules. His term of office is usually five or six sessions of the class. Different teachers have different methods; in some classes they elect or appoint his successor. The successor is always chosen a few days

previous to the expiration of the first man's term of office, so that he serves an apprenticeship.

You would be interested in the duties of the safety engineer. He is on the look-out for dangerous tools such as the cold chisel with the mushroom top. The goggles are kept clean and in good condition. All these things, and many others, are checked by the safety engineer. No one is allowed to use a grinder of any type without wearing goggles. I am reminded of an incident that happened in one of our intermediate schools. A Board of Education maintenance man came into the shop to grind a cold chisel. He had barely started the grinder when the safety engineer stepped up and turned off the switch. "I am sorry, sir, but my job is to allow no one to use that grinder unless he wears goggles."

The mechanic looked at the youngster, caught the spirit of the thing, smiled and said, "May I borrow a pair?" and put them on. That boy was taking his job seriously, and we find a serious attitude toward it all the way through.

Teachers sometimes argue that since the operation of a small grinder is not very hazardous it is not necessary to wear goggles, or that because certain machines are relatively safe, it is a waste of time to go through the routine of safety precautions. Then I have had another trait of teachers brought to my attention. It can be illustrated by the teacher who says "O yes, I was using the table saw just now *without any guard* but I never let the pupils do that." It is obvious that such examples by the teacher will not impress pupils with the teacher's sincerity or with the sincerity of the whole safety education program. Let us assume that the safety rules apply to all.

Incidental to that, we have taken a great deal of trouble to write our specifications for new machinery and equipment which incorporates proper consideration of the safety factor. Every new machine in the Detroit Public Schools is installed with an under-voltage and over-load switch, and wired in the circuit of this particular shop in such a manner that when the teacher, with the remote control switch, stops the machinery, all the machines in that shop will stop, and then when he puts the current on again, not a single machine will start. The only way that machine can be started is for the individual operator to start it. That is the practice now for all new buildings, and has been for the last four or five years.

In conclusion, I simply want to say that our problem in Detroit has been first, to impress upon teachers that safety education is an integral part of the teacher's job in all industrial and vocational subjects. It is not something added to it. Second, we are trying to show that guards and many of the manipulative and mechanical things we bring into the school shop have as their primary purpose the prevention of accidents to the boy in school, but that the biggest purpose of all of the mechanical devices and of many of the things that we do in the shop, is to develop in the boy a safety-consciousness and an attitude toward safety which will function in the industrial world when he gets a job.

This program of education in our schools should produce a group of workers who are conscious of the importance of having able bodies, who have a feeling of personal responsibility for the safety of all.

The problem of the vocational schools is not only to develop skill, but to develop a proper attitude toward our social-industrial democracy. It is not enough to provide hospitalization and disability insurance for the injured worker. The old adage "an ounce of prevention is worth a pound of cure" applies very well to accident prevention. It is well to develop the feeling that the injured person is not always the one to whom sympathy is due. Dependent parents, the wife, the children, have a claim to be recognized. I cannot refrain from quoting—"And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comforts 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 helpless wrecks who were once strong men shall no longer be a by-product of industry."

And this, my friends, is one of the school's outstanding objectives.

CHARLES D. DAWSON (Assistant Superintendent of Schools, Grand Rapids, Mich.): This is not necessarily safety, but I would like to ask Mr. Bedell if you have any provision for taking care of serious accidents by the Board of Education? For example, suppose you have an accident which is beyond the scope of first aid. Is there any provision for taking care of the boy?

MR. BEDELL: We have a very definite program for taking care of serious accidents; and I might say that you may expect that in a city the size of Detroit we do have serious accidents. Our program, briefly, is this. The teacher is to give first aid to a serious accident and then call a receiving hospital. They come for the injured person. At the same time we call the boy's parents or guardians, and then we let things take their course. If the parent gets there first, he may take the boy to a hospital of his own choosing, or home, or to a private doctor. The parent stands supreme after he is on the job, but until then, the teacher, that is the school, and receiving hospital stand supreme.

Our teachers do many times take a boy to the receiving hospital in their own private cars. We have had it called to our attention that the teacher assumes certain liabilities when he does this, but that does not seem to make any difference; teachers are willing to assume that responsibility.

MR. DAWSON: Does the Board of Education assume any of the cost of hospital or physician's service?

MR. BEDELL: According to the corporation counsel and court decisions, the Board of Education does not assume any and is not allowed to. The board can assume no financial responsibility for any accident in a school shop to children under instruction.

MR. DAWSON: We are probably disobeying the law when we do that in Grand Rapids?

MR. BEDELL: Our board helps through other channels, but a direct indemnity to an injured boy or pupil is not permissible.

CHAIRMAN GRAHAM: Considerable progress has been made in giving instruction in accident prevention work through the various media of visual education and the excellent progress that was made industrially unquestionably can be duplicated in our school shops. Further than that, the school systems themselves have very consistently developed programs of visual education, and I think it is apropos to have someone discuss this morning the visual methods which may be used to teach youngsters in school shops the safe way of doing things. It is with a great deal of pleasure that I introduce to you Mr. C. B. Boulet, of the Wisconsin Public Service Corporation of Milwaukee, who is a school man and has done quite a bit of education work among foremen and various other industrial groups.

Visual Aids in Teaching Safety

By C. B. BOULET

Safety Director, Wisconsin Public Service Corporation, Milwaukee, Wisconsin

I congratulate you on the work being done in Detroit, Mr. Bedell.

I wondered why I was called on to address the Vocational School Section. My first thought was that probably the vocational school is so close to industry that you wanted somebody from industry to tell you how industry looks at your school.

We in industry feel that the vocational schools have an enormous job. Their prime business is to teach vocations, trades. I believe the most important job is not that, but rather to prepare boys, who might become driftwood, for responsible

citizenship. The teaching of a trade is simply the means to an end. Whether education is the preparation for life, or whether life is education itself, is a question that will always be debated. I do not know, but I do know that since I have been out of teaching, I often look back and think how short the schools where I taught were falling in their endeavor to create responsible citizens. What an enormous gap there was between the boy who finished high school or finished vocational school, and the center of the industrial system where he eventually found himself.

Industry has come to realize that safety is an important part of every job. Thousands and hundreds of thousands of dollars are being spent every year in trying to protect the workman. Every year thousands and hundreds of thousands of workmen are passing on, and every year thousands and hundreds of thousands of boys are coming from school into industry, and a large percentage of them are absolutely untrained. One of the problems of industry is to keep those boys from getting hurt. Our biggest problem—and I say this without any qualification—is not to take care of the fellow who has been with us two or three years, but to take care of the fellow during his first two or three weeks. We have a larger percentage of accidents with fellows with us from two or three weeks to six months than we have with all of the men with us more than six months. Our big worry is the new man, and one of our jobs is to get that new man to appreciate the hazards of the job.

The vocational schools can do a wonderful work if they can send into industry men and women who are trained to appreciate the hazards they are going to encounter. It does me good to get back to a crowd of school people, because as I sat back there this morning, I began to feel again that sort of a vague something, a sort of idealism that you lose when you get up against just the hard-boiled facts of industry.

I have, in my brief career as a safety man, seen men die. I have seen young boys just out of school, married a year or two, pass on because of an accident. I have seen a man taken to the hospital and have his eye taken out. It is a hard-boiled proposition.

What can we do about it? It is a big job. I don't like to quote the records of our company, because sometimes I think people get tired of hearing records of what you have done, but are more interested in how you did it. Just let me say that in the past year we have cut down our lost time accidents from one hundred and thirty-six in a year to about one hundred and twenty-three in a year. We have cut down fatal accidents from four or five a year to none, or sometimes one in a year. We feel we really have helped the man on the job. We have saved him money, and we have saved him for his family. In doing that job, we have utilized every device that we have known to teach the man safety.

The subject assigned to me this morning is "Visual Aids", and it was properly called "Visual Aids" because visualization is merely an aid. It is not the whole job. It is a small part of any safety program, because there are so many angles. There is your field work, your safety meetings, the use of the conference method, safety contests, and numerous other ideas that enter in. There are some things that come into the picture that cannot be visualized. You, as school men, of course appreciate the fact that most of your learning, a large part of any child's learning, must come through the eye, and we, as industrial safety men, have tried to appreciate that fact.

I would like to take this group and call this a safety meeting of our men, or a group of vocational school boys, and conduct for you a typical safety meeting, using the conference method coupled with visual aids. I cannot do it in less than an hour and do it right, and I am not going to attempt it, but just let's assume for the time being, that we have a little group here, and I am just going to present one single subject and try to help you visualize, as workmen, or as vocational school students, the problem I am going to present to you.

There has been a lot of discussion in the past few years whether orders to wear

goggles are of any value, and I wonder whether they are. It seems to me that the thing we have missed is the fact that ordering a boy or a man to wear goggles without proving to him conclusively that, for his own selfish interest, he should wear goggles, is wrong. If I just tell you that on jobs where you are chipping, or grinding, or where pieces of metal are apt to fly, you ought to wear goggles, you would say, "Yes, I guess that is right", but it hasn't soaked in. I have given you just an oral picture of what I want to tell.

I might paint for you orally a picture of a splendid scene—Lake Louise, for instance. I might tell you of some horrible accident, but, to use the words of Walter Lippman, "The only feeling one can have about an event he does not experience is the feeling aroused by the mental image at the time." No matter what I picture to you by words, you have to go into your experience and pick something out of that experience and put it together into a new picture. If I show you a picture, or if I show you the actual events, you are going to remember it.

It is particularly important to remember this, because the employee or the boy we have the most difficult time with in teaching safety is the fellow whose mind is too lazy or sluggish to concentrate on the formation of a picture. He has to grope around and pick out parts of his past experience to put together. In other words, if I tell him a thing, he is probably going to look out of the window and see something to attract him, or think of something easier. He is the most dangerous man we have and visualization for him is tremendously important.

The question of how to utilize the eye in safety work must be answered. I am going to list briefly some of the devices you can use. Mr. Bedell mentioned moving picture film strips, lantern slides. I would put those down in the category of visual aids without any question at all. We use them continually. Bulletins, posters, pictures and charts are helpful. I would like to suggest that in your vocational schools you graph your accidents. Here is the record made by last year's group. Can you beat it? See if you can't reduce your accidents from one hundred and thirty-six to one hundred and twenty-three. The competitive spirit can be used through graphic charts. The display of defective tools can be used. Incidentally I shipped from Milwaukee a board that I prepared with various exhibits: burred head chisels; a hammer that took a man's eye out; a wrench that caused an accident and two or three other items I had been saving for the past three weeks, mounted on a board as a visual aid for this talk, but it has been lost.

I have been in vocational schools and have seen tools handed out that we would not let a man use. I have seen tools go out with the heads not properly ground. I have seen machines that have been insufficiently guarded. I have seen portable electric lamps with terrible cords on them, cords we would throw into the discard in industry. Somehow the schools feel they have to get along with those things. They have a false idea of economy. This idea of good housekeeping Mr. Bedell mentioned, is very important. As the boy does in school, he will do outside. If you hand him burred head chisels in school, he is going to use those when he gets into the shop. If you permit him to accumulate under the lathe or press a bunch of junk, he will do the same thing outside. If you permit him to use an extension cord that is all rotten, or a lamp without a sufficient cord on it, he is going to do the same thing outside, and eventually he will hurt himself.

These items are all visual aids in the school. Consider them as visual aids rather than as protection, because you are creating in the boy a safety-consciousness. Display of protective equipment is important, that is, if it is followed up as it should be. In your shop you have protective equipment: goggles, gloves, head shields and masks of various kinds. These all show protection. All of those items should be on display in your shop as a visual aid, impressing that these all help to stop accidents.

Actual demonstrations of the right way to do the job are helpful. Too often we tell the fellow coming in how he should not do it, instead of how he should do it.

A lot of our work in Milwaukee is outside work. We operate street railway system power plants. Our line men set up a dummy pole out in the yard in the summer time. Our safety meeting convenes around this pole. The job is assigned to three or four of the men whom we feel are experts, to erect a transformer on that pole. They start the job and go ahead. The others sit and watch. After the job is done, we ask the watchers to criticize the work. You would be surprised at what wonderfully analytical minds the rest of the line men have. They are anxious to see the right thing, but they are also very anxious to pick out the wrong thing.

In doing a job of that kind, we try to pick out men we feel are exceptional in doing that kind of work, because we want the right method impressed on the men. That is really dramatization, and it is very effective. I do not doubt that in your schools you can do exactly the same thing. Just as an experiment I want you to picture this morning the most common type of injury to all industries, eye injuries. Here is an exhibit of smashed goggles loaned me by the American Optical Company. Every one of those goggles saved at least one eye; some saved two eyes. The cost of those eyes in compensation would run about \$70,000. The cost of those goggles would run less than \$25. Don't you think this exhibit will stick in the vocational school boy's mind? Don't you think if you tell him that here is a lens that was broken by molten metal while pouring, and that the man's eye would have been put out; that this was broken by a six-inch chisel which let loose from an air hammer when a man pulled the wrong trigger; that this one was broken by a piece of concrete while using an air hammer, he will remember?

Here is another ruined by molten metal, and another broken by a piece of cast iron while chipping. Fortunately this has some of the metal left on it as proof. Here is a lens splashed by babbit while pouring into a bearing. Both eyes would have been lost without goggles. The lens of this one was shattered by a splash of molten metal while pouring; this one was broken by a piece of metal flying from a mushroom chisel; another caused by a tool breaking while operating a shaper, and another caused by work flying loose from chuck while operating a lathe.

Here is the picture of the fellow that got the chisel in his eye. You put something like that in your vocational school shop for a few days, and watch the boys get around it. Why? Because it is real; it is taken from life. It is something that actually happened, and they are going to have a lesson printed on their minds that they will never forget. You can make that much more dramatic than I have because of the time that you can take. Why even after showing an exhibit like that, won't some of the men wear goggles? We have discovered one reason that might be of interest to you. A lot of goggles are very uncomfortable. The shapes of faces differ. A pair of goggles that I will put on may hurt my nose where it might fit you correctly. I may not be able to see well out of them. Excuses would surprise you. The solution to that is to get goggles that will fit almost any face, goggles for various purposes. There are goggles here for welders, goggles for men doing chipping, and so on. Tell your group, "Now, fellows, we want you to wear goggles. After this meeting, I would like to have you come up and try them on and get the one that fits you best. If there isn't any, we will get a pair that will fit you. We want you to be fitted."

Now we use a couple hundred pairs of goggles a year, but three or four years ago we just couldn't get men to wear them. We had to try a stunt of this kind. I remember an experience in Rollin, Michigan. They were putting in a new street lighting system and three or four fellows were chipping concrete. Not a single fellow had goggles on. I went down to the office of the manager and I said, "I can't understand this. We have been talking our heads off about goggles, and here is this bunch of fellows not wearing them."

"Well, they are all new men."

I said, "The foreman should be looking after that."

By the time we got back, every man had goggles on. The thing is that that bunch

of men should have attended a safety meeting before going out on the job. They should have seen a display of this kind. Somebody should have said, "Here, fellows, pick out the goggles you like."

If I go into a meeting without this exhibit and tell the men to get a pair of goggles, not one of them pays any attention unless it is a fellow with only one eye. Speaking of one eye, we always use in our safety meetings a demonstration of this kind. It is a gruesome thing, a glass eye, but it is a good glass eye. Glass eyes can be made pretty nearly perfect. I say "If you lose your eye; you don't have to worry about your looks, as you can buy a good looking eye. No one can tell you have only one eye, but you can't see through the darn thing. That is the trouble." I pass the eye around and let the fellows look at it—another visual aid.

And so I say you can pick out visual aid after visual aid. I am going to ask to have two or three slides shown to impress still further this thing.

Again I want to say that your vocational schools have an enormous job on their hands. As a school man, I know that people outside are looking for wonders from you, perhaps the impossible, but industry is demanding something solid and practical from the schools. Economy is the great cry today. Waste from accidents, industry has agreed, must be eliminated, and industry will look more favorably on your vocational schools if you can send them fellows who will stop a man who is using an emery wheel without goggles. What has that to do with the responsibility of the schools outside of safety? When a man begins to appreciate the need of stopping his fellow man from grinding without goggles, he is learning lessons of civilization, of responsibility to his fellow man and to the community. That is the important job of vocational schools. The matter of job training is just incidental, because that only gives you the way to earn a living, and that is only one-fourth of the work a man has to do. He has to learn to live with others in the community. He has to learn to live with himself, and he has to learn to protect himself and his fellow man.

CHAIRMAN GRAHAM: Mr. Boulet has given us a number of very pertinent ideas that we can take back to our various school systems and use to good advantage. Our vocational school shop work is more or less of a copy of what is being done industrially, and I think that we should know that the sort of thing that Mr. Boulet has shown us this morning is being carried on in one form or another throughout all of the great industries in the country today, and that if we are to keep in step with the times, we, too, must adopt similar practices in carrying out our educational work with the youngsters. Boys are going to get that sort of thing in industry, and they will be in a far more receptive mood, and the results will be achieved so much better and quicker if we have the opportunity, and take advantage of the opportunity, to train them in a similar way in our school shops.

I would like to mention in connection with the goggles and various other equipment that were shown, that all of you ought to attend the exhibits which will be found in the basement of the hotel. You will see various safe guards and protective apparel which are being used industrially. It will give you a very good idea as to what modern methods in protection are so that you can adopt as many of them as you can in your school shop work.

MR. BEDELL: I would like to ask one question. We have had some question in our minds in Detroit as to just the point where visual material can be made too emphatic. If we show gruesome results, we are liable to produce in certain children a nervous attitude toward their work. We have been quite concerned about that.

MR. BOULET: The particular pictures I showed are from a film strip on infection, trying to emphasize the need of getting first aid. I don't think it will do a bit of harm to show the terrible results of not getting first aid. In any safety work, it is important that you do not instill fear. That is why we try to teach the right method rather than showing the wrong method and results. Except in the case of

first aid. A man approaching a machine with fear in his heart is going to be much more subject to accident than the man who goes at the machine with full confidence.

CHAIRMAN GRAHAM: Those of us who are functioning in a supervisory capacity realize that in our school shop safety program, the instructor is the "meat in the coconut." We can't get very far unless we have the whole-hearted co-operation of the instructor. In the work that I have been engaged in, it was found at the outset that our first problem was not so much a matter of educating the youngsters as educating the instructors. We could hardly expect our various school shop instructors, many of whom had had no contact with industry for a matter of eight or ten years, intelligently to instruct the pupils in the shops in the latest methods in industrial accident prevention when they, themselves, had no very definite idea as to how it was being done in industry. Hence it was obvious that our first problem was to educate the instructor as to just what was going on; how things were accomplished; how these various objectives in accident prevention were attained, feeling that he certainly could not instruct the youngster until he had a fair knowledge of the procedure himself.

Our next speaker, Mr. H. G. Noyes, is president of the Wisconsin Vocational Association.

Interesting the Instructor in Safety

By H. G. NOYES

Co-ordinator of Adult Education in Trade and Industry, Wisconsin Vocational Schools, Appleton, Wisconsin

I am going to give some of the experiences which we have been through in trying to get shop instructors, as well as academic instructors, to see that they have a duty to perform in developing in the boy and girl habits and attitudes toward safety that will actually carry on into life. The problem in the school is just about the same as it is in industry. I have had more or less contact with industry and I think that the safety program in the average industrial establishment is almost in direct ratio to the interest and the amount of thought, energy and money expended by the management in that program. Similarly the shop instructor will have just about the same attitude toward safety instruction as the administrative head of the school has.

The first thing we ought to do is to get those in charge of our school programs more vitally interested than they are at the present time. As Mr. Boulet said, the visual aids which can be obtained from the National Safety Council are of benefit to our school systems. It has been my pleasure to attend the Congresses for several years, and I believe that if we could interest more school administrators in the work of the Council and in its publications, they would become more interested in their own safety problems.

The conference method is a valuable device which school principals, superintendents and directors can use with their teachers to gain the desired end. Every school has faculty and staff meetings at which routine things are taken up. I have attended some of those myself, but I have never heard anything said about safety. I doubt very much if safety is ever given much of a place at such meetings in our schools. Safety must be considered a part of production.

Our philosophy in Wisconsin is changing quite rapidly regarding the purpose of vocational schools. We are emphasizing the fact that we do not teach a trade in the schoolhouse. We do not think it can be done. All we hope to be able to do is to give the boys and girls who come to our schools some of the manipulative skills, and some of the thinking habits and attributes which may carry over into life.

In our schools we have stressed several levels, one which we call "Occupation and Study" which was something like the introductory work given in the junior

high schools; then the next is the "Trade Finding" episode, and we feel that those two steps offer guidance for the boy and girl. Then we put them through the third stage which we call "Trade Preparatory." That is more or less vague, perhaps, but we have passed the point where we say that the student is learning to be a machinist in the schoolhouse; we are trying to give him some of the things that will help him when he enters industry. We are trying to take into consideration occupational hazards, occupational diseases, the shop housekeeping and many other things so that the boy, throughout all these periods, will have an idea of what he is going to meet later on the job. Because the instructor has to include in his lesson material the hazards and the importance of shop housekeeping, I believe we are going to instill in the instructor a consciousness of his responsibility in teaching.

This morning, coming down from Beloit, I talked with a representative of the Yates-American Company who was on the train, and he says they sell a lot of machinery and equipment to school shops, and he says it is surprising in the last two or three years the superintendents of schools and directors who are demanding up-to-date equipment with safety devices, which shows not only a compliance with the state law, but that they are safety-minded.

One thing we have trouble with in our state is to get the instructors to see that the boys use the guards after they have been provided by the schools. The old type instructor is like the old type foreman and the old type workman. He will put in the major part of his life without guards, and he thinks they are a sort of a nuisance. While we have no definite program how to do it, we have in one school in Wisconsin a woodworking teacher who has a hobby of inventing guards, and I think through this interest in his hobby, he has been able to put over in his particular shop a lot of safety instruction, perhaps unconsciously.

Another chapter we are taking out of the book of industry is the shop committee. Several schools are trying committees in our state. The committee meets at stated intervals, makes inspections and reports and so on. When this thing first started it did not work so well, because the teacher did not care much whether it did work or not, but since the teacher has been impressed with the idea that this is just as much a part of his job as to teach a boy mathematics or how to run a lathe, it works better. If we can't get the teacher, we never can reach the students. That is vital.

In the state of Wisconsin during the last four or five years, we have had quite a lot of what we call "Safety Schools" carried on in cooperation with industry. The last two years we have been sending quite a lot of our teachers to those meetings, and the reaction has been this. Those shop teachers, who came up through the ranks of industry and then came over into the school shops as instructors, have been impressed with the idea of what the industrial foremen are doing in safety, and I think that helps a lot. The instructor's attitude is changing.

Another thing we are doing in co-operation with the State Board of Health and the Wisconsin Industrial Commission is to include in our shop lesson sheets a paragraph or more dealing with the hazards of that particular operation. We have at the present time gone farthest in machine shops, electricity, painting and decorating and plumbing than in other types of work, but we are finding that the instructor who has to include safety as a part of the lesson sheet, begins to believe in safety.

I doubt very much if you can drive a teacher to teach safe practices. I think you have to lead him into sort of wanting to do that as a part of his job, and that calls for a lot of tact and diplomacy on the part of the administrative head of the school.

I think that in the social science end of your school program, there can be a lot of safety instruction put over too, oftentimes by teachers other than shop teachers. As Mr. Boulet said, the industry is only one-fourth of his life, and so I think the boy or girl that comes through our schools should know something about

public safety and home safety. The statistics show that the number of accidents at home is large. We have tried to get the teachers in our Home Economics classes to stress electrical hazards and other hazards occurring in the homes, and to be honest with you, we are having far better luck with them than we have with our shop teachers.

In summary, I think we can get the instructor to discharge his responsibility of teaching safety by using the so-called "conference method" of instruction. You can bring home to him the fact that teaching a boy how to run a lathe is only a factor in the duties which he has to perform as an instructor in the shop, and that developing safe habits and a safety-consciousness in the boy is also a vital thing.

Another valuable part of our program is to include in the material which the instructor uses specific information on safe practices, shop housekeeping, etc. His use of that material will make him more safety-minded.

I think we should participate more in the safety activities of the public and industrial groups in our various states. Here in Chicago, if the schools were really doing the safety job they ought to do, seventy-five per cent of the vocational administrators would be present at a meeting of this kind. Co-operation between the state and the school system will oftentimes bring to bear on the instructors a sort of, I won't just say, "pressure", but an idea that safety really is an important factor in the educational program. After constant drumming for a while he will begin to believe in safety and do something about it.

In all our skilled building crafts, plumbing, electricity, etc., our instructors have to learn a code; they take the code study, either national or state or local and we have classes for them while they learn this code. This study has brought them to the realization that safety is being recognized legally and that has helped considerably.

In general school courses of social science, we are offering now a so-called "Red Cross" course, generally taught by the school nurse, and in two instances I can tell you of boys and girls who later on used this training to good advantage.

I was in a school machine shop yesterday where there was an electric switch in wretched condition, yet the boys were using it constantly. I asked the director about it and later on, we talked to the teacher. They said that they had to send to Milwaukee to get a new one, and hadn't got around to get a requisition for it. The instructor gave a lot of reasons why it had not been done, but I don't think the instructor had any sense of responsibility for the individuals in his class.

Round Table Discussion

CHAIRMAN GRAHAM: It is quite apparent from Mr. Noyes' remarks that he has had ample contact with instructors. I can tell that he has had some of the identical problems we have had in Detroit.

The thought occurred to me when he was discussing the matter of interesting the instructors that his statement was very true that we cannot enforce safety instruction simply with orders. Accident prevention work is a good deal like religion in that it is a thing that cannot be rammed down anybody's throat. You have to sell the idea; you have to persuade people. It is sometimes the long way around to use the persuasive method, but it is the only sure way to accomplish results. If an instructor teaches safety and makes it an important part of all his instructional material because he really wants to do it, and feels it is part of his program, he will do a very good job. If he is peremptorily ordered to do the thing, he does it only to the extent which he feels is necessary to get by and it has not his whole-hearted enthusiasm which is necessary to put it across in a way that will really stick.

Mr. Bedell, in his talk, mentioned little booklets on safety rules and regulations as used in the school shops in Detroit, and I am sure that any of you who desire to have a copy can secure one from Mr. Bedell.

Instructors do the same sort of thing that we occasionally find foremen doing in industry. We have all known of instances where a foreman will censure his men very severely for grinding without goggles, and yet do the same thing himself. We have found an instructor emphasizing the need for wearing proper eye protection when performing grinding operations, and a few moments later, stepping up to grind a tool without goggles. The boys who are acting as safety engineers in Detroit school shops are given instructions by their teachers but the teacher is no exception to any of the rules. If the boys find the instructor violating any rule, he is called immediately, and of course, there is a very keen eye to detect something that the instructor does wrong.

Another thing that I would like to clear up, is the title of our group here. We are constantly referring to vocational shop safety work, and I think that we are inclined to think only of those schools which are trade schools, whereas our industrial safety activities should extend into all of our school shops, regardless of whether or not they are actually trade schools, because a large percentage of the students who graduate from our high schools and our elementary schools are going to become connected with industrial concerns. They may not be out in the shop; they may not be men who are operating machines or performing manual work of any kind, but they are going into these industries in semi-executive capacity of one sort or another, and it has been very amply shown that it is just as necessary for the executive to have an understanding of safety work, as it is for the man on the machine to know about it; so we feel we are preparing these boys for their work as industrial executives, even though they may never actually operate a machine. I think that in considering this matter of school shop safety, we should think of it as affecting all of the school shop activities.

I was glad Mr. Noyes mentioned the Home Economics group. I think a good deal can be done in home safety activity. We have more accidents in the homes of our country than we have in our industries and almost as many as on the highways. Homes are very good places to put across safety teaching, such as using proper ladders, proper electric and gas appliances, and preventing fires.

This should extend not only to cooking classes, but other classes as well. There are certain elements of danger involved in operating sewing machines, and dangers in deep fat frying, etc., that can be emphasized. We are starting work along that line in some of our Home Economics Classes. They are having the equivalent of a student safety engineer in those classes, a girl whose duty it is to watch the activities of the girls and see that the gas flames are not turned too high and that the handles of pans are properly turned and so on.

Another point Mr. Noyes alluded to is the matter of the administrative attitude toward the whole safety education problem in the school system. I do not think we can get to first base in any school system with any accident prevention program unless the superintendent and the various other men immediately under him take a very definite and open stand concerning accident prevention activities. They cannot give it just a casual approval as they might a requisition for a new desk lamp. They have got to come out and say that they are absolutely behind the movement. If they can convince the rest of the administrative group that it is a problem that is with us to stay, and not a passing fancy then we can begin to make progress.

After all, I think safety is a matter for everyone's consideration, and I think that we should not in our school shop activities, just confine our work to industrial safety. There are many other phases of safety work that can be put across very effectively in the school shop. We can put across traffic safety or home safety, fire prevention, good housekeeping and things of that sort.

Another point which can be emphasized very frequently is that industry today is looking to its foremen and other executives as leaders to make the various companies by whom they are employed, more efficient, so that industry can make a better livelihood. Industry is picking out from its men those individuals who have the

qualities for leadership, and industry is paying considerable attention to the qualifications that a man has from an accident prevention standpoint. Production used to be the only cry, but industry has found that accidents are a very costly thing, and that the foreman who can get production safely is a greater asset than the man who gets production only.

CHARLES D. DAWSON (Assistant Superintendent of Schools, Grand Rapids, Mich.): All of our teachers, no matter what they are teaching report to the superintendent's office every accident which keeps a child out of school a half day, no matter if the accident happened on the street, in the home, on the playground or any other place. If that accident is so serious that it keeps a child out of school a half day, or requires the services of a physician or hospital it must be reported.

This makes every teacher conscious of the fact that the superintendent's office will know of the accidents which are happening in his department. That is not the end of it for very often the superintendent calls in groups of instructors and talks to them. That is not the end either. We have a full time safety man who analyzes the reports and goes into all the schools about once every three months and talks about the specific accidents that are happening, and what the instructors' duties are toward accidents. I will just give you one example. A little girl in a Domestic Science Class was stirring a pan of dye. There is a seat on the bench that she may sit on if she wants to, but she climbed up on the seat, leaned over the pan and in some way or other spilled the dye over herself. She was badly scalded.

The whole group of practical arts teachers was brought together. They said the gas plate on which this pan sat was rounded, and would not sit flat. That caused the accident. I said, "Well, were there any other contributing causes?" and then this fact came out: they had allowed the child to climb up to this seat and stir the pan.

"Did anybody warn her not to do that?"

"No; nobody said anything about it, because she had decided that that was the better way to do the stirring."

I said, "Did you know the top of that stove was rounded?"

"Why, sure, we knew."

"All right, you knew the danger was there, and you saw the child doing something she shouldn't have done. You have no excuse. There is no alibi. Your business is to teach children safe practices."

In other words, as your chairman has said, this matter of safety must be energized from the top down, and instructors must feel a responsibility in the teaching of safety. I think as soon as you get a program that actually functions in a general way from the head down, that safety work will be much more effective.

I would like to ask the last speaker one question: Do you, Mr. Noyes, have any information relative to the teacher training institutions? Is this matter which is so important to life and limb and happiness and economics and all phases of human life stressed in our teacher training institutions?

MR. NOYES: I think the answer is, "No." I am ashamed to say that, but I think it is correct.

We started this year, as an outgrowth of some work that was done by the Fox River Valley Safety Council, to put in our itinerant teacher training program some safety instruction. We did that in two ways. We have in home economics and in trades what we call itinerant teacher trainers, and they hold group meetings with the teachers. If a city is large enough, they will hold a meeting with the local staff; if there are two or three cities near by, they hold it at a central point. This year for the first time, we have tried to put over a safety idea. Then in plumbing and foundry, painting, decorating and electricity we use an advisory committee composed of two employers and employees who meet monthly and go over the units of instruction, both in the field of apprentice and adult education. They have given some assistance in building up specific safety instruction in those crafts, and that has

been done under the jurisdiction of one of our teacher trainers. That is all we have done. It is more or less disorganized.

MR. DAWSON: I would like to make a motion that Mr. Noyes be appointed a committee of one to do some research work and report back to this organization next year on teacher training. We want to get some recognition of safety in the teacher training institutions.

The motion simply is that he be appointed to make an inquiry and to report back the replies he receives from teacher training institutions, and if they are doing any work, get what they are attempting to do.

(The motion was seconded and carried.)

CHAIRMAN GRAHAM: Thank you very much for making the motion. That ties in closely with something I would like to discuss right now. The vocational school group has been a founding on the doorstep of the National Safety Council for the last two or three years, and we are about to toddle on our own feet by reason of the fact that the Council has felt that the work being done in school shops is of sufficient importance to warrant the organization of a School Shops Committee of the Child Education Section. There is to be a luncheon meeting today at which this committee will be organized. I shall certainly see that the motion that you have presented, which has met with the favor of the group, is taken up by the committee. I am sure that some very definite result will come from that, and I hope Mr. Noyes will co-operate with us in trying to get some information along that line. I know that the other members of the Committee and the staff of the Council will be glad to co-operate in getting out a questionnaire to see what is being done.

I think it is a very essential and necessary thing that we have some organized effort directed at certain very definite objectives if we are going to progress with this sort of work, and I would certainly like to urge all of you to attend this committee meeting.

CARL E. KARLSTROM (Detroit Board of Education, Detroit, Michigan): The gentleman from Grand Rapids spoke about the accident report. I wish to state that in Detroit we report every major and minor accident. One copy goes to Mr. Bedell. We keep the reports so we may decide for ourselves what accidents occur more frequently.

We feel also that we should get our teachers interested and we give them a bulletin on safety education to present to the children. It is all right to teach safety, but you have to put something into the hands of the teacher in order to put safety across.

ADJOURNMENT

THENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Home Safety

Thursday Afternoon Session
October 15, 1931

DR. R. M. LITTLE, Chairman

Bureau of Rehabilitation, New York Department of Education, Albany, N. Y.

The Home Safety session convened with Dr. R. M. Little presiding.

CHAIRMAN LITTLE: At the close of our meeting last October in Pittsburgh, the committee agreed upon the following suggested proposition: that the News Letter should be further developed.

Judging by the letters that have come to my desk during the year, these efforts have been made rather successfully. I found the News Letter exceedingly interesting. The programs which were prepared and suggested for women's clubs were quite practicable. One or two letters told of the various accidents which occur to children and others in their homes. The news which was brought to us about home safety was also stimulating, and that which was being accomplished in various cities indicated that at least in some parts of our country the idea of home safety was taking hold in a very substantial way in influential minds. I think that we should congratulate Mr. Billings who has served as secretary of the Committee. Quite naturally, it has been somewhat scattered, and it would be very difficult to sum up the results.

We are pioneers of a great effort, a greatly needed effort, because the statistics are simply shocking as to the number of injuries in the homes of the American people. I could not believe at first that there are more people killed in their homes accidentally each year in America than there are in our industries. Of course, the exposures of home life are vastly greater than in industrial life. At the same time, when we have practically 30,000 deaths from accidents in the homes of the American people each year, and a conservative estimate of 150 injuries for one death or, in other words 4,500,000 people seriously injured in the homes of America every year, there is great need for a broad effort to bring the idea of the practice of safety into the home life of the American people.

We cannot say from the statistics which have been gathered that the hazards of our homes are due in a majority of cases to scientific invention. The electric, gas and other appliances have added to the hazards of the home, but it remains as a distressing fact that most of the serious home accidents are not due to those appliances and their use, but rather, after the first few years of life, most of the home accidents occur by that age-long disposition of weak human folk to stumble and fall, 21 percent of all accidental deaths to persons over 14 years of age are caused by falls—and most of these occur at home. That is no new development. I presume that it started with the race at the first and has continued until now. How-

ever, there have come into our home life through scientific research and invention and economizing of home effort, many new hazards that need to be safeguarded against.

These are only preliminary remarks because the program which has been arranged for today is one replete with interest and competent speakers to present the various subjects.

The first will be presented by Miss Frances L. Swain, the director of Household Arts, Public Schools of Chicago, and president of the American Home Economics Association.

Teaching Home Safety Through Good Home Management

By FRANCES L. SWAIN

Director of Household Arts, Public Schools of Chicago; President, American Home Economics Association

It has been convincingly demonstrated in industry that if a factory is to be operated efficiently, ample provision must be made for safety. In other words, the efficient factory has been found to be a relatively safe factory; accidents and near accidents seriously interrupt the even and rapid performance of work.

Although most persons set up different standards for use in judging the value of a home from those used in judging a factory, they readily recognize the havoc which may result from accidents involving either the safety of the members of the family or of the family possessions. It is considered highly desirable, therefore, that a house be made as safe as possible in its construction and equipment, that the occupants be trained to do things in a safe way, and that they be alert in meeting situations involving hazards.

Primitive peoples devoted much of their time and effort and their keenest ingenuity to securing personal and group safety. Fortunately the inmates of the modern home need fear few of the perils which menaced the primitive household. However, the number of home accidents and fatalities reported each year is far too great, and it is agreed that earnest effort should be devoted to reducing this number to the minimum.

It is not the purpose of this paper to consider at length the various groups of home accidents usually classified as falls; burns, scalds, and explosions; asphyxiation and suffocation; poisons; cuts and scratches; and others. A study of these data sheds too little light on the basic causes of the accidents, although information as to the more frequent and possible causes of home accidents is essential if a sound program of accident prevention is to be developed.

Such an investigation is reported by Miss Gertrude Zurrer in her recent study, "The Home Accident Problem." Miss Zurrer lists 14 different factors which it was determined had contributed to certain of the accidents which she investigated. These, arranged in order of frequency, were: hurry, physical defects, defective appliances, absence of light, use of wrong tools or equipment, matches or dangerous articles in unsafe places, slippery walking surfaces, articles left on floors or stairs, loose rugs, carrying heavy or large objects, winding stairs, broken utensils, flammable articles, and poor ventilation. In considering a list such as this, a person's instinctive reaction is to begin formulating unconsciously a program of home accident prevention, registering certain things which should be done and others which should be avoided.

A careful scrutiny of these factors contributing to the accidents reveals that they were related to the condition of the person, the hurried manner or the way in which things were done, to the condition and use of equipment, to the physical condition of the house, to the location of various articles—all matters of greater or less concern to those responsible for the management of the home and the guidance of the children living in it.

Good home management in the larger sense is not a simple task. It should make provision among other things for the satisfactory organization of home activities, recognizing both work and play; for the adoption of desirable methods to be followed in performing various tasks, especially when efficiency and safety are of special concern; for the selection of safe and suitable materials and equipment; for the attaining of desirable standards in physical condition and arrangement of the house as a building, in the arrangement of equipment, and in the character of housekeeping; and, when such seems necessary, for giving information and warning of dangers or risks to be guarded against.

Leaders in the safety movement have naturally turned to the schools to assist in educating young people to avoid needless dangers and to learn how to cope most adequately with unavoidable risks. Furthermore, the school child is being looked upon as a suitable messenger to carry the doctrine of safety into his own home. And very naturally the question is being raised as to the extent and nature of the contribution the home economics teacher has been making and may in the future make to this program of home safety education which may be fostered in the schools.

As an aid in determining to what extent home safety is being taught in home economics classes in the elementary and secondary schools, occasional examinations have been made of home economics textbooks. Such examinations have yielded very meager returns. It is very evident that home safety has not been a primary concern of the authors of these texts, so that in many cases where care is necessary to avoid accidents, accurate methods of procedure may be presented but with no reference to the risk these same procedures are seeking to avoid. A careful investigation would probably reveal that a very considerable amount of this type of indirect safety education is included in home economics texts and even more in home economics classes. It is perhaps interesting to note in this connection that one of the editions of the Boston School Kitchen Text-Book, by Mrs. D. A. Lincoln, first published in 1887, gives the warning that, "Through ignorance or careless management of a fire, much fuel is wasted, health impaired, and not seldom human lives are sacrificed", and the author proceeds to give very definite precautions about the management of fire in the coal stove and the necessity of proper draft adjustments and adequate ventilation, and adds, "Fires have often been occasioned by careless storing of hot ashes."

Quotations from the replies of a few city supervisors of home economics to the question as to whether or not home safety is taught in the home economics classes under their charge will serve to indicate the attitude of these women to the subject and will indicate something of what is being taught in the home economics classes:

"The first lesson in our foods work is on the gas oven.

This includes:

"Care of matches and their disposal after use.

"Lighting of burners—avoidance of reaching across flame.

"No uncovered flames.

"Lighting gas oven—always open oven door—light—look to see if completely lighted—close door.

"An early lesson in clothing classes is on the use of the electric iron. Observation of pilot light and care in connecting and disconnecting.

"Care in handling kettles of boiling water and in avoidance of contact with steam.

"Care in disposal of broken glass and china."

"With our 25,000 girls in cooking classes, we have never had a gas stove accident or a severe burn." (Philadelphia)

"We bring into our laundry lessons safety problems in explosive materials used for renovating and cleaning.

"Our teachers are given instructions on how to handle emergency needs, fire and first aid. In our Home Nursing course in junior high school, there are first aid lessons. Our junior and senior high school laboratories are all equipped

with the labor saving devices and in teaching the correct method of using these devices, dangers involved are also brought to the attention of the children."

"In our Home Economics work, health and sanitation is stressed, which of course includes safe practices." (Baltimore)

"Safety in the care of foods and their preparation, the folly of keeping heavy utensils on top shelves, the danger of holding pins in the mouth while sewing, the likelihood of getting fingers into the machinery of the mangle, washing and sewing machines, the hazards of fire while cooking, all these and many other things come immediately to mind; and since we have almost no accidents, it must register."

"I believe a regular safety program would be a help to many of the teachers, especially those who take it for granted that children know such things by instinct."

"I can not pick out any particular place where we neglect such teaching but I know we could do more of it everywhere." (Cleveland)

An illustration of one way of teaching safety habits is found in one of the intermediate schools in Detroit where special housekeepers in the home economics classes are appointed to keep the school kitchen safe and to assist in teaching home safety. A list is posted of some fifteen items which the pupil must check, such as keeping the aisles cleared, floors free from liquids, first aid and emergency equipment in place, gas cocks closed when not in use, utensils placed so that they will not fall, and rubbish cared for. Training in observing and checking such matters affords excellent experience, contributing to the development of habits of safety.

The chief of the home economics education service of the Federal Board for Vocational Education has stated that:

"We have reviewed a number of the vocational courses of study in home economics in our files, and find that whatever is done by way of teaching accident prevention in the home is incidental to other instruction, as health, care of children, house planning, and the like."

"For example, in some vocational courses in child care, where a study is made of toy selection for children, the need for considering the factor of 'safety' in choosing toys for children is brought out, and attention called to the injury that might come to children from handling toys with sharp edges."

A woman who has had much experience in training home economics teachers has said:

"The accidents to pre-school children have increased as rapidly as accidents in general; whereas accidents among elementary school children have decreased more than accidents in general. This would seem to indicate that there is an excellent opportunity to include instruction on safety in the home in our home economics program in order to adequately train for better homemaking."

The rural home economics extension worker has an exceptional opportunity to carry the message of safety into the rural homes, and this is frequently done in connection with the study of health, sanitation, home furnishings, and household equipment. "In the work, for instance, on health and sanitation, regular extension work has been developed on such topics as a safe water supply, sanitary sewage disposal, first aid to the injured, and home nursing." An example of home furnishing work that dealt with safety is the finishing of floors and the placing of rugs to avoid accidents as well as to make for attractive and comfortable living. Extension workers have always emphasized the safety factors when giving information on the choice of labor saving equipment."

Emphasis has also been placed on precautions concerning the labeling and storing of poisons, disposal of waste, and fire prevention. Recently the problem of safety has been given especial consideration in the boys and girls clubs in one of the states, while in another state a series of programs on safety in the home is being planned jointly by the extension service and the Federated Women's Clubs.

These quotations and statements serve to make it increasingly evident that it is justifiable to say that the home economist is only incidentally teaching safety and further that unique opportunities are afforded in the home economics class of linking safety teaching with actual situations so that they will tend to become fixed in the minds and habits of the pupils. In order to develop a sound program of safety education in home economics courses, the problems of home safety should be thoroughly studied so as to determine more about the nature of the causes of home accidents, ways in which these may be most satisfactorily met, the material in safety education suitable for use in the home economics courses, and the best approach and most satisfactory methods to employ in presenting this to home economics students in home economics classes.

Miss Zurrer's report on "The Home Accident Problem" has very happily dealt in part with some of the philosophy on which the home is based that should be recognized in developing the home safety program. She has pointed out that the home should afford a certain degree of freedom to the various members of the family, that ordinarily there are many other considerations than the individual's ability to do a certain piece of work which are taken into consideration in the assignment of tasks, that efficiency in the sense used by a manufacturer does not apply to many of the household activities, and that the home situation offers an infinite variety of situations in which accidents may occur, so that specific methods of preventing each of these cannot be developed but that home safety education may include a consideration of factors common to most hazardous situations, so as to fit the person in so far as possible to deal with unusual situations when they arise.

There is need for research on specific problems to discover safer procedures, materials, and improvements to reduce the hazard in using certain types of equipment. For example, gas, electricity, and cleaning materials are recognized as almost indispensable agents in most households, but each introduces its peculiar hazards. Yet the solution of the problems presented will never be by the exclusion of these useful servants from the home. At present, however, the home economist, as well as the housewife, is not as familiar as she should be with reliable safeguards, which although meeting the requirements of safety have not been brought adequately to the attention of those less closely connected with the safety movement. Intensive study should be made of ways to eliminate hazards wherever possible; and where they cannot be removed, to point out risks and to formulate the information which will prepare one to cope with the situation as successfully as possible.

Home economists and others seeking to promote home safety are at present in need of adequate and readily available reference material, preferably a carefully prepared text in which is assembled relevant information on home safety. Such a text might well present briefly certain philosophies pertaining to safety and significant psychological principles which should be recognized in training small children in safe practices. But the greater portion of the text should be devoted to a presentation of specific information, which is of definite concern from the point of view of home safety, relative to materials; equipment; processes; situations; and the house, its plan, construction, arrangement, and care.

As progress is made in research on the various aspects of home safety and in the literature on the subject, and as she becomes aware of the magnitude of the problem, the home economist may be depended upon to make a more direct and significant contribution to home safety education.

CHAIRMAN LITTLE: We are indebted to Miss Swain for giving us a splendid presentation. We will now have a short open discussion of the paper.

DR. H. W. GENTLES (Chicago Chapter, American Red Cross, Chicago): There are two books just published by Bobbs Merrill, by Dr. Emerson and Dr. Fess of the Educational Research Department of Northwestern University meant for grade pupils. They are in sequence, contain a great deal of first aid hygiene, and are well fitted for school work and other work of that kind.

Dr. EUGENE E. WILLISON (Field Representative, First Aid & Life Saving Department, American National Red Cross, Washington): I think that the lack of good home management gets more people in trouble around home than anything else. As a physician, I have done a considerable amount of ambulance work with these cases.

A youngster is sitting at the breakfast table dressed in heavy underwear and woolen clothing over that; some one comes along in a hurry with a cup of coffee and passes it over his head; the cup slips off the saucer and the youngster has a burn almost to the waistline. A mother instructs her youngster to light the stove. A mother, washing, sets a pan of hot water on the floor, the youngster sits down in it. A mother carries a child up a flight of stairs in one arm with a pan of water in the other. There are so many of these practices. They are not due to improper physical equipment, but to just plain carelessness.

Notice how many velocipedes and coasters are scattered along the hallways and sidewalks as you go in and out of buildings. It is not so much poor physical equipment in the home as poor management of the equipment.

The other day a youngster picked up the cord to attach a percolator and stuck the end in his mouth and lost about half his tongue before they could get it out. I think we should emphasize proper management.

CHAIRMAN LITTLE: We must gather up these facts which are scattered throughout the whole nation and get them presented in such a way that they will focus the attention of the people on the need to correct bad habits.

Mrs. WILLIS M. GRAHAM (Illinois Federation of Womens Clubs, Chicago): I don't know whether this is a defense of women or not, but I think in nine-tenths of the accidents we all know better but we lack a self discipline which makes us pause and apply the knowledge that we have. The lack of that little interval between our knowledge and the application of it I feel causes the accident.

I gave a talk some time ago in a little town down in the central part of the state, and after the talk was over I met a woman on the street. She said, "Didn't you speak to our club this afternoon on home safety?" She waved a package and said, "I went right to the hardware store and got some things to fix my cellar steps. I have known for six weeks that they needed fixing."

CHAIRMAN LITTLE: Miss Esther Rockey, who has been chairman of a committee of Dayton Power and Light Company, and whose committee has done excellent work with first aid, will now address you.

First Aid to Home Accidents

By ESTHER ROCKEY

The Dayton Power & Light Company, Dayton, O.; Chairman, Safety Subcommittee, Women's Committee, N.E.L.A.

There is an Oriental word for which we of the Occident should have no use—"Kismet"—"Allah wills it."—"So be it"; the old idea of fatalism—that one must not fight against fate. Yet we build, equip and decorate a home, give it a soul in a mother, glorify it with children, and then let fate take its course. The staggering figure of 30,000 fatal accidents in the home in 1930, and many times that number of injuries, leads one to believe that the idea of Kismet rules the home so far as safety is concerned. Not many years ago there occurred a terrible accident in a small community near my home in which a child was burned to death, and I heard some wisecrack make this remark, "Well, it seems just like it was to be!"

The National Safety Council and the National Electric Light Association do not feel that accidents are just to be—not if they can help it. They realize too well the human factor must be considered, that one thing in this world which does not change is human nature, and that there are two traits which have survived generation after generation,—carelessness and daring. An animal obeys its own instinct. It tries to safeguard itself from harm, but man, the superior animal, (and I daresay this is one of the greatest distinctions between men and beasts) man courts danger, and as long as the human race endures there will be need for safety work.

Safety work for women in the electrical industry is a part of the program of the Women's Committee of the National Electric Light Association, and is stimulated by the work of the Accident Prevention Committee of that body. The Women's Committee, which I represent, includes the 30,000 women employed in the electrical industry, whether they are home service workers, stenographers, typists, telephone girls or clerks. This organization was established through the efforts of executives of the industry who understand how much the women in their employ contact with the public, and how much service and assistance they can give women outside the industry, the vast majority of whom use electric service, if they knew their industry not as a cross section presented by their own particular line of work, but as a vast panorama. All over the country utility women have sought to inform themselves on the use of electricity in the home, the best methods of rendering service and courtesy to the customer, and last but not least they have trained themselves in safety practice. Since electricity enters intimately in 70 per cent of the American homes, for the past few years women have been interested in electrical home safety.

Now, it isn't the object of the electrical industry to hang a danger sign on its product, when electricity is the safest means of producing light and power in the home if the appliances designed for its use are handled with reasonable care.

Have you ever stopped to think how much more safely electricity does the work to which it is assigned than the old methods which it replaced? We know it does it more efficiently, of course, but how much safer is the electric light bulb than the old kerosene lamp. Mrs. O'Leary's cow wouldn't have made her famous gesture right here in Chicago with its far-reaching consequences had the widow milked the animal in a modern dairy. Out of Texas comes the story that the owner of a very fine breed of cow kept her in a cowstable equipped electrically with an extension light above each stall. One day he milked Bossy, left her for a moment, to find her dead when he returned. The cow had swallowed the knoped section of the extension, chewed on the socket and was electrocuted. The moral to that tale is first—that Bossy in electrocuting herself didn't burn down the town, and second, common sense should have told the farmer not to permit electric light cords to dangle where animals had access to them. In the home, the old broom, washtub and iron were not particularly dangerous, but they weren't especially favorable to the health and disposition of a woman. In industry, small compact motors are doing the work much more safely and efficiently than the old steam driven belts, safeguarding the life and limb of many women employees. The electric range has brought undreamed of comfort in the kitchen along with greater safety. Insurance agents will tell you that when the use of electricity in the home was in its infancy, policies carried a special rider, if the house was wired for electricity, because at that time electric current was considered a special hazard. House wiring and the industry as a whole have developed to such an extent that today a house not wired for electricity would be considered a greater hazard and the insurance rate applied would be higher.

If I were a minister, I would say, "In this matter of Home Safety I take for my text.—Common Sense." Use all the electric service and appliances available

for they have done much to remove drudgery in the home and they give more time for homemaking. Also remember a few common-sense rules in the use of these appliances.

It is with this thought in mind that the Accident Prevention Committee of the National Electric Light Association has prepared a few simple rules governing the use of electricity in the home and has called their pamphlet "Common Sense."

1. If protective covering has failed because of wear and tear, because of defect, or has temporarily become ineffective due to watersoaking, a dangerous shock may be received by a person with hands wet or damp who touches a metal socket, electrical appliance or anything connected with electricity while—

Standing on a wet floor

Taking a bath

Touching radiators, piping or other plumbing.

2. Secure use of molded composition or porcelain sockets in bathrooms, basements, and all other damp locations. Use wall switches where possible. Approved sockets of molded composition or metal sheath porcelain are recommended for use with extension cords.

3. Never leave electric irons on anything that will burn. Always use the metal stand or rest that is provided. Do not use lamps, irons or toasters to warm beds in the winter. Fires may be started by such misapplication of these devices.

4. Extension cords for connecting electrical household appliances or lamps should be handled carefully so as not to injure the protective covering of wires. Have cords repaired or replaced when they become worn. You cannot depend upon defective cords. Long extension cords are unsightly as well as unsafe.

5. Do not use your electrical equipment for playful experimenting or practical joking.

6. Additional wiring in your house should be installed only by a responsible electrician. Your best insurance against fire and accidents is good wiring.

7. If a fuse, the electrical safety valve, blows out, you are overloading your wiring system or using a defective appliance. The trouble is not corrected by inserting a larger fuse. A fuse of the proper size is your protection against fires or accidents. Ascertain and correct the trouble before putting in a new fuse.

8. Convenience outlets should be installed for connecting portable appliances. Screw base receptacles or outlets are no longer approved. Where they exist, equip them permanently with detachable screw base section of attachment plug or have your electrician replace them. This will prevent inquisitive children from making accidental contact with current carrying parts.

9. Place outdoor aerials to one side and not crossing over or under power supply wires. A radio aerial which has fallen against power wires is probably alive, regardless of weatherproof covering on power wires. Disconnect power supply from your radio before you do any work on your set.

10. Fallen wires on streets or highways may be alive. Avoid them. Notify the electric light and power company.

Supplementary to this, the home is the place to teach children not to fly kites with wire string.

You will note that out of ten recommendations made, two relate to eventual fire hazards, appliances turned on and forgotten, and overloaded wiring. Two relate to more special subjects of outdoor conditions, radio wires and fallen wires on the streets. Three relate primarily to the quality of permanent wiring systems, namely the use of extension cords and adequate convenience or service outlets. To keep equipment of this nature in good working order is nothing more than what one would do for an automobile.

There are therefore only three of the ten recommendations that are specifically addressed to the layman to guide him in his personal actions in order

that the danger of shock may be avoided, and these three can be summed up by saying that immunity from dangerous shock can be assured if people will avoid touching live parts of electrical equipment and appliances which is merely a matter of common sense.

The voltage which enters your home is safe and dependable for its intended use. Practical joking with electrical equipment may lead to extraordinary things and records contain accounts of a few actual fatalities from this cause.

The number of fatalities due to ordinary lamp voltages is exceedingly small, and this is all the more remarkable when we realize that electricity enters the vast majority of American homes. I am told that more than one third of home accidents are classified as due to falls. Adequate light at the top and bottom of stairs and in all halls throughout the home will prevent many falls. It is not the intention of the power and light industry to speak lightly of the number of fatal accidents in the home,—human life is too precious for that. Roughly there are somewhere between seventy and eighty such fatalities a year throughout the United States. By far the greater part of these occur in industry, and those occurring in dwelling houses are not greater than twenty a year for the entire United States. The National Electric Light Association has been and still is endeavoring to gather authentic information relative to fatal accidents attributed to low voltage contact. Figures such as I have given you have been checked by newspaper clippings and reports from electric service companies.

At one time the National Electric Light Association analyzed a number of low voltage fatalities, and out of 31 occurring in the home over a certain period, 12 were bathtub cases; 6 were caused by shock from portable appliances not used in the bathroom; 7 were killed by electric shock when they were standing on wet basement floors; 1 died because a lamp cord was defective; 1 lost his life making amateur experiments; 4 died from miscellaneous shocks. An electric heater set fire to the bed clothes and burned a child fatally; in another case a man wet with perspiration was found dead wrapped in an electric blanket.

You can easily see that these relatively few electrical fatalities could have been avoided by observation of one simple precaution we have discussed. So could other home fatalities, for that matter, be avoided. Utility women have realized, since woman's province is peculiarly the home, the value of Home Safety study. Never in history has the standard of homemaking been so high in comfort and convenience, but the wonderful new equipment that has produced this efficiency is not always used properly. Utility women recognize the fact that women should be encouraged to quickly note unsafe conditions in their homes and correct them, and have included all phases of home safety in their programs, not only electrical. Through playlets, talks, bulletins, utility women everywhere are trying to spread the gospel of safety. Many appear before women's clubs, school children and other organized groups. Many have entered crusades against kite flying with wire string. Others have entered into Fire Prevention activities, going so far as to prepare programs. Many of them are interested in safety organizations outside their industry.

Because the National Safety Council has given us so much help along this line is the reason I am here. This help hasn't been merely in words of encouragement, but good solid material designed for use in these programs.

Safety activities during the first few years following the inception of the Women's Committee were mostly along the line of training in First Aid and Prone Pressure Method of Resuscitation. In 1922 Mr. Samuel Insull established the Insull Medal, an award for meritorious cases of resuscitation from electrical shock by the Prone Pressure Method. Women of the utilities were quick to realize the value of Safety and First Aid methods in their programs of study. They took courses in these subjects. They organized teams for contests, in many cases winning in contests with men's teams. To such a standard of effi-

ciency have they brought their demonstrations that they are asked to appear before women's clubs, schools and other organizations. A utility woman, Miss Stella B. Marple, of the Public Service Company of Colorado, is the first and only woman recommended for a United States Bureau of Mines First Aid Instructors Certificate. Some companies require every woman to become proficient in the Prone Pressure Method of Resuscitation.

Since women do not become linemen, electricians, groundmen, why should they study First Aid? It is the human aspect which has appealed to them and their industry. A company is made up of men who are very human beings, and executives have encouraged their women employees in this work. Does it pay?

A Child's Life Saved

In a home in Pennsylvania a little six year old girl fell on a broken jelly glass and suffered a deep, jagged laceration across the throat. A utility woman in an office near by heard the child scream, ran into the house, picked her up, carried her into the power and light office, where other employees assisted in giving first aid. Otherwise the child would have died before the physician arrived. Up in South Dakota, a group of young folks, few of whom knew much about swimming, went on a swimming party. During the fun, one of them got into deep water and was carried down stream. One man, a poor swimmer, went to her assistance but was also caught in the undertow. The only real swimmer went out and brought in the girl who did not need to be revived; then went back after the man and dragged him from the water unconscious. Only one member of the party, a woman employed in the local power and light company, was familiar with the Prone Pressure Method of Resuscitation and immediately set to work on the victim. After fourteen minutes he was revived. Another utility woman had the unusual experience of reviving her father who had been asphyxiated with gas.

I might go on and on to relate incidents of this nature in which utility women have used their safety training to advantage; I might recount many programs, many activities in Home Safety. Since safety so far as electrical current is concerned depends upon common sense, perhaps the entire safety program of the utility women cannot be considered commercial. Safety study on the part of women in the power and light industry adds no kilowatts to the line, nor does it increase the revenue of a corporation, yet safety propaganda is one of the most sincere expressions of good will a utility can make to the community it serves.

CHAIRMAN LITTLE: At Pittsburgh last fall the question was asked from the floor as to what has been the influence of industrial safety on home safety, a broad question and difficult to answer, but from general observation we know that the influence of industrial safety has been carried into homes and into communities where it has been well developed.

It occurs to me to say again what came out at that meeting, namely that the public utility organizations have stressed efficiency and with efficiency and service, health and safety. They have been an educational influence in the homes of the American people. They have the strength and intelligence and they are widespread in their influence, developing safety in our homes as the last speaker has said.

We come to a very interesting feature of our meeting this afternoon. Miss Rosamond Losh, director of the Kansas City Children's Bureau, will present one of her puppet plays which has proved most popular, and discuss puppetry. Incidentally, all workers in Miss Losh's Bureau are instructed in home safety and teach home safety when they enter a home just as they do sanitation, good food and fresh air.

The Puppets Teach Home Safety

By ROSAMOND LOSH

Kansas City Children's Bureau, Kansas City, Mo.

In an effort to vitalize safety teaching and to stimulate a greater interest in safety knowledge, the Kansas City Children's Bureau has been making extensive use of puppetry in its child health and parent education work.

The puppet play as a means of enjoyment and education, needs no introduction or justification—the joy that the puppet show brings is sufficient justification in itself; in addition to this, the preparation for giving the play has almost unlimited educational possibilities. It is a very ancient art dating back many centuries B. C. Most people are familiar with its uses, but few, perhaps, have made use of it to teach accident prevention. Not only can safety teaching be made fascinating, entertaining and instructive by this method, but results show a definite improvement in safety attitudes and practices.

The procedure in a puppet show project involves principles that conform to those principles underlying the best educational practice.

This activity possesses a universal characteristic, it interests, charms and ensures the imagination and affection of all ages. It has immense value in the development of a great diversity of abilities. One of the greatest values of the puppet show is the opportunity it offers for creative expression with the aid of a large variety of tools—pen, brush, needle, scissors, hammer, voice, action, dramatics.

The opportunity for correlative work in the puppet project are as great as, if not greater than, in almost any other form of activity. Reading, writing, arithmetic, handicraft, music and drawing are all included in this method of safety teaching. It arouses the pupils interest in safety, stimulates the imaginative powers, stirs him to thought and action, encourages creative effort, requires a search for safety information and calls for cooperative planning. The construction of the stage and puppets and the writing and presenting of the play are done for the sake of the play, thus the play gains in meaning and significance because of the varied activity involved. It has the advantage of providing activity for all ages and for groups of any size.

The project calls for the following cooperative effort:

1. Selecting subject matter that fits the child's needs.
2. Selecting the plot.
3. Writing the play or developing the plot.
4. Selecting and preparing the properties.
5. Painting heads, backdrops, and other properties.
6. Constructing and equipping the stage.
7. Dressing the puppets.
8. Selecting the players.
9. Preparing and presenting the play.
10. Discussions and criticism of the production by the group.

These plays are not presented primarily to impart information, the important thing is the creation of attitudes. However, the preparation of the play does require the accumulation of a tremendous amount of safety information.

The puppet show safety project is not necessarily difficult or complicated. It is adapted to a very wide range of age levels. Little plays can be adapted to the kindergarten age and other plays challenge the best efforts of the grown-ups. It can be made to serve the mother's need for profitable home activity for the pre-school child as well as for the school child. It acquaints the parents with the school's objectives and its methods, materials and procedure. The ease with which the little hand puppets can be manipulated, makes them admirably suited to the young child.

To prevent unintelligent home influence from tearing down what the school is

attempting to do, the Children's Bureau has tied up its puppet show safety project with the home by making it a part of its present education work. It thus secures the active cooperation of the home and thereby helps to remove the danger of limiting the school's influence.

Women's Clubs have become interested and have provided groups of clever talented workers for all the activities mentioned. One group has just presented a very successful original play for a state convention. The club members met to write the play and to do the particularly fascinating and most important piece of work of preparing costumes for the puppets, painting heads and backdrops, and preparing other necessary properties.

Since January 1, 1931, one-hundred-eighty performances have been given before approximately 35,000 children and adults. Thirty-one original home safety plays have been contributed by children and adult volunteers working with the Kansas City Children's Bureau. Four hundred and eighty-six individuals have aided in the construction, equipment and operation of the plays.

The advantages of the puppet show as a school and home project may be summarized as follows:

1. It meets the needs of children.
2. It holds the interest.
3. It offers opportunity for creative ability.
4. It offers opportunity for free expression.
5. It instructs youth in matters of safety.
6. It establishes right safety attitudes.
7. It develops originality.
8. It develops a safety consciousness.
9. It provides training in color, speech, rhythm and muscular coordination.
10. It prevents self-consciousness.
11. It increases the vocabulary.
12. It provides group activity that strengthens the social unity of the group.
13. It places the emphasis on doing instead of reciting.

We feel that children of every generation are entitled to this enchanting activity, especially as it can be made to serve educational needs so effectively.

MISS LOSH: This afternoon we are going to present to you one of our 32 original plays, "Our Gang." It was written by our former mayor's wife who has written a number of them to use at the request of Mr. Lynch for radio programs as well as puppet shows this winter.

(Editor's note: Copies of the puppet play "Our Gang" are available free through the National Safety Council.)

CHAIRMAN LITTLE: Miss Zurrer, who is next to address us, has spent a year in study as a fellow at the University of Chicago in home safety. We heard last year a sketch of what she hoped to work out.

The Welfare Agencies and Home Safety

By GERTRUDE ZURRER

Fellow in Home Safety, University of Chicago, Chicago, Ill.

I hope no one will remember what I did say last year because there is always a great difference between what one says and what one finally does accomplish.

After what we have heard this afternoon I don't think it is necessary to give you any figures, and I don't think I have to put any more emphasis on the fact that all accidents at home are inexcusable, and that the whole problem is so big that every one of us should make an effort towards a solution.

I will presume that we want to do something for the home making problem, and the question is what should we do.

As Miss Swain has said, there are very many special considerations in home safety; the home is different from any other places from the point of view of accidents.

Mr. Enlows, of the American Red Cross, said something very significant. He is teaching first aid to many groups of students, Boy Scouts and Girl Scouts, etc. He said, "We are not doing anything with the home because we don't know how to get inside of it." I think that is very true, but I feel that we must get into the home some way or other.

It has been pointed out that safety in connection with home life cannot be separated from every-day activities. In this particular study I have found that just about as many people get hurt performing no specific duties in the home like cooking, cleaning, washing as get hurt actually at work. They are just walking through the home or walking upstairs, and have an accident.

This does not mean it is not any one's fault or is not due to poor home management; some one may have left something on the floor. Nevertheless you could not say, "Be careful walking upstairs, learn how to walk upstairs properly, and be sure that the stairway is clear." Those are all words. It is not always easy to have the stairway clear, and it is not always easy to take care.

Trying to find out how we could reach the home I have come to the conclusion that no separate agency should undertake to teach safety in the home. I mean no new separate agency. We know that the National Safety Council is doing a great deal in home work, and it is mostly in a way of reaching groups of people, not individual homes. It would not be within the scope of the National Safety Council's program to reach individual homes, since they are the first to dispense the basic information on safety, but we have many groups of people that go into homes, and that try to influence home life and improve it, who can very well be the messengers for this safety work.

I find three very distinct groups which have much to do in the homes and which visit homes regularly, the public health, home economics and social service groups.

I would certainly not want to increase the number of agents going into any one home. At the present time there are too many people going into other people's homes and it is a question if they get anything out of it or if the home gets anything out of it. I am really quite serious when I say that. It is quite an imposition by the time everybody has put his ideas into somebody's home. The groups that go into the homes anyway, and on which we depend very much, must sooner or later become the bearers of the safety message.

I think Miss Losh and Kansas City should get a compliment for what they have accomplished in combining health and safety work. A health program is not complete if it does not include safety. A health program means protection of life, and certainly protection of life is safety. I don't know how we have been able to go so long without realizing this, or if we have realized it that we have gone so long without trying to include safety in general health work. Every type of public welfare work concerns itself with public health, physical, mental and moral. There is no type of welfare work that does not fit in this classification. In practice we usually distinguish between public health work and the work of the home economics group and social service group.

As each of these groups develop we find that they reach into each other's fields. This cannot be prevented. The best part about any of them is that there is no type of work that any of the groups will say is not theirs because if it affects the family it belongs to the public health group and if it affects public health it belongs to the home economics group just as well as to the social service group.

There will be some explanation to be made some day when we are trying to separate these groups or coordinate them in a better way than has been done up to date, but just because we see this problem coming there is no reason why we should not

at present try to work out a program whereby we can introduce safety into the home.

Therefore, there are the three distinct groups which should bring safety into the home, and to all these three groups there is just one outline which can be used, and you will see that it is very simple. The outline includes work, play and recreation and safety must be taught from the point of view of all of these, and each may be subdivided into organization, facilities and equipment and training. We should bring the use of this schedule of ideas into our programs and include it into the textbooks so that it will be regularly used.

We can easily outline which part of the work is organized and observe the facilities and equipment for both work and play. But the third point is more difficult. It seems strange that in spite of the great deal of home economics that has entered the public schools there are a lot of people that enter into home management without adequate training. I feel that very much. If you compare the extent of this training with other professions you will see how scanty it is. You couldn't be a stenographer without training, but our girls marry and enter into home making, and use one or two years for experimenting. This experimenting has to come sooner or later, but it might come under better auspices than if the girl is left by herself in the kitchen trying to get a meal. With the facilities the schools now offer this should not happen so often.

The home advisor, whether she be a public health worker, a social service worker, or a probation officer can teach safety, the probation officer as she supervises a child under court order, or supervises a household under a mother's pension. For instance, the child placing agency which certainly has facilities for supervising the home a child is being placed in, can insist upon a regard for safety in the home as she insists on facilities for play, relaxation, and proper home management.

It would not be difficult to introduce a program of this type into the programs of these home advisors. It does not make any difference if they are under public or private auspices. This does not mean, of course, that the mother is excused from thinking along safety lines: it simply means we could bring her a certain amount of help, and experience which we feel she needs and does not have.

The most important purpose of all the agencies which send visitors to homes is to bring to that family and to develop in that family a sense of responsibility for each other. That is the best type of welfare work there is, and safety must become part of it.

Of course, we must direct our teaching towards general practices. Every house has different stairs, different management, and equipment. We can not say, don't use this particular knife. The important thing is to learn how to handle all sharp instruments safely. Teach children how to walk and to keep balance, even under less favorable circumstances: don't teach them not to fall over in a given circumstance. Accidents in the house are so various that you can't lay stress on a single accident; you must teach general safe habits in the different types of activities.

A girl friend of mine cut her leg while trimming the limbs off a Christmas tree. It would be futile to teach people how to cut up Christmas trees because they might sometime do that. But they should be taught precautions regarding using a sharp instrument safely.

People are not so interested in the prevention of accidents as in the prevention of communicable diseases. If your neighbor has such a disease, it might fly over to you, but if your neighbor falls down the stairs, you are not afraid you will. Because of this it may be difficult to introduce the safety thought, although it seems to me there is so much evidence of danger that housewives will realize the challenge home safety presents to them.

A mother whose child had watched her prepare a dessert told the child she was going down cellar and would leave the door open and the child should be careful not to fall down the stairs. The child watched the mother pile some jars

in her arms and go down. The youngster then went to the top of the stairs and cried, "Now, Mother, do be careful how you fall!" I think that welfare agents going into the home can size up the situation and introduce safety practices which are adjusted to the home far more successfully than can any one else.

We wouldn't think of teaching diet without teaching nutrition, nevertheless we teach first aid without teaching prevention. We have a well developed system for teaching diet and it seems inconsistent not to have an equally well developed system for teaching the prevention of accidents.

I have seen Mr. Murphy, who is sitting there, look through lists of accidents. One time while he was inspecting a list, he pointed out case after case where the cause was making fire with kerosene or gasoline. Many times the reports showed people thought they were using kerosene, but it was gasoline. This is one of several specific kinds of accidents that are worth taking up in detail, although it seems that anybody would know better than to make a fire with gasoline. That brings in a difficult factor in home safety: why don't we practice safety? Why don't we do a thing the safe way?

I was interested in hearing Miss Rockey say it was a matter of common sense. It is not always a matter of common sense. For instance, to me it is common sense to put out fire with water, and I have seen people try to put out an electric spark on a wire with it. Is it common sense we need or is it knowledge? You could hardly say it is lack of knowledge in a question of making fire with gasoline, although perhaps with some people it is. To me, electrical hazards are still (I hate to say it for I have grown up with it) not so much a matter of common sense as of knowledge. I don't know much about it.

In the home I have found another problem still larger, the problem of knowing and still not doing. We can overcome ignorance but how about those who know better and still do the unsafe thing? I wish you would answer this for me. Perhaps bringing into the home this routine supervision will help. We first must train workers to think of safety along with all their other duties. There is only one way of doing anything in the proper way, and that is the safe way. You may find a way that is faster and cheaper, but if you don't do it in a safe way, you don't do it the best way. I don't think that can be questioned. If any one in this group is busy in some kind of welfare work, I wish you would think it over and try to find which agencies we should use to make the home safer. To me it seems that these agencies I have mentioned are the best ones but this does not mean that we cannot use women's clubs or Parent Teachers' associations and other groups that have been mentioned this afternoon. We should, however, make use of the many home visitors who all these years have not taught home safety. They never refuse if they can see the heart of the work.

Dr. Winslow, to whom I have been talking, and some other public health people are very willing to include safety in their programs, and Miss Swain has already promised us the whole-hearted cooperation of her group, and I hope within very few years we can show something of an improvement in the home accident situation.

CHAIRMAN LITTLE: We will take a few minutes for discussion of the subject generally.

Dr. EUGENE E. WILLISON (American National Red Cross, Washington): I have been engaged in teaching first aid instructors exclusively for three years, and I would like to correct one or two mistaken ideas. In the first place, we teach first aid under the following heads: definition of the situation, accident to be handled, the cause, the prevention, and then follow with symptoms and treatment. First emphasis always is upon cause and prevention of accidents, and that is the chief reason the American Red Cross is in the business of teaching first aid.

Secondly, we cannot teach safety with generalized principles. The American Telephone and Telegraph Company has been able to make one of the best accident

records in the United States by emphasizing first aid and by providing a very detailed safety code to the man on the job telling him what he must do in order to be a safe worker. I don't believe we can teach safety in a home on general principles.

There are two things that confront the average person all the time, making a living and taking care of himself. I will not talk about making a living, but in regard to health and safety the graduate of the average secondary school or college doesn't have enough fundamental education about his own human body to read intelligently articles on how to care for himself.

Housewives, fathers and mothers are meeting up with accident situations all the time; we want to prevent accidents first, but we also want to train these people to know what to do when the accident occurs, and not be absolutely frantic, as many people are.

CHAIRMAN LITTLE: There has been an attempt to reach the women's clubs with safety programs. Does any one have any remarks on this?

Mrs. J. F. KITCHEN (Vice-president, Erie Safety Council, Erie, Pa.): I represent the Parent-Teacher Association of Erie. We conducted first aid classes for women two years ago, and they received first aid certificates. Our child accidents have decreased.

Dr. HENRY J. STACK (Supervisor Child Safety Activities, National Bureau of Casualty and Surety Underwriters, New York): I have enjoyed these papers; they have all been good, and I think it should be the sense of the meeting that this very good material be put in the hands of the right people.

I believe that, for instance, a paper like Miss Swain's should appear in the *Journal of Home Economics* which goes into the hands of some sixty or seventy thousand teachers every month.

Dr. T. F. MURPHY (U. S. Census Bureau, Washington, D. C.): Part of my duties are to compile statistics from all deaths. I handle over a million certificates a year. Out of that are approximately one hundred thousand who die—I am speaking of fatal accidents now—due to external violence. We call them external causes.

About two years ago Miss Zurrer came to my office on the line of work she is engaged in and aroused my interest in a particular study of accidents in homes, which up to that time, as far as I know, had never been undertaken seriously. During the speeches this afternoon I became confused because I didn't know whether the speakers were talking of accidents, fatalities, total numbers or what not. The truth of the matter is, so far as I know, there are no reliable data on the number of accidents that occur within the home. The information is on every certificate I receive, that is, on the new forms revised last year, but it has not been compiled. In the limited time at my disposal I want to read an analysis I made of two forms of accidents.

The first was burns. I analyzed about 4500 accidents, fatalities, I mean. Of the 4500, approximately 2200 fatal burns occurred in the home. That was fifty per cent. Let us see how some occurred.

Over a hundred occurred by a lamp or lantern upsetting; 300 occurred due to kerosene; 640, stoves and furnaces; 600, women cleaning their own clothes in the home; 550, bonfires and grates; 250, bonfires or cleaning up trash around the yard; and about 270 others.

That makes a total of about 2150. Compare that with 950 which occurred in industry; and yet we are prone to believe that industry is the dangerous place. It is not, as you can see by these figures.

It is a revelation to find out how many ways you can fall and die. Out of a total of 6700 cases I found 2400 due to falls in the home.

In these two types of accidents, the home is more dangerous than all industry and home safety is a subject which has not been taken up; there are no reliable

data on the subject. I think it is impossible to teach unless you have first the factor. You cannot go out and sow broadcast without knowing what the seed is you sow.

CHAIRMAN LITTLE: I suppose we should bear in mind that the exposure in the homes is much greater than it is in industry. The number exposed to whatever hazards may be in the home is the number of people that inhabit the country, whereas the number occupied in industry is much less. However, the number of accidents in the homes and deaths in the homes is astonishing and dreadful.

ALBERT W. WHITNEY (Associate Manager, National Bureau of Casualty and Surety Underwriters, New York): I will say we hope to publish Miss Zurrer's report in some form or other. It is not directed specifically to the house wife; it is a report for the people that are concerned with this problem, home economics people and social workers and public health people, and so it is a question of just how it ought to be published because of the limited number of people that will have a use for it.

CHAIRMAN LITTLE: That will be good material when it is published and put in the hands of home economics, divisions, public utility workers and others touching the home.

There will be a general meeting of the Committee after this open session is over, to consider any progress we may make during the coming year, and you are all invited to remain for a few moments longer.

ADJOURNMENT

TWENTIETH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Statistics Section

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Tuesday Morning Session
October 13, 1931

Joint Meeting with Street and Highway Traffic Section

JOHN A. MASSEN, Chairman

Chairman, City Council Committee on Public Safety, Chicago, Ill.

The joint meeting of the Statistic Section and Street and Highway Traffic Section was called to order by Mr. John A. Massen, chairman, City Council Committee on Public Safety, Chicago.

CHAIRMAN MASSEN: May I remind you that you are gathered here in a city that has made a most conspicuous application of statistics to traffic. I refer to the no parking ordinance in our great Loop district. Prior to the enactment of that ordinance we were getting nowhere improving Loop traffic.

A careful study was made, facts and figures were gathered, and on the basis of those facts and figures and the probabilities which they indicated, the city council, with the acquiescence of the great business community which controls the Loop district, enacted the no parking ordinance. The business interests were skeptical, but the facts and figures seemed to indicate that this enactment would produce beneficial results. The ordinance has been a success. The probabilities as determined by the facts and figures collected before the enactment of the ordinance were sound.

We are going to find that just plain facts and figures are going to be most helpful in the solution of a great many traffic problems. In the olden days access to abutting property was a prime purpose served by the streets and highways. It was a matter of ingress and egress and we laid out the streets and highways accordingly. But now we have great volumes of traffic. So we study the volume of traffic and

that volume of traffic determines the need for the improvement involved, the character and type of it. We study the origin and destination of traffic, and that determines the location of the improvement. These cold figures that we gather together are having a very important part in determining improvements these days, and my guess is that they will have a far greater and a more important part in the future. So too they will have a very important part in determining what to do about accidents.

On that subject I am pleased to introduce as the first speaker of the day Mr. J. W. A. BOLLONG, Seattle, Washington.

J. W. A. BOLLONG: In Seattle we are fortunate in having introduced the Standard Traffic Accident Reporting system recommended by the National Safety Council. The outlines of our methods are thoroughly covered in the Council's publications. What I have to offer will be to a great extent an explanation of how those recommendations have been put into practical use.

The Discovery of Hazardous Locations

By J. W. A. BOLLONG
Traffic Engineer, City of Seattle, Wash.

That accidents be recorded there must first be a clear cut regulation with regard to the reporting of them. Such regulation should be so worded that it will not serve to quell the true facts and circumstances. Many such reports are garbled through the fear of the operator that the information thus given will be used against him in court or in adjusting the liability.

For instance, the Traffic Code in the City of Seattle, after stating that a report must be made within twenty-four hours, further states "None of the information required by this section to be given shall be construed as fixing liability or fault or negligence of either party, but shall be a means of identification of the facts and circumstances," to which we might add "for the further prevention of accidents."

Section 16 of Act IV of the Uniform Act, recommended by the Third National Conference, covers the same thought in different words.

After having a proper regulation governing accident reporting we must have a form of report that will give all the pertinent facts. Such a form has been so thoroughly worked out by the National Safety Council that it has become universal in its adoption. This report has been prepared after experience of years, during which time the most prevalent causes of accidents have been defined.

Filing of the report should not be left entirely to the operator. He should be given a list of the uniform reasons and requested to check those which govern the accident in his particular case. In general, these cover:

- 1—What the driver was doing
- 2—The mechanical condition of the vehicle
- 3—What the pedestrian was doing
- 4—Physical condition of the pedestrian
- 5—Physical condition of the driver
- 6—Direction of travel
- 7—Type of road surface
- 8—Road conditions
- 9—Type of pavement
- 10—Weather conditions
- 11—Light conditions

along with other data regarding injuries and fatalities.

From these reports we find:

- 1—What type of accident occurs most frequently
- 2—Where most accidents happen

3—What acts of the driver are involved

4—What conditions of road surface are, and type of road surface

5—Weather and light conditions

The item we are most concerned with now is where the accident occurred.

The accident report may be made out on cards with names and locations on one side and standard accident causes on the other side, as outlined in the pamphlet on accident reporting by the National Safety Council; or it may be made out on larger sheets of thinner material, with all the necessary data on one side only. This type of report is being used in Seattle, San Francisco and Vancouver, Province of British Columbia.

In each of these cities it was thought important to have available a space for a sketch giving the place of contact. I believe the sketch is very important as many persons can depict by a drawing much better than they can describe the location, thus greatly assisting in locating the scene of the accident.

A further virtue of the single sheet report is that it may be made in duplicate or triplicate and filed, for instance:

- (1) One copy by license number to identify repeaters;
- (2) One copy by location to establish danger spots, and
- (3) One copy to state authorities, where and when required.

A clerk skilled in accident reporting, should assist each operator in making out an intelligent report so that the true facts may be obtained.

Accidents in our city vary from 40 per day on dry days to 100 per day on wet days. They are best depicted by the use of spot or pin maps. I favor using the pin map, with various sizes and colors of pins to represent not more than seven items, which are as follows:

- 1—Collision between two automobiles
- 2—Collision between an automobile and a pedestrian
- 3—Collision between an automobile and a street car
- 4—Collision between an automobile and a motorcycle
- 5—Collision between an automobile and a fixed object
- 6—A fatality
- 7—An injury

White prints of maps of not less than 1000-foot scale should be used, changing to 400-foot scale within a central business district.

A soft, fiber board backing, such as sound proofing material should be used for the map (not plaster board), to allow the pins to be inserted with ease to such a depth that they can not easily be knocked out.

As the accidents grow at an intersection, different sized or colored pins may represent 5, 10, 25 and 50 accidents of the same class.

From this pin map, twice a year a spot map may be drawn, showing the major accident intersections of 10 accidents or more.

From this map may be selected the avenues or streets that require warning signs or STOP signs, or it may be a traffic signal, as the conditions require, and particularly the intersection, which, from the number of accidents, needs study in order that we may correct physical conditions, add regulation, or warning.

It is our endeavor to determine the need for the installation of a traffic signal through its coordination with other signals, the accident situation, the volume of traffic flow, and the pedestrian's needs—all balanced one against the other.

It has been our custom to transfer the data outlined on this map to loose leaf sheets once every six months, at which time all pins are counted, proper entry made and then pulled out, leaving a clean map for the ensuing six months. There is no need to photograph as the data is recorded.

The system of location in this loose leaf summary is simply the use of the north and south avenues as the guides, inserting each cross street, so that we have every

intersection in the city represented, and thus may turn to it for reference at any time.

With this type of location recording comparisons can be made over a series of six-month periods and a close check thereby obtained on such correctional method that may have been made.

We have shown how the general hazardous locations may be found and now we must go further and obtain more detail.

In order to do this we must have a location file for the accident reports so that when an extra hazardous location stands out we may delve deeper into the facts or causes of each accident.

Filing may be performed alphabetically as is often the case or it may be performed in the same manner as already described for the accident intersection summary, choosing the avenues as the guides and every cross street in order, as they occur, to obtain the location.

For instance, we type out all the streets by districts, and each cross-street or avenue in the business district throughout the city. On the side is the name of the cross-street. We have six columns opposite each. In the first column is the collision between two automobiles; in the second, collision between an automobile and a pedestrian; in the third, collisions between automobiles and street cars; in the fourth, between automobiles and motorcycles; in the fifth, with a fixed object; and sixth, injuries.

The data are taken off the map and transferred to this sheet. I have on this sheet the record from 1929 up to now, by six-month periods. We can compare by six-month periods the accidents that are occurring. We can go back and compare how our regulations are affecting accident occurrence, the effect of parking regulations upon accidents, etc.

I believe the avenue guide method more preferable as each district in the city is grouped together and an intersection may easily be found by anyone familiar with the platting of his particular city.

The method for locating the hazardous locations I have just described has defects, but I believe it has the virtue of direct application and in a simple practical manner enables the official in charge to swiftly pick out the danger spots.

From the accident reports for any one location collision diagrams are platted, which I understand will be covered by the next speaker.

Just departing a little, let me illustrate some of the practical uses to which an accident report can be put.

Each month, from a summary of accident reports, a comparison can be drawn up showing the condition of the driver in motor vehicle accidents or a comparison of condition of the pedestrian. For instance, how many pedestrians were in the street and not at an intersection. What was the driver doing, the probable cause of the accident, etc. For instance, out of 1000 accidents nine per cent were due to cutting in, twelve per cent to failure to signal, nine per cent for failure to stop at a through street or artery, etc. That is the method we use to make comparisons. We are very much affected by rains in our city. Curves can be drawn up showing the accidents day by day, with the rainfall, so there is a very direct comparison.

Then a comparison can be made from year to year showing injuries occurring in each month of the year. We can find out what effect our regulations are having.

Unfortunately, it has been our experience in the past two years that a great many accidents aren't being reported. Somebody will call up and say that eight or ten accidents occurred at a particular place, but our records don't show an accident reported there at all. The injury accidents, however, are reported. By following these injury cases we can always get a pretty good picture of what is occurring.

CHAIRMAN MASSEN: Many of us have thought that the city with heavy rainfall would have many accidents, and now we have a statistical demonstration. Is there any discussion?

E. E. GROVER (Director of Safety, Columbus Railway Power and Light Company, Columbus, Ohio): I have been using a similar system in connection with our street railway accidents. By putting the information in the newspapers, and giving it to our platform men, we have found a considerable reduction in the accidents at places where they ordinarily occur. I value that in my work for the street railway as much as anything that we do.

JOHN W. KANE (Traffic Engineer, Newark, N. J.): I should like a little more detail on the method of collecting these reports.

MR. BOLLONG: The report is made out in triplicate. One of these reports is filed by license number and the other by location. The third is kept for the highway patrol of the state. The individual is given the report to fill out. There is a model outline above the desk where he is writing. We have one report all filled out with the answers that he should make. He can glance at that outline before he checks his report as to whether he fills in No. 1, 2 or 3, and so on.

MR. GROVER (Director of Safety, Columbus, Ohio): Do you call every man in? MR. BOLLONG: Yes, on a \$50 injury, as required by the code. All accidents are reported in pretty well whether there is an injury or not. In our city they report to the central police station.

MR. GROVER: In the use of this reporting system, does the police officer ordinarily fill these out?

MR. BOLLONG: No they are filled out by the individual. The clerk, however, goes over the report after the individual operator has made it out. Probably it would be better if the police officer made them out himself. We haven't got our department educated that far yet.

FREMONT CHESTER (Rochester Safety Council, Rochester, N. Y.): Is it a state law or a city ordinance that requires the reporting of accidents?

MR. BOLLONG: A city ordinance. We hope to get a state law in time.

GEORGE A. BARKER (Director, Traffic Bureau, Lansing, Mich.): I should like to get an idea about the permanent records. Is your spot map covered with glass? My maps get so dirty that I can't read what happens after a year.

MR. BOLLONG: The pins are all taken off at the end of six months and the information put in a loose-leaf book as I have shown. There is no photograph made of the maps. After the pins are all removed we have a clean map to start over again for the next six-month period. I tried to keep it for a year at first but found that I had too many pins to be able to count them correctly. We also lost a lot of pins due to the improper backing used.

MR. BARKER: Have you tried to cover the pins with glass?

MR. BOLLONG: Yes. I don't know that it is of any great value after you have the data recorded on your loose-leaf sheets. If you want to know the number of accidents that have occurred, if you want to know how many injuries there have been, and whether they were between two automobiles or between an automobile and a pedestrian, this gives you the data. If you want to go further, you can go to the accident file and pick out the number of accidents that occurred. The collision diagram is drawn up from that. That is studied and proper warning signals or regulations or corrections may be made.

WM. C. KNOELK (Asst. Supt. Schools, Milwaukee, Wisc.): Is there any compulsory accident reporting law in the state?

MR. BOLLONG: No. The requirement that a copy of the accident report be sent to the state traffic squad is merely in the ordinance. It is hoped that in time we will get a state law that will require accident reporting, to a central division at the state capitol. As to the size of the spot map, it is on a thousand-foot scale. Our city is thirteen miles across north and south and it varies from a mile to five miles in width. That makes a map about six feet long by three feet wide. It is mounted on movable leaves so that it can be moved around and inspected.

Mr. CHESTER (Rochester, N. Y.): Do you photostat that?

Mr. BOLLONG: I don't believe it is necessary to photograph it. We have transferred all the data contained on that map to a permanent record.

Mr. CHESTER: Your idea is that the map is simply an educational feature; somebody comes in and wants to know about accidents and we have a copy of the map to show him.

Mr. BOLLONG: Yes. Some of the newspapers have borrowed the map. They have shown it in downtown store windows. There is always a large crowd around there inspecting the accident map.

ALEXANDER K. GAGE (Asst. Prosecuting Attorney of Wayne County, Detroit, Mich.): I was struck with the statement made by the speaker, that on account of inclement weather conditions the accident toll seems to mount higher. I think the records will bear me out when I say that we find the contrary to be the case in Detroit. As the weather conditions become more unfavorable we have a lessening of traffic accidents. I should like to know whether that is the case in a majority of the cities.

CHAIRMAN MASSEN: The gentleman from Detroit would like an indication as to whether bad weather conditions produce a lowering of the accident rate in your local communities.

(The vote was about evenly divided.)

Mr. GAGE: When you ask a citizen to make a report of an accident and sign his name to it, he is practically making an admission against his interests. Especially is that true if those records are in any way open to the public. There has been mention made here of the ambulance chaser, and of course he is a menace. And not only does the ambulance chaser have access to these records but also the insurance adjusters and the insurance investigators. If either one of them has an idea of using these records for a sinister purpose it is a very bad thing as affecting the rights of the individual.

I believe there are some states in which there is a decided limitation upon the public use of those records. I think there should be. Prosecuting attorneys and judges of traffic courts are often criticized because after they get a case well prepared nothing is done, no adequate remedy is applied. The reason is that people are frequently not willing to come in and tell what they know because of the possible effect upon their right for action in a civil case to follow.

I think those things should be very carefully considered and I should like to hear some expression from some of the members present as to what difficulties, if any, they have encountered along those lines. Furthermore, this again suggests to me that we should have a whole session or a day devoted to the consideration of the legal phases of a lot of these questions. I believe it would be of just as much interest to have such a discussion as it would to have a discussion of the engineering phases, for instance.

CHAIRMAN MASSEN: Mr. Bollong, have you any observations to make in connection with the proposition brought out by the gentleman from Detroit?

Mr. BOLLONG: We feel that the point Mr. Gage has brought up is vital. So far as possible we prevent insurance representatives from inspecting individual reports. Whenever there is an injury or fatality occurring, the operator involved is required to make out a separate report and sign it. That is the only thing that is used in court. With the accident report it is our endeavor to keep that for cause purposes only.

WALTER W. MATTHEWS (State Deputy Commissioner of Motor Vehicles, Harrisburg, Penna.): I should like to read a paragraph from the Pennsylvania vehicle code regarding the confidential character of reports: "Such reports shall be without prejudice, shall be for the information of the department, and shall not be open to public inspection. The fact that such reports have been made shall be admissible in evidence solely to prove compliance with this act, but no report, or any part

thereof or any statement contained therein shall be admissible in evidence for any other purpose in any trial, civil or criminal, arising out of such accident."

L. A. LYON (Deputy Supt. Michigan State Police, Lansing, Mich.): We have a law in Michigan and have had it since 1929, requiring the reporting of all accidents involving death or personal injury or serious property damage where the car cannot be driven away from the scene. Those reports are for statistical purposes only. They cannot be used in court. We have those reports turned in to our department. We record and file them and try to get our information from them. We make a practice of giving out to the attorneys or insurance adjusters only the names and addresses of the persons involved in the accidents. We do not give them the result of our investigations.

The report is obtained in a slightly different manner from that commonly used. We don't require the motorist or the person involved to fill out any report himself. We do require him to appear at the police station (and our definition of police station includes the sheriff's office) and make a report of the accident and the circumstances surrounding it. The officer whom he reports to naturally questions him. He generally goes out to the scene of the accident or has an investigator call there. He makes out the report, and his report as to what occurred is more or less the conclusion that he draws from listening to these different people. The officer is experienced in handling such cases. He has investigated other cases and has talked to a great many people, and he knows whether the fellow is lying or not. We find, when two parties are involved in an accident, that each one is right. The other fellow is wrong, always. The officer generally goes into it and gets the facts. That conclusion of his is what we use, rather than the statements of the individuals involved.

That entire report is our property and doesn't belong to anybody else. It is not a public record at all. We don't consider it as such. The only information that can be taken from that is the name and address of the person involved. If the attorney or insurance adjuster wants any more information, we give him the name and address and he can get it himself. The report cannot be used in court in any shape or form.

CHAIRMAN MASSEN: Unless there is somebody who wishes to discuss this matter further we will proceed to the next topic, which appears as "What the Collision Diagram Shows." This discussion will be opened by Mr. Peter J. Stupka, Accident Analysis Engineer, City of Philadelphia.

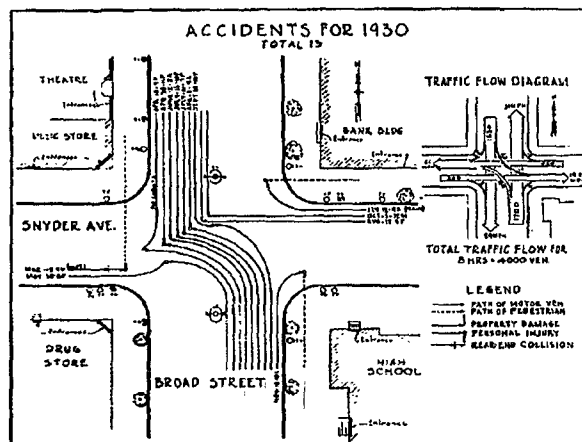
What the Collision Diagram Shows

By PETER J. STUPKA

Accident Analysis Engineer, City of Philadelphia

If we were to study a particularly "bad" accident intersection and arrive at some solution to the problem, we might begin by ascertaining how many accidents occurred during the last year, perhaps determining also the number of pedestrians involved, collisions between motor vehicles, trolley car accidents, and other facts of this nature. Our conclusions and recommendations for relief could rest largely on these facts. Of course, the usual field observations would be made, traffic checks taken, etc. We would do much better, however, if in addition, we took all of the accident records and studied each one carefully, noting the direction in which the vehicles were traveling, where and in what direction the pedestrian was crossing, what the drivers wanted to do, cause of the accident, and other significant facts. Accordingly, our conclusions and recommendations would most likely have to be revised. They would be more specific and would more nearly fit the demands of the problem. However, even this analysis procedure is too cumbersome and unsystematic for obtaining satisfactory results.

A much better and clear-cut procedure for the analysis of accidents would be to make a large layout or diagram (drawn roughly to scale, say 1 inch equals 20 feet) of the intersection, showing the curbs, building outlines, street lights, traffic signs and signals and other pertinent physical facts; then plotting on this diagram all the accidents, showing by means of lines and arrows, the direction and course of travel of vehicles and pedestrians, and by symbols the severity of the accidents (fatal, personal injury or property damage only) together with the date, time and circumstances (rain, wet, intoxicated, etc.). A plan or diagram such as this is called a "collision diagram." A reproduction of one for Broad Street and Snyder Avenue, Philadelphia, is shown below.



Collision Diagram of the intersection at Broad Street and Snyder Avenue, Philadelphia

The collision diagram, in effect, is an accurate model of the intersection, superimposed upon which is a composite reconstruction of all the accidents. It lends perspective to the study and permits a closer analysis of the accidents in their true relation to the physical surroundings. It reveals specific hazards, (as a "blind" corner, poor street lighting, no safety island, curb radius too small, etc.) in some instances; in others it suggests special investigations (proper "clearance" time at signalized intersections, length of cycle and timing, consideration of accident records over a larger period of time), and in still others it points out the desirability of instituting certain regulatory, cautionary or directional measures. It attracts attention to any preponderance or "grouping" of accidents of similar kind, suggesting where most consideration should be given. The collision diagram serves to decided advantage in enabling rapid correlation and comparison of all the important accident facts, a feature possessed by no other plan or method of accident analysis.

Obviously, a collision diagram alone is insufficient to reveal clearly the condition or combination of conditions which result in accidents. We must know something

about the volume of traffic flow and turning movements, speeds and pedestrian traffic—in other words we must know the Traffic Flow conditions. We must know a few things about the physical side of the intersection, such as the kind of neighborhood, proximity to schools, churches and playgrounds, grades, kind of paving, obstructions to good driving vision, special local conditions, etc.—in other words, we must know also the Physical Characteristics of the intersection. Clearly then, the proper solution to any accident problem demands full consideration of all three factors—Physical, Traffic Flow and Accident Characteristics. It would be false to assume purely on the strength of the "pointing" of the collision diagrams to a preponderance of right-angle collision accidents that the installation of a traffic signal is the answer to the problem. The traffic flow in this instance might be only 300 vehicles per hour with but 12% of the flow on the minor street. The collision diagram for the accidents at a signalized intersection may show an unusually large proportion of winter-season rear-end collisions on one of the streets. Without knowing that this street "dips" sharply at the intersection and is paved with wood blocks, the answers to the problem may be several in number.

Essentially, repeating again, the collision diagram is a device for "pointing" out significant facts regarding the occurrence of accidents at intersections and for suggesting reasonable "leads" to a solution of the problem. By way of illustration, a few practical examples of the use of collision diagrams, how they are studied, and what they reveal are considered here.

Example No. 1. First, let us consider the collision diagram shown on the preceding page for Broad Street and Snyder Avenue. Here the "bunching" of left turn accidents is quite evident, and is the "sore" spot of the accident picture. The first thought for a solution is the prohibition of the conflicting left turn. Can this be done without causing undue inconvenience to the motorists desiring to make the turn? A glance at the traffic flow diagram shows that but a relatively small proportion of the northbound traffic makes the turn. Yet this same turn is responsible for the greater proportion of all the accidents occurring at the intersection. *Recommendation:* Prohibit the left turn from the south on Broad Street.

Example No. 2. The collision diagram for 4th & Jackson Streets (4th Street one-way southbound), a relatively small volume traffic intersection, shows a large proportion of all the accidents involving right turns from the east and left turns from the west on Jackson Street, and southbound traffic on 4th Street. Plainly a case of traffic trying to turn into the "out" end of a one-way street. We might draw the conclusion that proper police supervision is lacking. A check of similar intersections in the same vicinity indicates nothing unusual in the way of accidents due to bucking one-way traffic. Police supervision or better enforcement, then, naturally is out of consideration. Close field inspection of the intersection revealed that only one one-way sign (an old one at that) was located at the corner, and in a manner probably of least benefit to Jackson Street traffic. *Recommendation:* Installation of two new standard one-way arrow signs in the north throat of 4th Avenue so as to be plainly visible to traffic on Jackson Street approaching the intersection.

Example No. 3. Right-angle intersection of two two-way streets in a residential district. Collision diagrams shows 17 accidents, 12 of which are right-angle collisions involving traffic from the four approaches to the intersection. Traffic volume—9870 vehicles in eight hours, 27 per cent of which is on the minor street. There is little left here for discussion. The traffic demand warrants a traffic signal. The accidents which have occurred are predominantly of the type which a traffic signal can eliminate. *Recommendation:* Installation of traffic signal.

Example No. 4. Collision diagram for a heavy trolley passenger transfer point, a signalized intersection of two two-way trolley car streets (at an acute angle: Elevated railways on one street) shows two "groupings" of accidents to pedestrians, one group going from elevated tower to far side intersection trolley stop, the other

going from a car stop to far side of intersection and the elevated tower. This is a case of morning (as the accident records indicate) rush from street cars to the elevated and vice versa in the evening. In making these transfers, passengers must at all times cut across the path of at least one direction of moving traffic. *Recommendations:* Relocate car stops so that they are adjacent to the elevated towers; the transferring passengers, then, need only cross one lane of traffic, which is stopped half the time by the traffic signal.

Example No. 5. Collision diagrams of accidents at a relatively unimportant intersection of two streets, one of which is one-way. A railroad trestle of six tracks passes on a diagonal over a part of the intersection and covering one street for about a quarter of a block. The diagram shows 14 out of the total of 15 accidents as having occurred at right angle—the traffic on the one-way street and traffic coming from under the trestle. This suggests a "stop" sign or a "safe approach speed" sign. Inspection of the location revealed a straight up-and-down concrete abutment at the corner about which most of the accidents occurred. Intersection approach speed checks were made for all approaches to the intersection. The "safe approach speed" for the one-way street was calculated to be about seven miles per hour—an impractical slowing-down speed. *Recommendation:* Installation of illuminated "STOP—THEN GO WHEN SAFE" sign at the approach of the one-way street to the intersection.

Example No. 6. Collision diagrams for regular intersection of two two-way streets (two lanes wide) in a residential district. High terrace and concrete retaining wall on northwest corner property. The diagram shows for a two year period that seven out of thirteen accidents were right angle collisions involving the northwest corner and its poor visibility. Two other right-angle collision accidents centered about the southeast corner. Volume of traffic, Five Hundred forty vehicles per hour with 16 per cent on the minor street. Prevailing speed on minor street is 18.7 miles per hour. Obviously a traffic signal is not warranted, traffic demands do not justify it. The "safe approach speed" was found to be twelve miles per hour for the minor street. *Recommendation:* Installation of "safe approach speed" ("SLOW—12 miles here") signs on the minor streets at its approaches to the intersection.

The use of the collision diagram together with other pertinent data, analysis of accidents at specific intersections, for determining proper corrective measures, places the solution to a problem on a firm scientific basis. There is nothing spectacular about collision diagrams. They are merely orderly presentations of accident facts.

H. O. ROUXAS (Director of Safety, Automobile Club of Michigan, Detroit): Our City Planning Commission has adopted a plan that I think would help in the last problem discussed. In every street in which they can possibly do so the street car tracks will be moved nearer to the right-hand curb, so that there will be room for two local lines of traffic. That is to say, one for cars parking at the curb to do business, the other for the fellow who is going to stop in the next block or two. That will leave two rows of traffic in the center of the street, each moving in the opposite direction, for the traffic going through. That means that if the pedestrian wishes to reach the street car he will have to cross only one line of moving traffic. In that line the automobiles will have to stop back of the street car. We have been trying it out on one street and we are going to start on another street as quickly as we get a little further experience in it. I believe that is going to eliminate a lot of pedestrian accidents.

L. A. LYON (Deputy Supt. Michigan State Police, Lansing, Mich.) Everything we have heard has been on intersection accidents. I have a compiled record which I have made up for the first eight months of this year in Michigan showing that out of a total of 7017 accidents 5695 were not at intersections. What about these accidents that do not occur at intersections? We tried to make collision diagrams

and we found that they occurred over a long stretch of highway. They are at no given point. They just happen anywhere along there, either head-on collisions, rear-end collisions, cars going into the ditch or hitting fixed objects.

CHAIRMAN MASSEN: We discussed yesterday the accident-prone operator. We have discussed the accident-prone intersection today, and to some extent the accident-prone stretch of highway. This afternoon you will get information on the accident-prone vehicle if you will go to the Traffic Demonstration in Grant Park.

ADJOURNMENT

Tuesday Afternoon Session
October 13, 1931

Joint Meeting of A.S.S.E. Statistics Committee with Statistic Section

DR. T. F. MURPHY, Chairman
Bureau of the Census, Washington, D. C.

The joint meeting of the Statistics Section with the Statistics Committee, American Society of Safety Engineers—Engineering Section, was called to order by Dr. T. F. Murphy, Bureau of the Census, Washington, D. C., who presided.

CHAIRMAN MURPHY: The first business before the Statistics Section is the election of officers for the ensuing year, and I am going to call upon Harold R. Gordon, who is chairman of the Nominating Committee, to make his report.

HAROLD R. GORDON (Health and Accident Underwriters' Conference, Chicago): Mr. Chairman and Gentlemen: With the assistance of the staff of the National Safety Council and by correspondence with the other two members of the Nominating Committee, your committee submits the names of the following persons as nominees:

For General Chairman: Dr. T. F. Murphy, Bureau of the Census, Washington, D. C.

For Vice-Chairman, E. W. Kopf, Metropolitan Life Insurance Company, New York City.

For Vice-Chairman, Leon Aronowitz, State Bureau of Motor Vehicles, Albany, New York.

This is respectfully submitted by Dr. Earle G. Brown, Kansas Department of Health, Maxwell Halsey, National Bureau of Casualty and Surety Underwriters, and Harold R. Gordon, chairman.

(Upon a motion, properly seconded and passed, the Secretary was instructed to cast a unanimous ballot for the nominees named.)

Remarks on the New International List of Causes of Death

By DR. T. F. MURPHY
Bureau of the Census, Washington, D. C.

You are probably aware of the formation and history of the International List of Causes of Death under which practically all countries in the world now classify their deaths. For about forty years, at decennial intervals, an increasing number of countries have been classifying their deaths according to this statistical method. The List has been modified from time to time and those countries using it have tried to enlarge upon it, and to keep up with the times.

At a convention in Paris in 1929 fifty-six different countries using the list were represented. Unfortunately, the weight of influence remained with the European countries. In other words, I, as a representative of the United States and handling approximately 1,400,000 mortality returns each year, had one vote; as did also the representative from Panama and from Luxemburg. The British had one vote for England and Wales, one for Scotland, one for Canada, one for Australia, etc.

Now, it is well known that the rest of the world is not as accident-minded at present as we are. Therefore, when we suggested changes in the International List that would permit us to tabulate accidents in greater detail, we met with a great deal of opposition.

The present List hasn't a logical basis. We classify some accidents as to the cause, others as to place. An illustration as to place—we say the accident occurred in "mines and quarries." Anything might have happened in the mine or quarry. The victim

might have committed suicide; he might have been electrocuted; he might have drowned; he might be crushed by falling timbers; he might be struck by the light trams that they use there, or any of those things. Still, in prior years, the accident was classed as in mines and quarries and that was all we knew about it.

We tried to get them to adopt a more logical classification and I was made chairman of a sub-committee for the purpose. On my committee were representatives from Belgium, Czechoslovakia, Poland, Russia and England. I could do nothing except to insist that with the new 1930 List as revised there should be a supplemental table, obligatory upon all countries using the detailed list, and providing certain new information. The effect of this will be to show a death resulting from a burn in an auto accident as both "burn" and "auto accident;" a death from a fall in a mine will be classified both in "mines" and "falls."

It is probable that in the next ten years the increasing auto traffic in other countries will result in a greatly increased death rate from that cause. For that reason I have no doubt whatever that in the next revision of the list you will see a much wider and clearer acceptance of our accident theory as we believe it over here.

I have taken it upon myself, being in charge of the Census Bureau mortality tabulations, to comply with the obligatory feature of the International List, but I go still further than that. I am maintaining records that tell you for instance, not only that an accident occurred in a mine, but I can tell you how it occurred. I can say the victim was drowned or he was electrocuted.

As an illustration we analyzed 2,600 certificates and found this about accidental burns. The number which I ordinarily would publish would be 112. That was the number that went out in 1929. Upon analysis, however, I find that there were 25 additional burns, and that 17 of them occurred as the result of automobile accidents. In other words, under automobile accidents, 17 people were burned to death. So my total, instead of 112 is really 137.

Under drownings, we would say, according to our prior rules, that there were 118 drownings in this particular group. Breaking down my tabulation again, I found there were 18 additional drownings occurring as a result of automobile accidents. In other words, there was an automobile accident but the man was thrown into the river and was drowned. So my total is going to be 136 instead of 118.

It is rather interesting and important to find that among automobile accidents one man was electrocuted, that another died from the absorption of poison gas, etc. If you know that 18 were drowned, 17 were burned and a dozen things happened to the others, I think that detail will be of immense value to you in analyzing the factors in automobile deaths.

Two years ago we received queries with reference to how many people died as a result of being cut or thrown through the windshield or thrown through glass. We weren't able to give it to them complete, though I gave it to them in part. I have heard indirectly that it was partly due to the information that we gave them that many windshields are now made of unbreakable glass.

There is another interesting result of our breakdown of statistics. We have each year a large number of returns which come in simply as falls. I had a couple of clerks tabulate in detail just what was placed on the certificates. Of 5,500 cases they determined that about 3,000 didn't have enough information to help us in any way, but that 2,342 of those falls occurred in the home.

When it comes to burns, a very interesting thing occurred. You probably think that most of the burns are connected with conflagrations. We analyzed a group of 4,500 cases. We found that of that total, 102 occurred as the result of upsetting a lamp, and 300 as a result of kerosene poured on the fire to expedite its lighting. Then 700 were the result of stoves and furnaces, 56 in cleaning clothes, 500 from open fireplaces and grates, and 200 or 300 in other ways. A total of 1,600 out of 1,900 occurred right in the home.

It is of vital importance that we have as complete information as possible and to

insure for the next ten years at least a comparability with all prior figures. We will now be able to give very much additional information with reference to the circumstances of accidents. The idea of the whole thing is this: We feel that statistics in themselves are valueless. It is their application to some problem that makes them of value. In other words, if I can't file or compile returns which I believe are going to serve some useful purpose, then it is quite possible I had better be otherwise employed. Don't regard the Bureau of the Census as a great, big adding machine. It is quite the reverse. It is true that we get about 1,400,000 certificates of death and about 2,400,000 of births each year. All states except Texas are in the death registration area and all, with the exception of Texas and South Dakota, are in the birth registration area. So I get 96 per cent of the population.

Suggestions we welcome. If you have an idea of how these data could be better presented to enable you to apply them to your particular group or industry or study, where they will assist in preventive accident work or preventive medicine, we should like to know it. A lot of worthless figures don't appeal to me. Figures have life just as well as anything in the animal or vegetable kingdom. What we want to do is to give them more life.

Certain details of accidents it would be almost impossible to get, from our viewpoint. A man told me today that in the month of September his city had seven auto deaths and in the month of October, two. I said, "What was the cause of them?"

He said, "The minute I got the wholesale number, I simply spotted those particular ones and found out the reasons. As to the seven in September, there was a fair in a neighboring town. These people had attended the fair and were in a hurry getting home and three wanted to be in the same place at the same time. They found out they couldn't do it."

That represents a breakdown which we couldn't get in our totals.

CHAIRMAN MURPHY: In connection with accident classification, we are very fortunate in having with us this afternoon Dr. H. B. Logie, of the National Conference on Nomenclature of Disease, New York City. Dr. Logie is Executive Secretary of a committee, which has for its purpose the development of a really scientific basis for nomenclature of disease and accidents. Dr. Logie's remarks will be exceedingly interesting because they open up the possibility of getting a tremendous amount of information which is much more detailed than ours and is applicable to any type of accident study.

A Suggested Classification of the Circumstances of Accidents

By H. B. LOGIE, M. D.

Executive Secretary, National Conference on Nomenclature of Disease,
New York City

In spite of the great volume of the statistics on accidents compiled every year by many agencies, there is no standard method which has been considered worthy of general adoption. There are almost as many ways of recording these facts as there are institutions engaged in analyzing them and, by means of this analysis, measuring mathematically the occurrence of related phenomena.

There are two tests of the value of statistics: the first, what conclusions we may draw concerning them; and the second how these conclusions influence our attitude to the phenomena so measured and compared. From yearly comparison of the death rate from train accidents we can only conclude that trains, or some circumstances connected with trains, are becoming more dangerous to life. We could meet the situation only by abolishing trains or curtailing train travel if there were no more explicit statistics to guide us in abating the menace. If we find that the increase in these deaths is largely in the subdivision "accidents at level crossings", then we have

a chance to put statistics to work. General statistics must be readily susceptible of analysis or "breaking down" to provide these useful facts. In some cases, however, the general rubric is all that is required. In the International List of Causes of Disease there are 38 rubrics devoted to "violent and accidental deaths." Almost one quarter of these are devoted to the different ways of committing suicide. No doubt psychologists can make something of a changing preference between suicide by firearms and suicide by illuminating gas, but it does not appear likely that we shall diminish the incidence of suicide by comparing "drowning" curves and "morphine" curves. On the other hand, "accidental poisoning by food" cannot be analyzed too minutely to provide the statistics to set our remedial measure in action.

It is not exact to say that the only statistics which matter are those which can be used for practical purposes. There is no telling when statistics may be needed on any phase of accident, and it is well to anticipate the needs of the future by compiling statistics which just now may be valueless. In a general way, however, we should give first place to those of present importance and analyze only as minutely as present demands suggest.

We can agree upon other fundamental principles. It should be clear, but it is not, that we can compare only those phenomena which are of the same order. I can best illustrate a current fallacy by carrying the argument into the field of medicine. It has been an almost universal practice to classify diseases as diseases of various organs or diseases of various natures. Thus we have for comparison not only deaths from diseases of the heart, lungs, kidneys and so on, but deaths from infectious diseases, deaths from tuberculosis, deaths from pneumonia, and deaths from cancer. When we consider that tuberculosis may affect almost any organ and that it is also an infectious disease, that pneumonia is both an infectious disease and a disease of the lungs, and that cancer may be a disease of the kidney or any other organ, we find ourselves caught in a tangle of overlapping rubrics, the only way out of which is by means of confusing exceptions.

For example, death from rheumatic heart disease is a death from heart disease only when the rheumatic fever itself is not active at the time of death; gonorrheal heart disease causes death from gonorrhea infection. This necessity for exceptions not only causes confusion, but actually vitiates statistics, because each of these cases abstracts from the true number of cases of heart disease. Similarly we do not derive the true number of diseases of the lungs if we exclude tuberculosis of the lungs. These inaccuracies are, as a rule, of minor importance because the figure for tuberculosis and cancer is correct, and the figure for heart disease only slightly inaccurate. The figure for diseases of the lungs, however, is so far from correct that it has to be qualified by the phrase "excluding tuberculosis of the lungs." The statistics on diseases of the various organs, when cancer, tuberculosis, and many other infections of them are excluded, are of little significance. It is clear, of course, that the less important groups of diseases are sacrificed to the more important. The necessity for some sacrifice is apparent from the fact that a death from tuberculosis of the kidney cannot be numbered in both the deaths from tuberculosis and the deaths from disease of the kidney; there would then be two deaths for one patient. It has been found necessary to balance statistics at all costs, and indeed at a cost that physicians are not prepared to pay. It has been found necessary and possible to overcome this difficulty by means which I shall explain presently.

The same principle has guided the compilation of statistics on accidental deaths. The rubrics in the International List are themselves mutually exclusive if certain rules are followed. The deaths by intention are put in the various rubrics under suicide and homicide, so that "Suicide by jumping from high places" (169), is clearly distinct from "Accidental traumatism by fall" (186); and "Homicide by firearms" (173) bears no relation to "Accidental traumatism for firearms" (184); but one must not examine too closely the term "accidental." The distinctions are not always so

easy to draw: "Accidental mechanical suffocation" (182) must be distinguished sometimes from "Accidental traumatism by landslide" (186), and sometimes from "Cataclysm (all deaths)" (187). More difficult than that is "Accidental asphyxia" (under 182) and "Asphyxia by vomiting" (under 194 "Other Accidents"). It is this rubric 194 which seems most confusing. If death was due to luxation of a vertebra it would be classed here, unless it were due to a felony, a fall, crushing or landslide, a cataclysm or an attack by an animal. The total number of deaths due to luxation of a vertebra would then not be very accurately represented by the statistical figure. Then a man crushed at a fire or killed by a jump from a burning building died from the fire, and his death is not listed either as a crushing (186) or as a fall from a height (186a). In the supplement, which one must not ignore, is another aspect of the accident. Here are asphyxia, falls, crushings, explosion of gasoline tanks (not to be confused with burn by gasoline in 181), explosion of boiler (to be distinguished from burn by steam) and a very conflicting arrangement of the agencies and modes of accident.

It would be futile to illustrate further the confusion of the International List. It may be more profitable to examine the List for reasons for the confusion. The International List grew from small beginnings and its basis has been changed in the last revision. It has become necessary to break down the major rubrics; here the elements of each began to meet: suicide by poison overlapped accidental death by poison. Still the rule of priority held. With the amplification of the List, and the emphasis on causation and mode, new elements crept in. It was these new elements that gave life to the List because they allowed more exact analysis and stimulated preventive measures.

At present the International List sets out rubrics that are of so many different orders that comparison is often impossible. There can be no comparison of deaths from fall and deaths from broken neck, deaths from firearms and deaths from perforation of the chest. When general causes are analyzed into their elements, the same particular element may appear in several general causes. A fall from a height or a broken neck may easily be a common element of many general causes (so-called). Already it has been found necessary to attempt to graft a cross-reference system into the International List, little as that is adapted to it. Indeed the point has come where the International List is unable to bear the burdens which are placed upon it by the diversity of facts which statisticians require. It cannot be remodeled without becoming confused and cumbersome. Moreover, it was not intended to be reduced to a code-system comparable with the systems in use elsewhere, in business offices and libraries, for example. It was certainly not planned to facilitate the mechanical sorting of punch-cards. The digits in its code-system are meaningless. If the code of "suicide by hanging," 165 bears any relation to that of "suicide by drowning," (166) it is purely fortuitous: "infanticide" is 172 and "accidental absorption of poisonous gases" 178; "injuries by animals" is 188, and (death by) "hunger and thirst" 189.

The striking defect of the International List and lists modeled after it, is that the rubrics are not mutually exclusive. Analysis of these lists show that the rubrics contain, often without any clear definition, as many as four different elements in the accident: (1) the clinical result (broken neck); (2) the agent directly responsible (as in suicide and homicide or attacks by animals); (3) the means by which the accident was produced (as a weapon or an automobile); (4) the mode of production of an accident (as a fall, or an explosion). To this may be added a fifth which is commonly required, namely, the circumstances or environment of the injured person at the time of an accident: traveling in a train, living at home, working in a factory.

In any accident one or more, occasionally all five, of these are recorded, depending on the use to which the record will be put. If the record is for a physician or a hospital, the important fraction of the complete record is the clinical diagnosis: a

broken leg is not quite sufficient for clinical purposes, because the mode does affect the severity of the injury and the possibility of complications. All other elements, however, are subordinated to the clinical diagnosis.

From the legal standpoint, the agent, if there is one, is the most important and all other facts are supplementary. For purposes of compensation, the indirect agent must be determined, as well as the nature of the injury and certain facts in regard to the circumstances and environment of the injured.

From the point of view of prevention of accident, many of the elements that entered into it are important. In fact these are more far-reaching than any simple system of classification can encompass. Causes must be traced to their beginning. The clinical diagnosis is of minor importance because the nature and severity of the injury are often no indication of the general seriousness of the hazard.

If a common system of recording the circumstances of accidents is to be used by all those interested in injuries, it should be set up in such a way as to provide for these five elements. Records prepared by different agencies would then be comparable. To provide for elaboration in any direction it should be elastic; that is to say, susceptible of amplification without interference with general rubrics. To provide this elasticity, the code system too should be elastic, like those in use in business offices and elsewhere.

The International List is not suitable, not only for the reasons set out, and not particularly because it is basically a classification only of fatal accidents, but because it is absolutely inflexible unless a decimal system is grafted onto a code-system which is not decimally arranged. It is true that the International List has been amplified, for use in this country particularly, until the rubrics include many diseases and injuries that do not cause death. In order to provide for statistics on the industrial and other circumstances of the injured, a cross-reference system has now been supplied. Certain of these amplifications are arranged decimally, although the List itself bears no semblance of a decimal arrangement.

There are in existence a number of clinical classifications of diseases and injuries. The National Conference on Nomenclature of Disease has almost completed a classification to which a descriptive decimal code has been adjusted. By "descriptive," I mean that the code defines the disease and that not only do diseases and injuries of the same organ bear the same code indication of the site of the disease, but diseases and injuries of the same nature bear the same code indication of the cause or nature of the disease. I present this summary because it illustrates in a simpler way just what I am venturing to propose as a method of classifying the circumstances of accidents.

Since all diseases of the kidney bear the same "topographical" code-number, they may all be readily assembled in hospital records and in statistical computations, especially when the punch-card is used. Tuberculosis of the kidney has, in addition to the code for kidney, the code for tuberculosis. Hence this disease, besides falling automatically with diseases of the kidney, falls automatically with tuberculosis of any other organ. Thus statistics on tuberculosis of all organs can be completed from the addition of all that bear the code for tuberculosis; and statistics on tuberculosis of the kidney by the segregation of those "tuberculosis" records (or punch-cards) that bear the code for kidney. This principle is applied to every disease and injury.

This method has solved the problem of deciding whether tuberculosis of the kidney is "tuberculosis" or a "disease of the kidney." Of course, it is clinically both, but statistically it had to be one or the other. It no longer has to be, statistically any more than clinically. Suppose the records of death in four cases show (1) infection (unspecified) of the kidney; (2) cancer of a bone; (3) tuberculosis of a bone; (4) bullet wound of the kidney. According to the International List these deaths are recorded as (1) disease of kidney; (2) cancer; (3) tuberculosis of bone; (4) injury. According to the dual method to which I have just referred, there are two cases of death from kidney disease (or injury), two from bone disease, one from infection

unspecified, one from cancer, one from tuberculosis, and one from injury. Thus the record shows eight causes of death for four deaths. It will be readily seen that, by this dual method, the causes of death will always be double the number of deaths. This is not only a statistical convenience but a clinical necessity, since disease is defined, if not always in words at least in sense, as a dual entity, namely a morbid process in a certain organ or tissue.

This principle can be readily applied to the classification of the circumstances of accidents, with the difference that instead of being dual the system must be at least quadruple. It is suggested that the clinical diagnosis be divorced from this classification, since it is already provided for. That leaves, then, the four elements which I have mentioned: (A) the agent; (B) the means; (C) the mode or manner; (D) the circumstances of the injured (Tabulation appended).

The suggested arrangement is modeled in its content after the International List of Causes of Deaths, with the Census Bureau's amplification, but with due regard to the statistics compiled by the National Safety Council and other organizations. Each composite rubric in the International List has been broken down into its elements. Thus "Suicide by jumping from high places" (169) becomes a compound of 01 in Column A ("Self intentionally") and 02 in Column C ("fall from height"); its code is therefore 01 00 02. "Accidental traumatism by fall" (186) becomes simply "Accident due to fall from height", again 02 in Column C. The nature of the traumatism is set out in the diagnostic code. Thus both the suicide and the fall are recorded without prejudice to either. The total injuries due to fall from height thus include all injuries so caused and do not exclude those of suicidal or homicidal nature. In the same way all suicides are recorded and may be totalled by adding all records that begin with 01. This principle is followed throughout. For example if a workman were injured by being pushed from a height by a fellow workman and falling through a glass roof, A would be "fellow employee intentionally" (16), B "glass" (04), C "fall from a height" (02), and D "engaged in industry" (70), more specifically the building industry (72), if amplification of this rubric were required. There would be no difficulty in deciding whether the death was to be recorded as murder (except the legal one), as due to a fall from a height, as due to injury, or as death in industry.

No part of the International List is sacrificed. It is merely reduced to such simple terms that there can be little difficulty in recording the circumstances of any accident. These elements can then be combined in any desired way by those who are accustomed to determining the groupings, and who know whether suicide by fall is a suicide or a fall. Moreover, if the basis of the International List should be again changed from proximate cause to locale, statistics compiled in the simplified fashion could be assembled accordingly. Therefore statistics in any year would never be lost. By the International List an accident by mining machinery is not recorded in the same way when proximate cause rules as when locale rules. It is lost from locale if it is recorded according to proximate cause, and *vice versa*. By the method suggested it would be recorded for all time in both ways and could never be lost. This perennial comparability is aided by the fact that the code need never change except to be amplified by decimal subdivisions and the addition of new columns to the old constant ones. The International List of 1929 fails in very many places to provide comparability with the 1920 List either by rubric or by code; statistics based on it are largely being begun anew, and punch cards of 1928 are so differently coded from those of 1931 that there is an absolute break in continuity. It is suggested that the time has arrived for a stable system with an unchanging foundation.

Certain gaps will be observed in the lists suggested. These are to provide for additions. In Column A, 04 and 05 might be used to distinguish between fatal and non-fatal self-injury; and 10, 11 and 12 might particularize non-fatal injuries resulting from the act of another. Each of the columns A, B, C and D can be extended up to 99, and then extended decimally as far as desired.

The attempt has been made to condense the locale and the circumstances of the injured into one group (Column D) composed of two columns on the punch card, with an optional third. The difficulty here is that the injured may have been employed or unemployed in the street and that he may have been in a motor car in the street (although he would not be in a motor car in a bath-tub, or in a bath-tub in the street, except possibly in ancient Athens). This is the reason for the cross-reference. It is thought, however, that the arrangement would be simplified if the facts concerning employment were separately stated in a fifth group. The difficulty will still remain that accident occurring, for example, when the injured was at a railway crossing would not bear the same code as accidents occurring while the injured was in a motor car at a railway crossing. Hence the sum of accidents at railway crossings would have to be compiled and would not appear automatically from the punch-cards. It might be possible, however, to arrange the codes in such a way as to overcome this difficulty, but a little more space would be taken up on the punch-card. This is the only case in which it appears to be necessary to include more than one rubric in any column, and all because, contrary to physics, a man may be in two places at once.

I hope it will be clear that there need be no statistical falsification. The less important rubric will not be robbed to provide accuracy for the more important. In the composite code-number of the accident a record should be made under each of the four rubrics. If the workman who fell through the roof had not died from glass cuts, but had been crushed on the ground, there would be no need of entry under B (Means). In that event the columns devoted to B should be filled out with zeros. In this way if two workmen were killed by the glass roof and two by contact with the ground, all other circumstances being identical in each of the four, there would be 4 deaths produced by fellow workmen, 4 deaths by a fall from a height, 4 deaths in industry, 2 by glass and 2 by means unspecified. Thus the 4 deaths would be recorded 16 times. If the two in which the means were unspecified had not been recorded as such, there would have been only 14 records. Statistics can be made to balance in this quadruple fashion only if an entry is made in each rubric. I am not quite sure how necessary it is to have statistics balance; I only assume the necessity from the pains statisticians have been at to avoid the record of a death in more than one way. At any rate this method of "quadruple balance" is offered for what it is worth.

It is unfortunate that one must dwell upon the shortcomings of the International List without being able, as a part of the argument, to refer to its great usefulness in the past. It presents a method of making those distinctions in circumstances of external violence which have until recent years occupied the attention of statisticians. From its very inflexibility it has had to be more or less disrupted every time it has been revised. It is now so confusing that one has quite often a choice of two or even three rubrics for the same cause of death (or illness).

It must be remembered that, whereas those who are accustomed to use the International List can no doubt pick out the appropriate rubric for each cause of death, all those who may have occasion to use it will not find it easy to apply. The method used should be so simple that any intelligent physician, record-clerk, or factory boss could use it without hesitation or confusion. According to the proposed method, there are four primary questions to be asked: (1) Was any person or animal responsible for the violence? (2) Did any particular object inflict the injury? (3) What circumstances directly produced the hazard? (4) Where was the person and what was he doing when he was injured? The various answers to these questions are to be found respectively in Lists A, B, C and D. It is very much easier to classify elements than composites, and very much easier to interpret them. Once these four elements are recorded, either positively or negatively, the expert combines them into the groups which make statistics live. No element would be lost or submerged and statistics would be infinitely more reliable at their source and much more accurate in their summations. This is, after all, the test of any statistical scheme, for it must

be simple and reliable and must set forth clearly the conditions which constitute hazards to life and limb, so that measures may be taken to ameliorate them.

It has been argued, as it will be till the millenium, that we must not make a breach with the past nor destroy the comparability of statistics from year to year. It is true that with the change in codes a certain confusion might result for those who make the estimates mathematically; but it is not true that we should not be able to compare statistics compiled on different bases. The summations by the suggested plan would correspond with the summations by the previous plan, because we wish to know just the same facts about accidents as we did last year. If any of those are of no further value they can be dropped; as new demands arise they can be readily incorporated in the elastic system suggested.

The decimal system is centuries old; the decimal system of record-keeping is not new; and the punch-card has already become a necessity, particularly in the compilation of such enormous statistics as those we are concerned about. We shall have to get off the coach and into the motor car sooner or later, and you may agree that the sooner a change of some sort is made the better. Far be it from me to maintain that the method herein suggested is without a fault even in its general principles. It has been my hope to suggest one way of bringing the method of recording accident statistics more into line with modern methods of keeping records of related events.

It is this attitude which alone gives me the courage to present these suggestions to you; statistics is a field with which I am none too familiar. In the National Conference we have elaborated a method of compiling morbidity statistics similar to this method of recording the circumstances of accidents. It is our hope that the record of the latter may be so easily blended with the record of the clinical condition that hospitals will find no difficulty in recording those very facts which you require. The National Conference believed that we should make what suggestions we can for the blending of these methods of recording facts which are of such great concern to us as well as to you.

Figure 1 Composite of Sample Punch Cards

	Diagnosis	A	B	C	D
1.	0 1 0 3 1 6	0 1			5 0
2.	2 1 0 4 1 6	0 3	7 1	0 3	
3.	4 1 0 4 1 4	0 6	0 6		6 7
4.	0 1 0 4 0 4	0 8	5 2	0 2	7 3
5.			6 1	2 1	0 3

Interpretations

- Punch Card 1. Arsenical poisoning; suicide, in the home
2. Fracture of skull; jumped, from hay-mow, during fire
3. Penetrating wound of heart; pistol wound, by another intentionally, in a duel
4. General crushing; (puged) by insane person, from a height, (fell into) machinery, in a mine
5. (Any diagnosis); a train, in collision with motor car, (caused injury to person) in motor car

TABULATION

Suggestions for a Classification of the Circumstances of Accidents

A* Agent

- 00 Not specified
01 Self intentionally**
02 Self delirious or insane

*In punch-cards the letters are printed at the tops of the appropriate columns.

**The definitions of intentionally and unintentionally are to be determined, to distinguish, if necessary, between felony, negligence, etc., and between intention with and without culpability.

- 03 Self unintentionally
06 Another intentionally
07 Another unintentionally
08 Another delirious or insane
12 Competitor intentionally
13 Competitor unintentionally
15 Fellow-employee intentionally
16 Fellow-employee unintentionally
18 Parent intentionally
19 Parent unintentionally
21 Assassin
22 Burglar
30 Mob or group
31 State
32 Police
33 Army of State
34 Foreign army
344 Combatants
345 Non-combatants
40 Animal (unspecified)
41 Insect
42 Centipede
43 Scorpion
44 Snake; venomous animal
45 Dog
46 Rat
47 Horns of animal
48 Horse
B Means
00 Not specified
01 Cutting instrument
02 Piercing instrument
03 Knife
04 Glass
05 Firearm
06 Pistol
07 Falling object
08 Flying particle
09 Thrown object
11 Stove
12 Kiln
13 Gas-fixture
14 Sewer
15 Clothing (new unwashed)
20 Fire (not conflagration)
21 Burning gasoline
22 Burning kerosene
23 Boiling liquid
24 Boiling water
25 Steam
26 Molten metal
31 D dynamite
32 G gasoline
33 K kerosene
34 L lamp
40 Falling earth, cave-in, excavation
50 Machinery, unspecified
51 Agricultural machinery
52 Mining and quarrying machinery
53 Factory machinery
54 Wood-working machinery
55 Metal-working machinery
56 Electrical generating machinery
57 Machinery used for recreation
60 Vehicle (unspecified)
61 Train

- 62 Motor car
 - 63 Truck or commercial car
 - 64 Taxicab
 - 65 Bus
 - 66 Motor cycle
 - 67 Airplane
 - 70 Cataclysm
 - 71 Conflagration
 - 72 Forest fire
 - 73 Prairie fire
 - 74 Tornado
 - 75 Landslide
 - 76 Earthquake
 - 80 Miscellaneous
 - 81 Destitution
 - 82 Filivaltion
 - 83 Neglect, lack of care
 - 84 Bad treatment
 - 85 Ill treatment (of child)
 - 86 Malpractice
- C Manner**
- 00 Not specified
 - 01 Fall
 - 02 from height
 - 03 from hay-mow
 - 04 from scaffold
 - 05 from ladder
 - 06 from windmill
 - 07 from window
 - 08 from horse
 - 09 with lumber
 - 10 downstairs
 - 11 down elevator-shaft
 - 12 before or under train
 - 13 before or under other vehicle
 - 20 Collision
 - 21 train and motor vehicle
 - 22 street car and motor vehicle
 - 23 motor vehicle and bicycle
 - 24 motor vehicle and horse-drawn vehicle
 - 25 motor vehicle with fixed object
 - 26 of trains
 - 27 of motor vehicles
 - 30 "Lost at sea"
 - 31 Diving
 - 32 Bathing-camp
 - 40 Inspiration, inhalation
 - 50 Hanging
 - 51 Surgical operation
 - 60 Explosion
- D Place of accident and occupation of injured**
- 00 Land transportation
 - 01 Horseback
 - 02 Horse-drawn vehicle
 - 03 Motor car
 - 04 Truck or commercial car
 - 05 Taxicab
 - 06 Bus
 - 07 Motor cycle
 - 08 Railroad train
 - 10 Street car
 - 11 Elevated train
 - 12 Subway train
 - 13 Pedestrian
 - 20 Water transportation
 - 30 Air transportation
 - 31 Airplane

- 40 Public place
- 41 Street or highway
- 42 Intersection of streets
- 43 Railway crossing
- 44 Bridge
- 46 Public building
- 47 Public elevator
- 50 Home
- 51 Bed
- 52 Bath-tub
- 60 Play, sport, or competition
- 61 Play
- 62 Baseball game
- 63 Football game
- 64 Foot race
- 65 Wrestling match
- 66 Boxing bout
- 67 Duel
- 70 In industry
- 71 In construction work
- 72 In building trade
- 73 In a mine
- 90 Miscellaneous
- 91 In war
- 92 As civilian during war
- 93 Hanging objects
- 95 During birth

Note—To each of these, where applicable, are crossed:

- 1 In course of employment
- 2 Not in course of employment
- 3 On street in course of employment
- 4 On street not in course of employment
- 5 At intersection of streets, in course of employment
- 6 At intersection of streets, not in course of employment
- 7 At railroad crossing in course of employment
- 8 At railroad crossing not in course of employment

R. L. FORNEY (National Safety Council, Chicago): I sent advance copies of Dr. Logie's paper to several people, including Mr. H. W. Heinrich of the Travelers Insurance Company, who is here and who, I'm sure, has something to say.

Discussion re "A Logical Classification of Accidents"

By H. W. HEINRICH

Assistant Superintendent, The Travelers Insurance Company, Hartford, Conn.

Dr. Logie's paper embodies a straightforward, frank and accurate statement of facts. It is of value not only because of its constructive criticism of existing statistical codes but also because it contains suggestions for improvement.

Dependence is placed on accident codes and classifications to provide reliable data for the establishing of rates, frequencies and for prevention and other purposes. The immense amount of work and the tremendous cost already entailed by the preparation and use of existing codes in itself justifies the attempt at this time to make them workable and of value.

Dr. Logie states the fundamentals of code building. I agree with him when he says in effect that:

General statistics must be readily susceptible of analysis or "breaking down", etc.

We can compare only those phenomena which are of the same order.

Present rubrics $x \times x$ are of so many different orders that comparison is often impossible.

Codes should be so designed as to facilitate mechanical sorting of punch cards.

Rubrics should be defined to avoid confusion and inaccuracy.

Rubrics should be mutually exclusive.

Code systems should be elastic or susceptible of amplification.

It is much easier to classify elements than composites and much easier to interpret them.

According to the analysis of existing codes which Dr. Logie has made the rubrics contain five elements which he lists definitely as:

- 1—The clinical result
- 2—The agent
- 3—The means
- 4—The type or kind of accident
- 5—The circumstances or environment

For the purposes of the particular codes which Dr. Logie discusses, I agree that all five of these elements are important and should be coded.

Attached to Dr. Logie's paper I find what I assume to be a tentative form of a code such as he advocates. He has, of course, not yet had the opportunity to build up a complete coding system which meets all of his own objections to the existing codes. For example his rubrics or elements have not yet been clearly defined. This lack of definition still permits unlike data to be grouped. Under the rubric MEANS for example, a study of the tentative list of items indicates the intention to specify the inanimate object, as Glass, Stove, Machine, etc., also its action if of interest, as Thrown Object, Exploding Dynamite, Etc.

Such definition, however, is lacking and so we find two or more places to record one death, injury or accident. Glass may fly and thus permit coding as Glass or as Flying Particle. A Stove may Explode and again two places are provided to record the accident. Some of the Means are tied in with a form of action and others are not. If Means is to be defined as including both an object and its action it would be necessary to consider that several forms of action may relate to one object and to provide for this in the code.

I do not advance the foregoing thought, however, as a criticism but rather as an illustration of the soundness of Dr. Logie's guiding fundamentals. All in good time, minor points such as I bring out here, and which I am frank to admit also may be merely the result of misunderstanding, will undoubtedly be taken care of.

May I add further that it is a pleasure to endorse Dr. Logie's presentation of a most difficult subject because it is so clearly in line with work which is now going on under the direction of the American Standards Association. A sectional committee on statistics in this organization has set up a sub-committee on the revision of the Accident Cause Code. This sub-committee of which I have the honor to act as chairman meets this week and has its work in such shape that we hope to present our report before the end of the year. Although the scope of our code is limited only to industrial accidents and to only such circumstances attending the accidents as are of value chiefly in accident prevention, yet the fundamentals or elements in code building in general obviously apply to our work as well as to the codes Dr. Logie discusses.

We have set up our rubrics and we have so clearly defined them that a place is provided for all essentials, overlapping is practically eliminated, items are not combined but can be combined at will, rubrics are mutually exclusive, design is suitable for punch cards and provision is made for coding the proximate cause.

In the code we have constructed all of the fundamentals which are essential in Dr. Logie's opinion have been incorporated.

I should like to add here that the term "cause" generally seems to be a bit confused because it is more often than not taken to be applicable to the entire code system. We call it the cause code and yet we use that cause code for tabulating the various

elements that enter into an accident or accidental injury. There is room for a better definition of the term "cause." Our committee has made such a definition and it has provided a single column in our code system for coding nothing but cause.

Our rubrics include—

- 1—The agency (object, material or substance which is chiefly involved in the accident)
- 2—The part of agency (gears on lathe, etc.)
- 3—The kind of accident which we term "Manner of Contact" (fall, struck by, etc.)
- 4—The manner of performance (Transporting, repairing, etc.)
- 5—The proximate cause (unguarded machine—disregard of instruction, etc.)

As ours is an accident code we are not concerned with the clinical result which is recorded elsewhere.

By use of a code of this kind it becomes possible to determine all of the Falls in a given period of time and at a given locality. These Falls further may be broken down as to agency, part of agency, manner of performance and cause. It is likewise possible to determine all of the causes of a given class and then to find how many result in Falls or some other kind of accident. The same thought applies to each rubric.

If such a code for industrial accidents is adopted its scope may perhaps be extended to include nonindustrial accidents. Its principles likewise may be adapted for use in disease and fatality codes or in nature of injury classifications.

There is a vital need for more uniformity in accident and injury code usage. I subscribe to Dr. Logie's fundamentals and sincerely trust that we are approaching a time when logic, definition and uniformity will play a greater part in code building.

CHAIRMAN MURPHY: I doubt if there is another man in his capacity as state health officer who has done more in the line of accident statistics than Dr. Brown of Kansas. I am sure he has some remarks to make upon the suggestions that were made by Dr. Logie.

DR. EARLE G. BROWN (Kansas State Board of Health, Topeka, Kansas): I also had an advance copy of Dr. Logie's paper which I have read and re-read. He has given us a world of information that should be of great value. There are certain things, however, which make me wonder whether his suggestions could be properly applied in a state health department.

In insurance companies, where all information is absolutely required and where there are agents to secure the information if it isn't on the written report, and in industries where such a report is also required, it is possible to carry this complete coding through. But when we depend on the physicians and coroners and others to send in death certificates, even after an intensive two-year program of work in Kansas, in death certificates, even after an intensive two-year program of work in Kansas, we can't yet secure 100 per cent reporting. That is quite true in the United States, generally, that is, in reporting to the health departments.

If this 100 per cent reporting could be secured it would be different. I should say this: If the certificates were properly filled in by the physicians and coroners and others who are authorized to sign certificates, then the information could be completely coded in the manner suggested this afternoon. The possibilities of accident prevention work are greatly amplified by the correctness of the data which can be secured by those who sign certificates. I believe that a plan of this kind would require an educational campaign among physicians in the furnishing of correct information.

Here is one other consideration: This would entail some additional help; it would entail some additional expenditures. I don't believe that those of you who are not dealing with legislatures realize the great difficulty in securing adequate appropriations to make the department completely function.

R. L. FORNEY (National Safety Council, Chicago): Dr. Brown has made a mild

criticism: that the use of this recommended plan would be made difficult by lack of information. I wonder whether the proper handling of this more detailed coding system would require any more information than is now ordinarily reported.

For instance, Mr. Heinrich, in the work that you have done, would it have been as practicable to classify in this fashion as by the method that has been formerly used?

MR. HEINRICH: Yes. I would say that it is largely a matter of difference in method of classification rather than more information. It would be a harder task undoubtedly to correctly classify each accident. I would look at it largely as an educational procedure in which the labor departments and the industrial commissions of the states could play a large part, so far as industrial accidents are concerned. The problem would be largely one of asking leading questions, instead of leaving the matter of accident description to the individuals own idea of the language and terminology to use.

CHAIRMAN MURPHY: I thoroughly sympathize with what Dr. Brown has said about getting the material, by and large, from all over the country. We have been trying for thirty years to get states simply to record deaths. You can imagine how far in advance we would be if we ask them for all the information required in this plan. We should have to educate not only the coroner and the registrar, but the whole medical profession.

DR. BROWN: I should like to illustrate just one point. Just a few days ago I was preparing a report on infant deaths for a state health department. Of some 3,000 infant deaths reported in that state, there were 856, I believe, where the cause of death was unknown or ill defined. In our own state I think we report something like 50 as ill defined or unknown, out of approximately 1,800.

I should like to say this, too: In our accident work we have been using the supplemental report blank as put out by the National Safety Council. I would say that of 1,600 fatal accidents during the year 1930, we queried over 1,200 of them to secure additional information. Of course, our queries went into family details, number of dependents and other data. I believe that it would be necessary, to get the details necessary for this system, to query at least 50 per cent of the reports.

CHAIRMAN MURPHY: Take into consideration, also, that just to get the regular information necessary to tabulate the certificates we queried nationally over 100,000 cases last year.

DR. LOGIE: Mr. Heinrich speaks of flying glass as an item in the code. It might be hard to know whether to classify flying glass as "glass" or "flying particle." But details like that I think can be solved by amplification.

I suggested in my correspondence to Mr. Heinrich and I should like to state it again here, that unless the idea of agency is subdivided into living agency and inanimate agency, or means, as I call it, there is likely to be overlapping. It is not only necessary to know that a man fell from a height or that he cut himself or was hit by a bullet, but that there was some human agency behind it.

I have as one item, the exploding stove. I have listed separately several exploding things, and we could have as well as exploding dynamite, exploding stove, exploding gasoline tank. Some injuries caused by a stove would fall into two separate lists, both under means, of course. That is, burns by stove and injuries by exploding of stove. I don't think there would be any necessity for listing all stove injuries together.

It was most encouraging to find that I wasn't the first person working along these lines. What I tried to say in my main remarks was that this sort of thing ought to be done. Whether my particular plan is of any use doesn't really matter. I think from what I have seen of Mr. Heinrich's sub-committee's plan that perhaps my suggested scheme might be blended with his to some extent, particularly in the matter of the agency, and that from the two some workable plan might be evolved that would suit not only the particular work that Mr. Heinrich and his people are doing but the work that all of us are doing.

I think that Dr. Brown is needlessly alarmed because he asks a question which

shows that he has not perhaps grasped the point I was bringing out. He says, "How are you going to get all these facts?" That doesn't apply here any more than to any other system. If you can't get your facts you don't put them down. You can't go beyond the information that is given you. Whether people are ignorant or whatever it is, the same handicap applies in every case. What you do get you enter, only in this case you enter it more simply.

I was thinking about that, too, when Dr. Brown was asking, "Why do doctors not give these reports?" I know why I will not give reports many times.

If an automobile accident occurred, the car went over a hill and crashed and the man was smashed like a pancake. I would say there was certainly a crushing. If I see in the International List or some other classification "Death by crushing," I would say that is where it goes.

But I look down the list and see "Motor accident." It is a motor accident. What am I going to do about it. Well, that is just human faculty. I don't know whether these officials in Washington want to call it a motor accident or a crushing accident. I say to myself, "When they give me something specific, some information as to whether they want it as a crushing accident or a motor accident, I will send that in."

The point that I should like to make for Dr. Brown and others is that I don't think we are making things any more difficult for the doctors and coroners and policemen. We are making them simpler. Instead of calling for extra help to untangle all these returns, instead of sending out 100,000 letters a year to find out what this was, we say, "Give them simple questions to answer." You get a high percentage of correct answers when you ask a man questions like, "Where was the injury? What hurt him? What hit him?" Who can't answer those? That is the way to get people to answer.

Dr. Murphy asks about omissions of information. I have tried to answer that just now. When a card comes in and there is something you can't code from it, you assume, for instance, that there was no means. We can make no assumptions but we can say that according to the report the accident had no means involved.

CHAIRMAN MURPHY: We have had presented a subject which we can well afford to take home with us and study, one which will undoubtedly continue to be discussed at every meeting of this sort.

ADJOURNMENT

Wednesday Afternoon Session
October 14, 1931

Joint Meeting with Committee on Rural Highway Hazards, Street and Highway Traffic Section

ROBBINS B. STOECKEL, Chairman
State Commissioner of Motor Vehicles, Hartford, Conn.

The joint meeting of the Statistics Section with the Committee on Rural Highway Hazards, Street and Highway Traffic Section was called to order by Chairman Robbins B. Stoeckel.

CHAIRMAN STOECKEL: In the meetings of this Congress that I have attended there has been a very decided determination to turn over the responsibility for the making of accidents to personality; to make distinctions between different persons and their personal characteristics for operating, and to learn, so far as possible, which of those are necessary for good operation and which may lead to bad operation. Therefore, it would seem to me that our statistical research in the future ought to broaden.

Some of us have been keeping statistics for about fifteen years, and we are still making comparison in the old style, without taking into account the change in conditions and the exceedingly increased knowledge which we possess. I propose that we determine in the next year whether we can not, as a matter of fact, begin to get personality statistics. I am glad to say we are doing it in Connecticut. We started three or four months ago, and I have already the first returns from the work which we have done.

Motor vehicle administrators, who have grown old in the service always obtain great aid from younger men, men who come into the work fresh, who look at it with enthusiasm which has not been blunted by the years of failure which some of us have had in connection with our pet projects.

Such a man is Commissioner Hoffman of New Jersey whom I now take great pleasure in introducing to you.

New Jersey Starts Recording Motor Vehicle Accidents

By HAROLD G. HOFFMAN
Commissioner of Motor Vehicles, New Jersey, Trenton, N. J.

For several years, in New Jersey, we have had a figure masquerading in annual reports as the "total number of accidents during the past year." This figure represented a highly inaccurate guess, and might have just as well been compiled with the assistance of an Ouija Board. It is true that, since 1917, our motorists have been compelled under the law to report certain accidents to the Department of Motor Vehicles, but these returns were practically valueless, from a statistical standpoint, and the annual figure, rather than approximating the number of motor vehicle accidents, became instead the number of reports made to the Commissioner. Then, too, when this figure was not sufficiently large to impress the Legislature and the public, it was increased by the use of a mysterious factor corresponding to the percentage of increase in the number of vehicles upon New Jersey highways. Thus, it was determined that if our registrations had increased, for instance, seven per cent, there must have been an increase of seven per cent in the number of accidents for any given year.

But now, statistically speaking, we are growing up. Until April first of this year accidents were reported in every conceivable shape, varying from a

scribbled note on one side of a paper bag that had contained the family's last weeks' sugar supply to one report which covered nearly two yards of heavy manila paper, such as might have been used for wrapping in a hardware store. One of our choice bits of accident data came from a motorist who reported "the other car skidded the length of the string I am enclosing." The string enclosed as evidence was about 75 yards long.

Now we are compiling our statistics in an orderly, and, we believe, scientific manner, requiring the use of standard accident reporting forms. We have graduated from the paper bag and wrapping paper reports to uniform report cards, Hollorith machines n'everything. Soon we will be able to tell an expectant world the size, shape, and habits of the offending motorist, and whether it was senile dementia or the inopportune admonitions of his wife which caused the crash.

Seriously, I believe in the compilation of essential statistics, and in the use of these statistics in a way that will be helpful, interesting, and honest. It is my further opinion that the presentation of these statistics should reflect ordinary "horse sense" to the end that they may further, and not deter, the progress of safety upon our highways.

When I say that we should use good judgment in using statistics I have several things definitely in mind. I think, for instance, that making public the deductions of Dr. Bingham's committee that five per cent of the motorists cause most of the traffic accidents, would be most disastrous to the efforts of the motor vehicle administrator and to the public good. We already have too many motorcycleists—fellows who think they are the best drivers in the world. Their mental processes are reflected in the reports which always blame the accident on the other motorist. One species of the genus egotist is the twenty-mile-an-hour-driver who thinks he is good because he drives so slowly, while his more confident brother, driving at seventy miles an hour thinks he is a world beater because he can make such speed. Give a motorist of this type Dr. Bingham's figures and his superiority complex will reach the bursting point. "Aha!" he will say, "I knew it all the time. I'm glad that I'm an accident-immune driver, and not one of those accident-prone birds."

"How simple it is", legislators and newspaper editors will say to the motor vehicle administrators: "get five per cent of the drivers off the roads and all will be well in the traffic picture." It will be then, in his dilemma, that the motor vehicle administrator will have to turn to the Committee on the Driver and say, "How do you find the accident prone driver? . . . How do you know that he causes thirty-five per cent of the accidents? . . . How, in the name of American fair play, can you penalize him without giving him his day in court to determine whether he was right or wrong? . . . How, when you have over a million licensed drivers and over 50,000 accidents a year, can you give all of your accident-prone suspects an adequate hearing, within your limitations of appropriations and personnel . . . How can you, for instance, revoke the driving privilege of a taxi driver who operates his car in congested areas, say, 60,000 miles a year, because he has had three accidents, while you allow a one-accident banker, driving 5,000 miles on rural roads, to retain his license?"

In presenting statistics I believe we should, in addition to the use of good judgment, endeavor to be fair with ourselves and with the public. Isn't it true that we often use figures to justify our own shortcomings? We compile figures showing the annual increase in the registration of motor vehicles and the number of licensed drivers. Then, as we survey the annual increase in the toll of lives taken upon our highways, we attempt to justify it by saying, "Oh, well, there are more cars and more drivers on the roads; it is to be expected that there will be more accidents." We fail to present the offsetting factors. We generally do not point out the fact that annually the highway engineer is making his contribution to safety by giving us fine broad roads, with clear view at inter-

sections, with embanked curves, with guard rails, with adequate warning signs. We neglect to mention that the automotive engineer is continually giving us such features as four wheel brakes, more sensitive steering apparatus, better compression and other things that make for safety. Yes, we often full ourselves into complacency by selecting for use only those statistics that give us the greatest degree of self-satisfaction.

It seems to me, too, that we should not be too hasty in drawing our conclusions from statistics. The other day a friend of mine expressed the opinion that the inexperience of the new driver was an almost negligible factor in accidents. "Very few new drivers," he said "are involved in accidents. They are generally very cautious." This would tend to support a theory that we are spending too much time in our examination of the applicants for drivers' licenses. I passed this thought on to Walter Matthews. Walter happened to have with him the Pennsylvania accident statistics for the past eight months. We looked at them. They showed that only 835 accidents during this period had involved drivers with experience of less than three months, while 39,580 drivers licensed one year or more had figured in motor mishaps. Hastily, we both agreed that, after all, the new driver didn't cut much of a figure in the accident picture. However, when we sat down to talk it over, we found that we had failed to consider two important things. In the first place we had neglected to figure that the number of persons licensed to drive within this period and who would come within the less-than-three months' class was very small compared to the total number of motorists who had been licensed over one year; and in the second place we had overlooked that important, yet indeterminate factor, the relatively low mileage covered by the new driver. Considering these factors, and reviewing the figures, we then reversed ourselves and agreed that the new driver constitutes quite a hazard, and needs attention.

Statistics often disclose the sources of our traffic troubles, and thus are helpful, but in their practical application they are of little value unless they can be attended by results in the elimination of the defects. I have in mind again the drivers' examination. We are told that such-and-such a percentage of accidents are caused by defective eyesight of motorists; that a certain percentage of mishaps are the result of mental weakness, and so on. There are a number of professional groups all anxious to have a hand in the drivers' examination pie, and supporting their claims with figures that challenge the attention. The optometrists insist upon a professional eye examination; the psychiatrists want to delve into the mental capacity of the applicant; the orthopedists would examine cripples; the M.D.'s point out the value of a physical examination to discover traces of epilepsy and constitutional weakness. All are suggestions of merit, perhaps, but until some master statistician can conjure forth such an impressive array of figures that Legislature will be compelled to provide the necessary funds, those of us who are engaged in motor vehicle administration and examining, at times, a thousand applicants a day, will have to remain content with the best practical examination that can be given within the limitations of time, appropriations, and personnel.

It may be that I have gone somewhat afield from the subject assigned to me, but as a "rookie" motor vehicle commissioner who is interested in finding out "What to do and how to do it", I felt that these observations upon matters already discussed in this section might be helpful, even if they only serve to provoke discussion that may bring further enlightenment. I listened with intense interest, particularly at the opening session, to the discussion of statistics upon the accident-prone driver, and the methods used by fleet owners in his diagnosis and treatment. The fleet owner, however, can take steps to examine into the record of a driver before he is employed, and he can discharge him when he is not pleased with his violations and accidents. I am sure you are in agreement with my thought that, except in theory, we cannot approach in thoroughness

or effectiveness a similar plan to eliminate the "repeater" from a national, or a state-wide, standpoint.

We cannot hope to eliminate accidents until, as has so often been said, we know when, where and why, they are occurring. Today, with our methods of compiling statistics, we can quite readily ascertain when and where they are occurring, but I think that we are still far from the time when we can determine why. This is largely due to the fact that we must depend largely upon the operators themselves for our information, and we have no method of segregating the "lie-prone" motorist from the "truth-prone" driver.

From a state standpoint, I think that the chief value of an orderly compilation of accident statistics lies in the fact that it gives us a starting point from which we can determine, from time to time, whether we are making progress or whether we are failing in the battle to achieve safety upon our highways.

In 1930, from the nondescript reports received under our old system, it was determined that there were 35,358 accidents in New Jersey. Some idea of the inaccuracy of this figure may be ascertained from the fact that in the first four months of reporting upon the standard forms this year, there have been 22,000 accident reports. It is estimated that our total for the current year will reach 50,000. Still, we have every reason to believe that there has been no increase in accidents during the reporting period—we do know that we have had a decrease in fatal accidents, which had been compiled previously with some degree of accuracy.

Under the existing system motorists involved in accidents where there is personal injury, loss of life, or property damage of \$25, must report to the Commissioner of Motor Vehicles within 48 hours. These records are retained in our office, and are not available, under our law, for public inspection or for court records. Photostatic copies are then made and are forwarded to the New Jersey Traffic Commission, the agency that has undertaken the work of compiling and disseminating statistical information.

The commission, it might be pointed out, was brought into being for the purpose primarily of straightening out the chaotic condition in New Jersey resulting from the indiscriminate placing of signal lights and stop street signs throughout the state, and to effect some degree of uniformity in the municipal traffic ordinances, hitherto sadly neglected from the standpoint of state supervision. This Commission has been doing splendid work—I wish I might have time to tell you of some of its achievements in its first year of existence.

The Traffic Commission must now give its approval before any municipality may install signal devices, and you can readily see that it will be very helpful to have the accident history at particular locations at hand when consideration is given to the necessity for installations. Monthly and quarterly accident statistical summaries are forwarded to our Department, and from time to time the Commission conducts special surveys for our use. There has just been completed a very illuminating survey upon the prevalence of "one eyed" cars and the adequacy—or rather, the inadequacy—of lighting upon commercial vehicles.

I will not attempt to outline the mechanical processes for filing, coding, etc.—you are already familiar with that work. We are using the standard form of the National Safety Council, with but slight variation. We record the estimated property damage, believing that these figures will be helpful and in the thought that every accident no matter how slight the damage, is a potential fatal accident.

In starting this work we realized that after the selection of our forms, our next big job was educating the public in their use. We instituted a campaign of newspaper publicity, the final step in which was the issuance of a release in "bolder plate" or stereotype mats to all newspapers, both daily and weekly, in

the state, giving an actual picture of the reporting form, telling the motorist what they were for, and where they could be procured. We sent a supply of the forms to every gasoline station in New Jersey, and have found them to be an effective medium of distribution. We sent them, too, of course, to police departments, insurance companies, motor vehicle bureaus and a number of other agencies.

As a result of this preliminary campaign many motorists started to report on the forms immediately, and within six months 62 per cent of the original accident reports were coming in upon our cards.

It may seem rather difficult to realize that our accident statistics, collected only for six months, have already been put to practical use. The figures reflected a proportionately large percentage of accidents, both fatal and non-fatal, on three-lane highways, and already our State Highway Commission has announced a policy under which three-lane travel will eventually be abolished and our important roads widened to accommodate four lanes of traffic. Several miles of this additional strip are now under construction.

Our summaries showed to us that over the reporting period over 15 per cent of the drivers involved in fatal accidents were from other states, and of these, 50 per cent were from Pennsylvania, 48 per cent were New York drivers, and the remaining 2 per cent from other states. This became at once an appeal for uniformity in state laws and an urge to give the visiting motorist all possible information upon our existing laws. Recently our Highway Commission has marked one of the State's most important highways—the Brunswick Pike—with metal signs setting out our maximum speed limitation. We had found that, in the minds of visiting motorists there was an erroneous impression that this great straight stretch of road, between Trenton and Newark, was a "super-highway" or an "express highway" and that they could travel as fast as they pleased.

Our figures so far show, at variance with many of the other states, that most of our pedestrian accidents occur between intersections. They indicate that we Jerseyites should give attention to our "jay walking" propensities.

Newspapers and magazines have been very kindly in their reception of our statistics, and have used them in many interesting and helpful ways. Right here I may say that it is important to "humanize" the statistics as far as possible. Complete accident data enable the collecting agency to give them publicity significance that is not otherwise possible. The aggregate number of fatalities is just a figure to the motorist. When, however, it is possible to break down these figures and show that so many people lost their lives going around curves too fast, the point has a more specific, personal meaning to him. He is not being killed, or killing anyone, from day to day, but he is going around curves many times at too high a speed.

Our State Department of Education has called for our statistics, and is planning to use them in a new program of safety education in our schools. In the absence of control over local police and judicial agencies we feel that the publication locally of accident figures will arouse public sentiment to a point that will demand of its police and its courts less leniency in dealing with motor offenders. We hope to use our statistics to successfully convince our legislative appropriation committees that more money is needed for our enforcement and educational program. The use of standard forms has reduced the work of our Safety Responsibility Division, giving us initially the essential information upon which to base our requirements for proof of financial responsibility.

There is a maxim to the effect that there can be no science until a means of measurement has been developed. Its truth is obvious. Where would engineering be without its elaborate system of measurement? Or astronomy, physics, chemistry, biology, economics or any other branch of exact and classified knowl-

edge. Indeed, none of these sciences could exist without their foundations of precise measurement.

In America we believe in the scientific method. We apply it to our every problem.

That is particularly true of the problem of safety. Every approach to it is becoming steadily more exact and factual.

Broadly, all of our efforts aim at the development of a science of safety. First among them is the collection of accident statistics and accident data. By means of these we are essaying to develop the measurements upon which we shall build the science of protecting human life and property.

New Jersey is making an effort to keep a balanced, commonsense viewpoint on its accident data.

It is recognized that while determination of the causes of mishaps is the first step in effecting a remedy, all forms of causation are not determined with equal clarity and dispatch.

Some accident factors, of course, are purely physical while others are mental. The former naturally are much more readily recognized and classified.

For example, the physical factor may be a dangerously steep hill, too narrow a highway, or a curve with too small a central angle. In such a case, measurement of the situation by collecting accident data will quickly indicate the remedy in the form of road relocation or widening.

The science of safety cannot be expected to work with equal celerity when the cause of the accident is mental. Take the case of the mishap factor known as driving too fast for conditions. It is rather common, very common, in fact. The collection of data on it does not indicate the solution or remedy as quickly and easily as in the case when the factor is physical. That, however, gives no occasion to despair over the limitations surrounding the collection of accident data. At least, after all the results are in we do know the various phenomena with which we must deal even if we are not certain just how to deal with all of them.

One of the largest problems looming ahead of motor vehicle administration is that of psychologic tests for drivers. It represents an effort to improve the science of safety through the agency of the least exact of all sciences, that relating to the human mind. One definite effort, that of Commissioner Robbins B. Stoeckel in Connecticut, is being made in this direction. Others are considering its possible advantages but, in the main, the whole situation is confused.

The collection of accident data is the place at which a beginning will be made in overcoming this confusion. It should eventually indicate what kinds of drivers figure in what kinds of accidents. The more data thus collected, the more accurate will be the deductions made from them. Therefore, accident statistics should be the most effective guide to the development of a psychologic yardstick for measuring driver fitness.

The easy course in the collection of accident facts and their analysis is to put them into already established categories, such as "narrow road," "too fast for conditions," "inattention," or the like. The wiser course would be to look at those categories and determine whether they are not too loose and general. Perhaps new classifications, or categories, should be established. Or, conceivably, there may be too many. We should use our accident data to determine which is the case to find out the causative conditions which need correction.

Complete data can be broken down into many human, educational safety stories and we are trying to use it in this fashion in New Jersey. At the same time, we try not to be morbid nor yet too light in our treatment of the information.

CHAIRMAN STOECKEL: In every motor vehicle department, the workman who puts his shoulder to the wheel at all times, on all subjects, in all matters relating to the

achievements and intended achievements of the department, is the deputy Commissioner. Such a man is Mr. Walter W. Matthews, State Deputy Commissioner of Motor Vehicles, Harrisburg, Pennsylvania, who will now discuss Mr. Hoffman's paper.

Discussion of Accident Records

Led by **WALTER W. MATTHEWS**
State Deputy Commissioner of Motor Vehicles, Harrisburg, Pa.

One of the purposes of the person leading a discussion is to stir up controversy. The thing that has been bothering me in Pennsylvania for the last seven years is what to do with the statistics after we have them. I think we are inclined to expect too much of accident reports, that is too much per se. The mere fact that you institute a system of accident reporting in any state or county does not mean your accidents are going to decrease.

There are, of course, many things that may be done with the records. Mr. Hoffman has touched on most of them; for instance, they can be made of considerable value to your highway department in engineering matters; or they can be used to discover the so-called accident-prone driver.

The motor vehicle administrator is up against a peculiar proposition, so far as the accident-prone driver is concerned. He has to weigh the conditions, and ascertain whether or not any particular purpose is going to be served by taking this man off the highway, and when he attempts to do that he has a number of other considerations which enter into the case.

We have lately tried to use our accident statistics in Pennsylvania in discovering the so-called accident-prone drivers. We have districted the state, under the supervision of some twelve inspectors, and when an operator shows a tendency toward repeating he is immediately called in, the situation is talked over with him, he explains these accidents to our satisfaction, and some effort is then made to discover whether or not we can help him avoid more accidents by not letting him drive for a while. It is my personal opinion that this suspension of the driving privilege is the best educator and helper that the administrator has, because the driver has a little time to think about what is causing these accidents or why he is inclined to get into them and other people are not.

We have supplemented that work with what we think is rather an important amendment to the Pennsylvania vehicle code, which gives us authority, for the first time, to re-examine any driver already holding a license. Those of you who are engaged in this work know that as time goes on some drivers get worse. I would just like to read this provision:

"The Secretary," referring to the Secretary of Revenue, who is the Executive Head of our Department, "may in his discretion, require the special examination by such agencies as the Secretary may direct, of any applicant for learner's permit or operator's license or any operator, to determine incompetency, physical or mental disability or disease or any other condition which might prevent such applicant from exercising reasonable or ordinary control over the motor vehicle."

We believe that is going to give us latitude in studying these operators. We have developed some rather curious situations already. A coal truck driver in our anthracite region in Pennsylvania had a series of five accidents in about fifteen months. In two of them he had hit children who had darted out from the curb. We called him in for a hearing. He seemed to explain these accidents to the satisfaction of the inspectors. We gave him again the regular drivers' examination. He passed that perfectly. Not yet being satisfied, we had him sent to a mental health clinic, a series of which are operated throughout the state by the State Department of Welfare, which cooperates with us in all these examinations. His reactions were

good; his physical conditions were good; he had an average intelligence quotient, but in questioning him they found he had a habit of loafing around the pool room at night, that his working and sleeping hours were rather irregular. His examining physician said that he would only consider him a safe driver if he got from six to eight hours sleep every night. Now, I submit to you, it is going to be a tough proposition for any motor vehicle administrator to assure himself that drivers are going to get that much sleep.

I think one direction in which accident statistics might be used, is to determine in what things the driver should be educated; that is, what shall we tell the drivers about driving. I was asked this morning where drivers, old or new, can learn to drive a car properly and safely. So far as I know, there is no such place, and perhaps it is up to the motor vehicle administrator to tell him what he has to do to preserve his own safety and that of people on the highway.

In Pennsylvania, for the first seven months of this year, we have had a decrease in total number of accidents but an increase in fatal accidents. We do not know how to explain it, except that perhaps our people are hitting them harder. Now we have no quarrel with speed in itself. It is a question in our minds, however, whether there are not a great many operators not temperamentally fitted or who just do not know how to drive present high powered cars. Perhaps if statistics we collect can lead to some education along those lines, they will have served some purpose.

If you are simply going to use accident reports to compile statistics for publicity purposes, many of which will not be used by the newspapers anyhow, or if you are going to set down serried rows of figures and say how horrible the situation is, and that is all the use you have of them, you should not attempt to collect accident figures. But if they can be used to discover operators who have a high accident frequency, if they can be used for educational purposes, if they can be used to determine whether operators or vehicles should be taken off the highways, then I say they will have served a useful purpose.

CHAIRMAN STOECKEL: In some states the motor vehicle, highway, and police departments all cooperate on the problem of motor vehicle direction. In other states, one department alone has to bear the burden. Illinois is such a state, I think, so far as relates to accident statistics. Here, as I understand it, they are in sole charge of the Highway Commission, and Mr. Frank T. Sheets who is the chief engineer of the Highway Commission, is here to tell us about them.

Using Highway Accident Records for Safety

By **FRANK T. SHEETS**
Chief Highway Engineer, Department of Public Works and Buildings,
Springfield, Ill.

Because I am an extreme youth from the standpoint of studying accident statistics I may bring to this discussion a freshness of viewpoint that may have a virtue; but I also may repeat things; I may say things that are heresy; and I may say things that are wrong.

One thing confronts every highway administrator, and that is that he as the engineering head of such an organization, is guilty of little less than criminal negligence if he does not build into the highway itself all the safety that his intelligence and the funds available make possible. If he lacks the intestinal fortitude or moral courage which is necessary at times to ram through proposed locations, eliminating physical hazards, it seems to me he had better retire to some more peaceful and more pleasant field; but if he enjoys a good scrap once in a while, then perhaps he is in a good place, because he frequently encounters one.

We in Illinois have been so extremely busy producing a highway system to operate, that the requirements of highway operation have been given relatively little

attention until the last two or three years. We have now produced a highway system of ten thousand miles, and have therefore been primarily engaged with construction and maintenance problem.

In the construction of this highway system, we have tried to keep in mind the cardinal features of highway location and design, as well as highway safety. That has resulted in the construction of long vertical horizontal curves, super-elevation of curves, grade crossing eliminations; etc. But I think one thing we have done in Illinois that has been one of the greatest contributing factors in highway safety is, that throughout the state you find prevalent practically the same alignment policies, curvature, sight distances, and that sort of thing carried into the work. The driver in Illinois does not come unexpectedly upon conditions of highway travel that are unfamiliar.

In order to lead up to this question of using accident records for highway safety, it is necessary for me to recite briefly how we get them. We have control of maintenance of the state highway system, and handle that by assigning maintenance patrol men to specific sections of road, some twenty miles in length on an average, and these patrol men come under the supervision of our maintenance engineer. In addition we have approximately three hundred state highway police, who operate under the state highway engineer. They constitute a bureau in the Division of Highways. Consequently, we are able to get close correlation between the policing activities and the maintenance activities of the department.

We require all our policemen and maintenance patrol men to submit to us, wherever they encounter an accident, a complete accident report. We are using the forms which have been largely developed and standardized by the National Safety Council, and we are compiling a lot of useful information, we hope; at any rate, we are attempting to use it. I thoroughly agree with the remarks of some of those present that the compilation of a lot of useless statistics is at least an unproductive pastime, and unless these things can be used we might as well forget them.

We are attempting to use them in this manner: Whenever one of these reports comes in it is diagnosed carefully; also, we record on maps outlining our state highway system, the location of each of these accidents. If the report shows a fatal accident, we immediately dispatch to the scene a competent highway engineer, who makes a complete diagnosis of the physical situation surrounding the accident, and determines if possible the physical cause that might have been a determining factor in this case. We use that as a means of correcting the conditions found.

If we find there is a repetition of non-fatal accidents at a certain locality, we likewise investigate the situation to see what can be done to remedy the physical condition. It seems to me after an engineering department has done all it can do in foreseeing dangerous conditions and eliminating them by adequate design, the accident report is one of the best guides to finding his mistakes.

These accident reports have suggested many things to us: for example, that the use of the non-luminous warning sign, as has been nationally adopted, is not the final answer for night driving. I believe the records indicate that state highway departments, in dealing with the problem of rural night driving, should turn as rapidly as funds will permit, to some type of reflecting signal which will indicate the points where caution is to be exercised or very dangerous conditions are to be encountered.

It seems to me also that something should be done toward trying to develop a safety factor for a highway, in which not only the number of accidents is considered but the amount of highway travel is brought into the picture; because it seems inevitable that the number of accidents must be some function of the volume of vehicular traffic.

We can sometimes be led to rather absurd conclusions from these accident reports. For instance, we find that some eighty per cent of the accidents happen on straight-aways, and we assume that curves are not dangerous. Or we assume from what

the Commissioner from New Jersey said, that fatal accidents happen largely to the people from Pennsylvania and other neighboring states, and only two per cent from those of other states. That is carrying the illustration to a ridiculous point. But frequently our newspaper friends, in publication of the results of accident surveys, overlook some of these factors.

Reports we have secured indicate that in about sixty-six and eight-tenths per cent of all accidents, the accident is primarily the fault of the motor vehicle operator.

In a recent report from Connecticut, it was pointed out that, in eighty per cent of highway accidents in that state the cause was that of the operator of the vehicle. Therefore, whether it is sixty-six per cent or eighty per cent or some other figure, the evidence seems to point to the fact that the great contributing cause of highway accidents is the deficiency of the operator, and that a relatively small percentage of the cause might lie in lack of adequate highway design, or inadequate width, or dangerous highway conditions, or weather conditions, or other such factors.

Therefore, it seems to me, as a highway official, that in spite of all our efforts to build highway safety into our highway system, in spite of the fact that we might by some unknown means attain absolute perfection in that respect, in spite of the fact that we might be able to persuade the All-Powerful to arrange that we would never have any slippery roads or bad driving conditions, we would still have this question of inefficiency, or lack of ability, or lack of care on the part of the individual operator of the motor vehicle.

And there, I think, comes your challenge. I think every highway engineer must accept the challenge of the safety of design, and construction, and maintenance; but I think those who are in a position to assist that highway engineer or administrator must accept the challenge of finding some way to cut down this sixty or eighty per cent of highway accidents chargeable to the driver.

I think the highway officials of this country have acquitted themselves reasonably well. They have cooperated with other agencies and have worked out a uniform system of warning signs. It has been put into effect through the American Association of State Highway Officials in practically all the states. At every meeting of Highway Officials, we strive to develop our principles of highway design and location in order to bring about greater safety and with the cooperation of such agencies as this, I believe that sufficient pressure and legislation will be brought to bear on the driver. That is the thing we must come to in Illinois. And I thoroughly agree with the gentleman from Pennsylvania when he says that the suspension of driving privilege is perhaps the best corrective measure that can be applied in the case of the drivers who contribute to these highway accidents.

CHAIRMAN STOECKEL: The last scheduled speaker on this program, Mr. E. Raymond Cato, superintendent, California Highway Patrol, Sacramento, California, is not here, and I have asked Mr. R. L. Forney, of the National Safety Council staff, to read his paper.

Putting the Accident Report To Work

By E. RAYMOND CATO

Chief, California Highway Patrol, Sacramento, Cal.

The control of traffic accidents rests in a coordinated action of three great factors:

- First, the factor of Engineering;
- Second, the factor of Enforcement;
- Third, the factor of Education.

Heretofore, the coordination of these has not been perfect. In some direct proportion to the imperfection, we lose correspondingly in results.

Let us discuss each of these three factors to see where each fits into the picture.

First, "Engineering." Road engineers have been studying road construction for

generations. They have developed high standards and for the most part they build to those standards. The first problem of the engineer is constructional—to build a road for wear, one that will stand up under the traffic requirements. But traffic conditions change and the best road engineers cannot foresee some of these changes. Road engineers could not foresee, for example, that the building of oiled roads would encourage a traffic of light trucks, which in a very short time ruined the roads. Then came the macadam road, a compress of rock and oil. This encouraged the use of heavier trucks and in time the road engineer found that the macadam road was inadequate. Finally, the concrete road was evolved as an economy for regions having heavy traffic.

With the advance of these roads and other conveniences for easy traveling came higher powered motor vehicles, and more luxurious ones. Then came the increase in density—one car for 2.7 persons in California, for example.

The present day problem of the engineer is still construction—to build a road to withstand the wear and build it of some ideal size that will accommodate peak volume without being extravagant in dimension.

The latest obligation of the road engineers in addition to meeting the common constructional difficulties is to do his part also with the construction, to cut down the traffic accident toll of human life.

In order to meet this latter obligation, the engineer requires to know where the accidents are occurring, where they are congesting, and when they are due to engineering faults. Such information enables him to decide what, if anything, he can do in a constructional way to remedy the conditions.

So the engineer looks for much information to that agency which the law authorizes to collect the traffic accident data. In California, it is the State Highway Patrol.

For the purpose of collecting accident data, we have established a very complete unit in the California Highway Patrol known as the Bureau of Research, Statistics and Traffic Safety. We consider it one of the most important subdivisions of our entire structure as an organization. I will not go into the question of the general activities of this bureau, but confine myself solely to the subject of what it does to use the accident data after obtaining it.

Judging from the thousands of letters we receive, asking how we use our statistics, I believe that most of the states are having more trouble finding satisfactory use for accident statistics than they are in gathering these data in the first place, difficult as that work is in itself.

As our accident reports are received at the state capital, we segregate them by the county of origin. We have a set of fifty-eight county maps and maps for ten of our leading cities. On these maps we place a pin for every accident in the exact location of occurrence.

Our system of using the pins is somewhat different from other schemes that many apply. We use one pin for each accident, but we employ a variety of symbolized pins to indicate if the accident caused a death to one, two, three or four persons; or if an injury to one, two, three or four persons, or more.

By these means, we can spot the relative congestion of accidents on the highways. We also use a large state map on which all fatalities are recorded by pins. This is to emphasize the congestion of "death" spots as distinguished from the congestion of general accidents. Should such appear to exist, we attach maximum importance to it as being primarily more serious.

The head of the Research-Statistics Bureau periodically inspects the maps. In addition, the clerks responsible for keeping the map up are instructed to call attention automatically to any striking or unusual congestion as soon as they detect it.

Maps are maintained by the year, and photographed at the end of the year for permanent record. Then the pins are pulled and we start over again.

The discovery of any significant congestion is at once called to the attention of the

State Division of Highways, which is also supplied with copies of the accident reports involved.

All captains of the Highway Patrol are instructed to call special attention to any spot on the highway where two or more accidents occur at the same place. This is done in addition to sending in the accident reports and includes consideration of property damage accidents which are not required to be reported to the State by motor vehicle drivers.

After determining locations where accidents are occurring, the Division of Highways makes its own investigation for construction and engineering faults.

The Highway Patrol Research continues to make practical use of the information to see if adequate enforcement provisions are being taken at these points.

Now let us pass along to the second factor mentioned in the control of accidents, that of "Enforcement."

It is our theory of enforcement in California that we will never have an adequate control of the traffic problem until we have a complete record of every driver in the State. By this I mean not merely a record of his driving license and application, but combined therewith the history of the driver's license, revocations, suspensions, renewals, cancellations, violations against the vehicle act and his accident record.

The Statistical Bureau at Sacramento maintains a drivers' accident file, in which every driver's accident record is maintained. This card is filed alphabetically and provides blanks for a very brief notation on up to five separate accidents for the individual. As the clerk who makes out the card notes three or more accidents to one individual, the record is pulled. Our Bureau of Drivers' Licenses is notified and an investigation is made of the driver with a view of determining his competency to drive. If the investigation shows him to be incompetent, we are authorized by law to hold a hearing and revoke or suspend his driver's license.

We also have a file which consists of an abstract of the conviction of any persons guilty of violations of the Vehicle Act. If three or more violations appear for the same person, an investigation is conducted with a view of revoking or suspending the driver's license. The records of this file are also compared with the Drivers' Accidents file and the bad driver's history is thus thoroughly exposed.

By these means we have been able to eliminate a number of undesirable drivers from endangering others.

The application of our accident statistics to other enforcement work is quite involved. We have a trained staff continuously experimenting with the figures, searching for obscure facts. For example, we segregated all accidents occurring in rural districts from those within incorporated cities. We also maintain this segregation for each county. We instantly note radical increases or decreases of deaths and injuries for each county. Such observations cause us to demand a special explanation from the county captain. This process has resulted on two occasions in our catching a standing accident hazard in time to eliminate it and so effect a reduction in deaths.

Frequently we send out special questionnaires to the captains in order to ascertain certain information about accident conditions the reporting of which is not provided for in our regular accident blanks.

Quite recently we so circularized the personnel to determine how many deaths last year may have occurred through the officers' inability to get medical aid in time. California is a large state, one thousand miles from end to end. In some of the remote counties there is not an ambulance available in the entire county. We have found such facts from the type of special questionnaire I mention; and from such information when it is collected, we have a basis for planning improvements.

One important use of our statistics consists in mailing copies of our Monthly Summaries to every captain and district inspector of the California Highway Patrol. These reports enable each captain to be advised upon state-wide conditions in addition to giving the summarizing information for their individual counties. The captain of the Patrol maintains his own county map in which pins are placed for each accident.

Special investigations are made of the fatalities, usually by the captain in person in conjunction with the officer on the beat. Many of the captains take photographs of the wrecks and the highway in connection with this work.

The third factor in the control of accidents is "Education."

All educational efforts must first be founded in facts. Our statistical service gives us those facts. The next step is to pass the facts on to those who can use them effectively.

For this purpose we have a mailing list of over 3,500 names of organizations and individuals definitely working on the traffic accident problem. This list includes every judge and district attorney in the State, every sheriff and Chief of Police, the leading safety organizations, insurance companies and seven hundred newspapers. Every month we send each of them a copy of the Monthly Statistical Analysis, exposing the accident conditions of the month previous.

We do not just send out the statistics. Chiefly, we send out our interpretation of the statistics, explained in simple, non-technical language so that a business man can understand what we have to say. These interpretations are made by our technical staff who know, most fully, the composition of the figures and how to properly qualify them.

In the past, we found much abuse of the accident statistics, occurring through non-technical persons endeavoring to make their own interpretations. Too frequently, they arrived at utterly false conclusions because they assumed a great deal on superficial appearances which was not justified. We have partially controlled this difficulty by giving the public less statistics and more interpretations.

The California laws provide for safety instruction in the public schools. Our Research-Statistics Bureau is working very closely with the Department of Education in furthering the safety instruction program in the school and although this work has been started but recently, we are confident it will in time net fruitful results in developing "safety-minded" children.

I would like to be able to tell you more about the experimental research work we do with accident statistics, but this work is of too technical a character to discuss in a general paper such as this. Suffice it to say we have found the practical answer to many a perplexing question by its aid. To know that pleasure seekers are more frequently involved in accidents than any other occupation group, is important. To know that between 3 p. m. and 9 p. m. is the critical accident period, is important. To know that the per car mileage is increasing and that although the California Motor Vehicle Death Rate is high when compared with other states on a population basis, it is favorable when considered on a mileage-driven basis, is important. To know that of our intersection accidents, which constitute 68 per cent of all, more than half are related to the problem of easy vision in which the body design of the car plays a vital part, is important.

In exposing primary or first causes responsible for serious accidents, I can not lay too much emphasis upon the need of the State requiring the accident report to be confidential for the use of the Department. This is encouraging persons making the reports to give us full and true facts which they otherwise might hesitate to do if they believed the report could be subpoenaed in evidence against them in court.

In concluding, we can say we really could not get along any more without the accident statistics bureau. However, a Statistical Bureau only begins to function when it gathers data. Its real work is to interpret the data, adduce the facts, and see to it that the facts are put to work.

CHAIRMAN STOECKEL: Both papers have been directed toward the use for practical purposes of such statistical information as we can get. One or two have doubted that that use is as great as it might be; but it appears to me that about everything which is useful in our work came out of the gathering of statistics and the application of the lesson learned thereby; for instance, our study of repeaters and the part which they play in accident production is possible only through statistics. The part which

highway imperfections play is shown by statistics. Now we are getting to the personality feature, which I hope may be developed. The question of what enforcement is, how far it shall be by police, how far by education, how far by the distribution of general knowledge to create public sentiment is being all worked out in that way; so I can not tell, as your Chairman, that there is any lack of accomplishment from statistics today.

I do think there is a criticism, properly directed, that continuing to pile up figures which can not mean much, is a waste of energy. I think we ought to take those statistical details which are showing the best methods of approach to this great problem, enlarge them as much as necessary, and then to some extent abandon the keeping of other figures.

FRANK T. SHEETS (Chief Highway Engineer, Department of Public Works and Buildings, Springfield, Illinois): Has any factor ever been developed indicating for a given mile of highway, the expected frequency of accidents per one thousand vehicles traveling the highway per day?

CHAIRMAN STOECKEL: So far as your Chairman knows, that has been done only partially. I know now of two or three different experiments where a mile or several miles of different types of highway were laid out and the accident rate kept on those stretches; but I do not think the results showed anything particularly.

Mr. SHEETS: You might have two pieces of highway, identical in safety, as to physical conditions, one carrying an intensity of traffic of two thousand vehicles a day, and the other of ten thousand vehicles a day. I wondered if any one had arrived at some factor which would show the difference in probability of accidents under these conditions.

HOWARD R. OLSON (Chicago Regional Planning Association, Chicago): I attended a traffic school this morning, conducted by Mr. Hawley Simpson, and they were studying traffic intersections and the accidents occurring at them. Their purpose was to determine a method of eliminating at least some of those accidents by different signal installations, application of signs, changing of signs, pavement design, or something of that sort.

They talked about the probability of accidents, and Mr. Simpson had a curve which he referred to once or twice, saying the accidents at a certain corner were greater than the probable number of accidents. Perhaps he has developed something along the line requested by Mr. Sheets.

DR. T. F. MURPHY (Bureau of the Census, Washington, D. C.): If I am not mistaken, a professor in the University of Maryland made a study of this sort some time ago.

Has it been considered whether, when a driver changes his type of car, he should be required to take a test of his ability to drive the new type of car?

WALTER W. MATTHEWS (State Deputy Commissioner of Motor Vehicles, Harrisburg, Pennsylvania): We have no regular re-examination for drivers. I do not know but what some time in the far distant future that may come about. We do have a re-examination but only for those cases that we think require it.

PAUL SEUROR (Montreal Tramways Company, Montreal, Canada): In Quebec there is no such examination for private drivers of motor cars. All chauffeurs, automobile chauffeurs, truck drivers, must, however, pass an examination in technical schools; but for private driving you get the license on an affidavit that you know how to drive, and that you have driven this car five hundred miles.

C. D. NEWTON (Travelers Insurance Company, Hartford, Connecticut): I am especially interested in how we are going to improve the private driver. We know that education has reduced child deaths. Also, the operator of a fleet of trucks can control his drivers.

The highway engineers, too, have made great improvements. But I am particularly interested in knowing any possible ways by which we can improve the private passen-

ger car owners and drivers; and, as Mr. Matthews pointed out, I am especially interested in knowing how a person can drive right.

Usually a person can do a thing right if he is properly instructed. So if we could properly instruct drivers and drivers who are trying to get their license, would it not be possible to reduce the number of deaths?

L. A. LYON (Deputy Superintendent, Michigan State Police, Lansing, Mich.): Various agencies in Michigan have been conducting so-called educational campaigns, trying to teach the drivers how to drive better, and trying to impress upon the public in general the menace that there is in modern traffic. We have had some success in that direction, but in our educational campaign we have discovered one thing; in order to make it effective we must also have a big club to swing at the driver. We finally passed an effective operators' license law, which is administered primarily by our department, and our department also gathers and records the accident statistics.

We have found out some things from our statistics, and are trying now to apply remedies. Some of those remedies relate to physical conditions on the highway, others to enforcement. We work very closely with the highway department, and whenever a condition comes to light that looks as though highway construction was a cause or contributing factor in accidents, the highway department does everything possible to correct that condition. Last year, however, a little better than forty eight per cent of our accidents were caused by what we call cutting traffic; in other words, a driver of a vehicle attempting to overtake and pass a vehicle going in the same direction. That seems to be a matter of enforcement. These and other things that are contributing factors in accidents we bring to the attention of our district commanders and sub-station commanders, and tell them that is one thing they must stress in the enforcement of the law.

In Michigan we used to think that high speed and defective equipment were the causes of accidents. We have found since we have the accident reports, since 1928, that we can trace very few accidents of any kind to such mechanical defects as tail light out or one headlight out or glaring headlight.

In administering our operators' license law, we record on the driving record of every licensed operator, the number of accidents in which the responsibility is fixed on him.

Incidentally, we have reported from all portions of the state convictions for traffic violations, and felonies in which a motor vehicle was used. They are all recorded, and when a man shows a couple of accidents combined with a traffic violation, we get out the reports; and if it looks like he was a little bit careless, we call him in and have him show cause why his license should not be suspended.

The point I am trying to bring out is this: That I think the most effective weapon in the prevention of accidents is a good workable operators' license law. I do not believe you are ever going to curb the careless driver until you have in your state an operators' license law that will permit you to take that license away from him without having to convict him in court. We have such a law in Michigan, since last spring. I went up to Saginaw last week, and held an examination of four persons that had been involved in fatal accidents since September in Saginaw. I revoked the license of one man who broke down the safety zone, carried a woman off the loading platform, across the street, and caused injuries from which she died. The man is being prosecuted for negligible homicide, a form of manslaughter. In another case two cars were involved at an intersection. I suspended the licenses of both operators. In that case there could not be any criminal prosecution under our law, but there must have been carelessness on the part of both of them; otherwise they would not have had an accident.

Since this law went into effect, we have revoked or suspended around fifteen hundred licenses in Michigan, for various reasons. The biggest individual reason is for driving while intoxicated; I do not believe that any legislation, nor any effort on

the part of the men who build the highways is going to have much effect, until you get to the point where you can say to a man, "Now you either straighten up and drive decently and carefully or we are going to take your license away."

DR. T. F. MURPHY (Bureau of the Census, Washington, D. C.): What do you do if a man from another state, driving across Michigan, makes repeated violations of your law? Can you take his license away, or does he have to have a special license to drive in Michigan?

MR. LYON: We can take away the privilege of any man from another state. Incidentally, we have reciprocity. If Mr. Matthews has any Michigan drivers who have their license revoked in Pennsylvania, we promptly revoke them in Michigan for a like period. Again, if a Pennsylvania driver comes up in Michigan and violates any of our laws to such an extent that we should take away his license, we do it. We take it away and send it back to Pennsylvania and let him go back and get it.

If an Illinois man comes up there and violates our law, we deprive him of his license to drive. We say he can not drive in Michigan, and if we catch him driving again it is quite a serious offense.

HOWARD R. OLSON (Regional Planning Association, Chicago): The use of accident reports by the highway engineer interests me greatly; and the use that can be made of them in improving our highway design, and in bringing proper signs and signals on the highway to eliminate accidents. I have been very much interested in seeing studies of intersections where they have plotted the accidents before and after a certain thing was done, and find that they eliminated a large number of the accidents—a very practical application of the engineering method in eliminating accidents.

The Commissioner from New Jersey made it quite evident that they plan to furnish the state highway department with statistics, as to where the dangerous points are. Are they going further and furnish the information to cities, so that the city engineer will know where his bad spots are, and to the county engineers and park authorities who may be doing the same thing? It seems to me that is a very important part of a state-wide law or policy.

WM. G. ELIOT (Washington, D. C.): I would like to supplement what various speakers have said regarding the use to which these accident statistics can be put. It seems to me that our principal use of them now is to compile general tables, whereas the real use of them is for the local authorities in pinning down the accidents to certain specific points, and to certain specific drivers; in other words, locate the accident-prone driver and deal with him, and locate the accident-prone section and deal with it.

G. D. NEWTON (Travelers Insurance Company, Hartford): I doubt that we can solve this problem through legislation. We have the pedestrian. Can we pass a law to influence the pedestrian, or can we have enough policemen to see that he crosses the street on the cross-walk or that he walks with the traffic light instead of against it? The drivers' license law may control the action of the operator, but obviously the pedestrian must be considered. Perhaps the pedestrian would prefer, to walk with the traffic rather than against it. We know that he would prefer in many cases to cross in the middle of the street rather than to walk to the intersection fifty feet away, and that he may ignore signals, or that we have parked cars which he takes a delight in darting out from behind. Personally, I think, the greatest demand at present is for efforts to point out the hazard, and to educate the pedestrian and driver that certain things are not good for them to do.

I do not think the problem is ever going to be solved by passing a drivers' license law or erecting lights, because the person is going to do certain things in spite of these safeguards unless he is properly forewarned.

LEROY E. PEABODY (United States Bureau of Public Roads, Washington, D. C.): Mr. Sheets and Mr. Olson both referred to one matter that I think is quite pertinent in judging and using accident statistics, and that is the quantity of traffic that is

using the highway. Part of the measurement of hazard is the number of vehicles that have opportunity to connect with each other or to hit pedestrians.

Some one in the National Bureau of Casualty and Surety Underwriters, some two or three years ago, made a study of about a dozen cities, and reduced the accident frequency to a function of the population of the city, the motor population of the city and the miles of paved surface.

J. O. DAVIS (Chief, Tennessee Highway Patrol, Nashville, Tennessee): During the last twelve months forty-eight pedestrians have been killed walking along the highways of Tennessee and forty-five children walking with traffic.

We have an increase in deaths this year of approximately seven per cent, and that increase is due entirely to one cause—the drunken driver who is killing people on the highways of the state. The drunken driver has killed approximately twice as many people this year, as he did last year. The Tennessee Highway Patrol this year has already arrested more than twice as many drunken drivers as it did during the entire last year.

Tennessee has no drivers license law. In the last legislature a proposed law was introduced, and Mr. Williams of the National Safety Council described it as pitifully weak; but when the State Senate got through with it, it was not worth the paper it was written on.

We did get through a drunken drivers' act, which provides that a man upon conviction of driving while drunk, may be assessed a fine of ten to one hundred dollars, six months in prison, or he may have his privilege of driving revoked for as much as six months. However, we have no way of keeping a check on that; and furthermore, most of the juries so far are rather in sympathy with the drunken driver. They think about the wife and children at home, and not about the wife and children of the fellow who has been killed.

There is one other thing I want to mention and that is the question of sleeping drivers. In the last three months we have had three very serious accidents, which resulted from a truck driver going to sleep. Interstate operators push these men from Akron to Atlanta without a stop. The drivers are not physically fit to stand it, and there is no law to take care of the situation.

W. R. ANSOR, JR. (Automatic Signal Corporation, Chicago): I would like to address a question to the gentleman from Michigan. I heard of a proposal in Detroit to eliminate the twenty mile speed limit from the trunk highways coming into the city.

I am a traveling man and I have a tendency to maintain a pretty good speed on entering any town, village or city, until I am pretty well into the congested district, or until I see a sign that tells me that the speed limit is so and so. I think if Detroit were to eliminate that warning of its speed limits, it would be the cause of a great many accidents.

Another question: You referred to an accident in Saginaw, in which the truck ran over a platform and killed a woman. I happened to be in Flint, Michigan, a year ago this July, when a furniture van did the same thing and investigation indicated that the brakes were at fault.

You made the remark that the mechanical condition of the car was seldom at fault. I have yet to find some one who can tell me how they determine such a thing.

L. A. LYON (Deputy Superintendent, Michigan State Police, Lansing, Mich.): Our information comes from the drivers themselves. Occasionally they tell you that they did not see an object, that the lights were dim or that their brakes would not work. I would not undertake to say how many accidents could be charged to defective equipment as a contributing factor. A great many of them must be, but we have not yet been able to determine just how many. It is certainly true people do not maintain their mechanical equipment as they should.

In Detroit they have a thirty-mile speed limit enforced on their through highways now. Incidentally, their accident rate has increased with the increase of their speed

limit on their streets. I do not think they have increased the limit officially, but the Council has instructed the police not to arrest the people at thirty miles an hour or higher speeds, unless they are driving carelessly.

The question, of course, of the increasing of speed on any arterial highway of any city is a question of the physical characteristics of that street, type and quantity of traffic and cross traffic and the control. On some streets you can certainly travel safely at a higher rate of speed than on others. I do not think you can apply a hard and fast rule and I do not think they are attempting to do that in Detroit.

We have a lot of data and a lot of remedies for intersection accidents, particularly in cities; but our statistics now show that the fatality, and injury rates are much higher on rural highways than on city streets. There may be more accidents per mile of highway, per mile of travel or per vehicle in the city, but the fatalities and injuries are much higher, in proportion, on the rural highways. Those of us who deal primarily with rural accidents are looking for data and for remedies to meet this situation.

ADJOURNMENT

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