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**National Safety
Council**

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NOTE

Volume III of these Transactions, containing the Public Safety sessions, Street and Highway Traffic Section, Traffic School, Statistics Section, Education Division, and Home Safety session, is being mailed automatically to certain members of the National Safety Council who are believed to be interested in these sessions. Any other member of the Council may receive a copy of Volume III without charge by requesting it.

NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



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Secretary and News-Letter Editor—HARRY W. TICHENOR, The Prudential Insurance Company, Newark, N. J.
Chairman Program Committee—CHARLES H. FLATHERS, Eastern Steamship Lines, Inc., Boston, Mass.
Chairman Membership Committee—W. E. STEWARDSON, Colombian Steamship Company, New York City.
Chairman Research and Statistics Committee—BENJAMIN H. SELF, Travelers Insurance Company, New York City.
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Tuesday Afternoon Session September 30, 1930

ARTHUR M. TODE, Chairman
The Texas Company, New York City

The Marine Section convened at two p. m., Arthur M. Tode, Technical Department, The Texas Co., New York City, presiding.

CHAIRMAN TODE: I shall first call for the report of our publicity committee, Mr. John S. Hunter, The Atlantic Refining Co., Philadelphia, chairman.

Report of the Publicity Committee

By JOHN S. HUNTER
The Atlantic Refining Company, New York City;
Vice-Chairman (In Charge of Publicity)

The work of the Publicity Committee for this year was a difficult task when one considers the amount of work which had been done by its predecessors, however, the committee has endeavored to keep before the public the work and aims of the Marine Section of the National Safety Council.

A number of the leading maritime magazines and publications have very graciously extended their columns for our use and the Committee has availed itself of them on numerous occasions.

Considerable publicity was given the 19th Annual Safety Congress, the complete program appearing in a number of periodicals.

The Publicity Committee has been called upon by the Chicago headquarters staff on many occasions to augment the work of the General Membership Committee. At their request many companies have been written to, drawing attention to the aims and methods of the National Safety Council in the promotion of Safety Work. Many of these companies were being solicited for membership in sections other than the Marine, but it has been the desire of the Publicity Committee to help the activities of the entire Council as well as those of our own section.

CHAIRMAN TODE: Next the report of the Poster Committee, Mr. H. J. Heidorn substituting for the chairman, Mr. R. F. Hand.

Report of the Poster Committee

By ROBERT F. HAND
Standard Shipping Company, New York; Vice-Chairman (In Charge of Posters & Slides)

During the past year, great progress has been made in the matter of obtaining new ideas for effective marine safety posters. Splendid cooperation has been secured from numerous members of the Marine Section. Not only have they placed the writer in possession of many worthwhile photographs showing hazardous and unsafe practices and conditions but they have also assisted with suggestions as to lettering, wording, etc., all of which cooperation has been very gratifying.

Stanley H. Kershaw director of the Poster Division, of the headquarters of the National Safety Council in Chicago, spent a day with the writer during the past year submitting numerous suggestions for poster copy, sketches and photographs, in order to secure the Marine Section's views and approval. This conference resulted in approximately a dozen good ideas being developed on paper which Mr. Kershaw took away with him and which will appear in final poster form during the next few months.

The attention of all members is called to the fact that each month in the *National Safety News* the new posters appear in miniature. The present allotment of marine posters which the Director of the Poster Division is permitted by Council rules to produce consists of one marine poster per month. Sometimes this is a "vessel operation" poster and sometimes a "stevedoring" poster. By consulting the *National Safety News*, therefore each month, each member may see the new poster which is available and may order it if interested.

The director of the Poster Division has assured the writer that at least two posters on sideport loading subjects will be submitted to the Council's Poster Committee for their approval in the immediate future so that they may be put into production without further delay.

In May of this year the staff photographer of the National Safety Council spent two days in New York under the writer's jurisdiction and obtained fifteen excellent photographs of various marine and semi-marine subjects. These included side-port loadings and fumigation practices and several other items covered by "vessel operation" and "stevedoring" captions.

The writer wishes to take this opportunity of expressing his thanks to the members who so graciously devoted considerable of their time in assisting the staff photographer and the writer's representative to secure these photographs.

CHAIRMAN TODE: Will Mr. C. H. Flathers, chairman, report for the Program Committee?

CHARLES H. FLATHERS (Eastern Steamship Lines, Inc., Boston): I have no detailed report. The program this year speaks for itself.

CHAIRMAN TODE: We are now ready for the report of the Nominating Committee. Mr. A. R. Bush, chairman.

Report of the Nominating Committee

MR. BUSH: Your Nominating Committee presents the following list of names which we place in nomination for the various offices in the Section:

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.

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ARTHUR R. BUSE, Westfield, N. J.

B. C. EDWARDS, Grace Line, Inc., New York City.

F. P. FOISIE, Waterfront Employers Association, Seattle, Wash.

FRANK A. FRITZ, T. Hogan & Sons, Inc., New York City.

JAMES A. GIBSON, Luckenbach Steamship Company, New York City.

F. C. GREGORY, United States Employees' Compensation Commission, Washington, D. C.

G. W. JOCHEN, American Fruit and S. S. Corp., New York City.

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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.

(Motion was made, seconded, and carried, that the report of the Nominating Committee be adopted and the nominees be declared elected.)

CHAIRMAN TODE: The first paper of the day is by Mr. P. Nichols, Superintendent of Terminals, Atlantic Coast Line Railroad Co., Port Tampa, Fla. Inasmuch as Mr. Nichols is unable to be with us, I will ask Mr. Bush to read his paper for him.

Safe Operation of Tugs

By P. NICHOLS

Superintendent of Terminals, Atlantic Coast Line Railroad Company,
Port Tampa, Fla.

There is no doubt of a greater diversity of conditions affecting operation of a tugboat than any other craft. Vessels of the same design differ in their handling; currents and piers in every port are unlike. A tug must work in close places and under various climatic conditions; as its name implies, it is a vessel especially designed for towing craft long or short distances in inland or outside waters, shifting vessels from one berth to another, frequently in crowded harbors and narrow channels; it has sometimes been referred to as a 'pinch hitter', a switch engine in port and a freight locomotive at sea; it is, after all, essentially a work boat, encountering many hazards and violent shocks.

During the past fifteen years we have witnessed rapid strides in aids to navigation and in the designs of all types of floating craft. It seems to me the first essential in operating a tugboat safely is that the navigating officer—Master—must know the practical side of the tugboat, and he must know his vessel and his crew, for he is the person from whom constructive criticism is expected.

Accidents have been the result of failure to maintain the vessel's boilers, its signal system and steering gear, and frequent inspections of this equipment have been known to rectify defects. We have learned that it is wise to watch the vessel's bilges in heavy seas, to keep them free of rags and other waste. Floor plates covered with oil or with tools or other obstructions are accident hazards. If the inspection tank of a vessel is not given close attention leakage from the heater coils in the fuel oil tanks will be carried back with condensed steam and allowed to come in contact with the boiler feed water, from which serious accidents have resulted. Screw valve bonnets in dark or out of the way places will give trouble if not frequently inspected, and we have found it is a safe practice in opening the screw bonnet valves to see that the bonnet does not move with the valve stem. We have found it pays to have mats in the engine and boiler rooms, on metal floors and gratings, to prevent members of the crew from slipping and falling in heavy seas or at the time of a violent shock. Rubber heeled shoes has been the contributing cause of many accidents to members of the crew traversing metal decks.

Alertness in giving clear signals and prompt acknowledgement has proven of prime importance and never have we known vulgarity or the use of intoxicants to be helpful in this or any other connection. The tug's lines are subjected to severe strains and are an important factor in safety to the crew and ship, and it pays in life and limb to stand clear of these lines when under stress and keep them properly coiled and in good condition when not in use; a seaman indulges in an unsafe

practice when he attempts to catch the knotted end of a heaving line. Members of the crew are safer in their quarters or at their posts while vessels are being docked or undocked, and none other should be allowed on board during operations.

We have found that fire and lifeboat drills held frequently and without notice bolster discipline and are important factors in the safe operation of our vessels; good housekeeping and prompt investigation of each accident are important; physical examinations of each member of the crew upon entering the service and at intervals thereafter make for efficiency and safety; first aid kits should be readily accessible and fire extinguishers should be kept in their proper places, while a system of educating the employee is materially enhanced if safety posters are neatly and promptly displayed in conspicuous places and at regular intervals. Frequent contacts between officials of the company, officers and men on board create enthusiasm and constitute a helpful promoter of safety.

In our attempt to permeate safety among our men we must have the whole-hearted support of our owners, a vigilant crew led by a master mariner, in sympathy with the common sense principles of safety. An officer's example bears fruit among the crew; hence, the wisdom of careful selection. We, of course, know a preventative is more to be desired than a cure, and to attain these ends we formed a terminal employees safety committee and numbered among its makeup are a Master and Chief Engineer from one of our tugs. Meetings are held at regular intervals and at convenient times when members of the crew, longshoremen and other terminal employees can attend.

The experiences of other operators are discussed and our own problems are thrashed out; the committee makes recommendations to the Terminal Superintendent who takes appropriate action and informs the committee at its next meeting. From these meetings we have learned that:

1. Information is valuable but does not prevent accidents unless followed out.
2. Safety permeates our organization from the top down and the day of swivel chair supervision has passed.
3. The Master of the tug must study and plan his work with the co-operation of his crew. A divided house is an accident breeder.
4. We have driven home the fact that by eliminating carelessness, assuming the proper attitude toward accident prevention and right thinking we can prevent accidents.

This is proven at the terminals I represent by not a single reportable accident in the past two and one-half years, during which period approximately 700,000 man-hours have accrued.

We have struck the keynote when we get the men to think and it can be done by the use of common sense methods and keeping everlastingly at it.

CHAIRMAN TODD: We will proceed to the next paper, by Mr. Robert F. Hand, vice-president and assistant general manager, Standard Shipping Co., New York City. In the absence of Mr. Hand, Mr. Heidorn will read the paper.

Posters "Sell" Safety

By ROBERT F. HAND

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

Webster's definition of the word "sell" shows it to have originated from Middle-English and Anglo-Saxon derivations meaning "to give" or "to deliver." Hence, although the ordinary sense of the word "sell" conveys a meaning of transferring property for a consideration, the last two generations have become accustomed to give the word a broader scope, designed in a colloquial sense to transfer ideas.

The question then arises "Can safety be sold?" In other words, Can the idea of saving himself from hurt, injury or loss be planted in a man's mind? And if so, What price safety?

An affirmative answer to the first question, I believe, is universally conceded. As to the second, the consideration is a combination of worthwhile rewards represented by health and happiness, freedom from pain, suffering and sorrow, for the workers and their families.

These statements being accepted, the next question to arise is, Can posters "sell" safety? Insofar as the present writer is concerned, there is only one answer: Positively yes!

How may we define a poster? Funk & Wagnalls' authority calls it an advertising sheet of considerable size, usually printed and often illustrated, with fairly large lettering so that when posted on a wall, etc., it may be easily read. Most of us have heard of the expression "so that he who runs may read."

This is an important function of a poster. It is not expected that this medium of publicity alone can impel employees to perform their duties with the exercise of utmost diligence, but it is most assuredly an aid to that end. It is an important aid, too, and no different, for example, from any one of the individual instruments, singly, which a captain uses in connection with the safe navigation of his ship. He would not rely, for instance, on his sounding machine alone to tell him whether he is on a safe course. The presence of that sounding machine on board, however, assists him to make a more accurate calculation of his position.

So it is with posters: they are an assistance. They tend to stimulate interest, and when safety is involved they keep the idea active; but they must be augmented by the enthusiastic cooperation of everyone in the company's management, from the highest official down. The opinion that posters can and do "sell" safety, I feel sure, is entertained by the majority of persons interested and engaged in the work of ridding industry of all dangers and hazards. It is most assuredly entertained by thousands of men and women in business today at the head of enterprises of every description who are expending tremendous sums of money annually to advertise their products and services.

Of course, it is also a fact, as John Wanamaker once said, that "advertising does not jerk, it pulls; it begins gently at first but the pull is steady. It increases day by day, year by year until it exerts an irresistible power." This includes poster advertising. Posters are an accredited medium of advertising. They attract; they impress. They must, however, be essentially correct in their wording and their illustrations. A marine safety poster, for example, would be ridiculed and, on this account, ineffective, if it were worded in the vernacular of the landsman or if its pictorial part embraced a subject nautically incorrect.

Posters make an appeal to the brain via the eyes; they convey a message which, it is believed by the majority of people, assists materially in giving momentum to the safety campaign. Humans learn much by rote, by a constant repetition of words, ideas, and pictures. The human instinct is aroused unconsciously by posters.

Socrates asserted that all persons prefer the right whenever they see it, and that all evil actions arise from ignorance. Safety posters show the right from the wrong and lead the way in respect of educating humans unconsciously.

Every normal individual is subject to the influence of suggestion. The idea of safety is suggested by the poster and the impulsiveness of human nature enforces the suggestion until the desired result follows. Safety then becomes a habit. All minds are constantly subjected to influences of which we have no conscious realization and we are led to form opinions and judgments oftentimes without knowing it. Posters have a connection with this theory.

The writer is of the opinion that most people believe in the resultfulness of posters. This paper, therefore, will interest those people only in a passing measure, perhaps, or confirm the convictions which they have already formed in their own minds. Still it may also present to them some new reason for believing in the efficacy of posters;

in their value as "sales" agents, or in the diametrically opposite situation in their power as "buying" agents; and in their influence on their readers to take greater heed, to work more safely.

There are still a few people who do not agree that safety posters carry any weight. They consider them a waste of money, simply something which is stuck up on the walls with results negligible. If those maintaining these views are right, then the millions who are contrary-minded must be wrong—which reminds me of the song composed during the World War days, "They were all out of step but Jim!"

It is up to those of us who believe wholeheartedly in the poster's "punch", to convince those who wholly disbelieve, and to enlighten those who now have only a "lukewarm" confidence in the poster medium. All of us unquestionably are familiar with such slogans as "It's Toasted", "Keep that Schoolgirl Complexion", and "Time to Re-Tire", and we immediately link them up, respectively, to a well-known brand of cigaret, soap, and automobile tire. Why? Merely because these slogans which have been adopted by the manufacturers of such commodities, have been repeatedly published in various sized posters, car-cards and similar media for disseminating information, thereby becoming impressed on our minds.

Is it not self-evident, therefore, that posters had a great deal to do with the memorization of these slogans? Is it not also true that the remembrance that they advertised these articles may be attributed in a large measure to the poster medium? Posters, then, do help in increasing orders for articles on sale. In other words, they do create a desire to comply with their messages. Why then, if the posters are effective in this respect can it not be assumed that they are effective in transferring ideas relative to safe practices to the minds of the workmen? My colleagues and I are convinced that they are!

HENRY J. HEIDORN (Assistant Chief of Personnel, Standard Shipping Co., New York City): I believe Mr. Hand chose this subject for his paper because he had received letters during the year from people in the Marine Section who believe posters are not necessary in cutting down accident frequency. This paper was written to refute that idea.

L. J. LYNN (Safety Engineer, Newport News Shipping and Dry Dock Co., Newport News, Va.): I have some new photographs for posters which I will submit to the poster committee today.

CAPT. THOS. W. SHERIDAN (President Alumni Association, New York Nautical School, New York City): I am very much interested in posters, and I am a profound believer in their use, but I wonder if any efforts have been made to prove their value by figures?

MR. LYNN: I don't believe you could get any specific figures on the amount of good that posters will do. Nevertheless, we know our men read our posters and we know that our accidents have decreased considerably.

DARNEY L. SMITH (Claims and Insurance Director, Export Steamship Corporation, New York City): I can vouch for Mr. Lynn's statements. I have been through the shipbuilding yard. With respect to Capt. Sheridan's remark; I don't believe it is possible to get any actual percentages, but I must say we recently adopted a plan of supplying each vessel as it set out on each particular voyage with a definite number of posters, and we are told that the masters and officers and crew all get interested in them. Since we have been doing that there has been a gratifying decrease in the number of accidents on the ships. There is no doubt that posters do have a great effect in cutting down accidents.

E. H. JEWETT (Manager, Safety Department, United States Protection and Indemnity Agency, Inc., New York City): I think posters are one of the keenest and sharpest tools we have in our accident reduction work. I wonder if anyone knows of an effective safety campaign in which posters were not used at all.

CAPT. SHERIDAN: I am profoundly of the opinion that posters are a necessary and valuable aid, and I am satisfied that the answers given this morning prove that point.

J. C. BERND (Sinclair Refining Co., East Chicago, Ind.): We used posters for several years, and then for one year we didn't get the necessary funds to buy posters. The foremen eventually asked for posters. They thought that with new machines, and new ways of doing things, and the health question, they should have the posters, because posters help them to explain things which in ordinary times they didn't have time to do. Our experience has been that posters used throughout the plant, whether old ones or new ones, will give the right thought to the men. We need posters, and I think we get better results by having them than by doing without.

MR. HEIDORN: The poster medium is never used alone in cutting down the accident frequency rate. If it were, you could probably get some very tangible figures and facts, but with the variable conditions surrounding each plant or ship, you can't get definite comparisons.

CHAIRMAN TODE: Posters are intangible; you can't measure their value in dollars and cents. But we must remember that advertising pays, and with posters we are merely advertising safety. Consciously or unconsciously the people who see the posters, day after day, week after week, will absorb some of that information.

The next paper will be delivered by Mr. E. H. Jewett, manager of the Safety Department of the United States Protection and Indemnity Agency, Inc., New York City.

The Man Higher Up—His Attitude

By E. H. JEWETT

Manager Safety Department, United States Protection and Indemnity Agency, Inc., New York City

Who is he? The president, the vice-president in charge of operations, the general manager? Is he three different men, or three men in one? It matters not. Somewhere in the upper strata of executives there is some one man who, by the sheer force of ability, title or position, is known and recognized as the one "Big Boss." His word is law. His orders are obeyed. His decisions are final.

How and where do we, safety men, safety engineers, or safety anything else, fit into his orbit? Do we register well with him, or are we just some of his many employees?

This is rather a blunt and direct way of bringing this problem before us, but not when we consider its importance to us in our work, and the fact that an honest realization of our exact niche in the scheme of things has a direct bearing on the success or failure of our efforts. The attitude of the Big Boss is a common one with all of us. Is he with us and standing solidly behind us? If so, all is well and our efforts will truthfully reflect our ability and earnestness of purpose. If not, what is our responsibility in the matter? Shall we complacently say "Well, we've done our best", shrug our shoulders, and let it go at that? Or shall we prepare ourselves with proper data and helpful information—and so armed, sell our work so effectively that our own Big Boss has no alternative but to get behind us.

In the December, 1929, issue of the *California Safety News*, there is an article "Placing Accident Responsibility", in which George F. Prussing, safety engineer, Union Oil Company of California, very forcefully presents his views. His pen is so nimble that I am well content to quote freely from it.

"The assignment of responsibility for safety that we find in so many organizations today is evidently the result of growth or accident, and not of design. A peculiar condition exists, and I am sure that most safety men are aware of the fact that it is on themselves that nearly the entire burden of responsibility is allowed to rest. They are supposed to be, and in fact usually are, the leaven that lightens the lump. On the one hand they must stimulate the owner or his representative to take suf-

ficient interest to supply funds for educational safety work and for making working conditions safe; and on the other they must sell safety to every subordinate of the owner or manager, down to the last man on the job. That situation is so common that most safety engineers have got used to it and are not impressed with the fact that it is illogical, inefficient, and contrary to recognized practice in every other part of corporation science.

"There are in organized industry three distinct functional groups, and their logical interest in freedom from accidents arises out of different points of view. First there is the owner group, to whom accidents can spell merely waste and reduction in profits. This group does not have physical accidents, seldom sees accidents, and its interest can and must be stimulated by emphasis on the fact, which few yet realize, that accidents are avoidable and that safety pays them profits in dollars.

"The second group is labor, the man at work, who must ever, because of his needs, place his job above all other considerations, even those of personal safety. It is to this group that accidents occur; members of this group feel the pain and stand the privations that come from industrial injuries. Yet their situation is such that they can do little for themselves unaided. They do not regulate their working conditions; they are subject to the direction of others.

"The third group is the management group, the hired men of industry who direct labor, but who themselves have little or no contingent interest in profits. It is to this group that the safety engineer belongs. And it is a curious fact that within this group you find today the greatest interest in safety. Whether it was assigned to the members of this group or not, the fact remains that it is the management group, with personally nothing to gain from a reduction or personal injuries in industry, which has assumed leadership in this greatest of humanitarian movements.

"Such is my analysis of the situation as we find it today, and I for one would not take from management one bit of the glory that comes from unselfish effort. But having established this point of view I should like to point out that, in their zeal, safety engineers sometimes misdirect their efforts. They are apt to spend too much time selling safety to the workman or foreman before the owner has been convinced of his opportunity.

"The final responsibility for accidents in industry can logically lie only with the men who have the power to stop them. This means the owners, boards of directors of corporations, and others in a position to say what working conditions shall be. It is the owner who hires and fires, who holds the purse strings, who says what shall be done and how.

"Because we live in a democracy we must move slowly in legislative matters. Public safety is difficult of accomplishment; but in industry, safety men should see that their efforts must first be directed toward the man at the top, until he is personally interested in reducing accidents. Why waste time trying to sell to the workman in an organization what the owner or employer can rightfully demand? If the safety engineer will but convince and interest the man on top, the man down the line will come to him to help himself hold his job. The foreman on the job is used to following instructions, and in turn his attitude is the attitude of the men under him. When safety is made part of the workman's regular responsibility to the man who can hire and fire him, the success of the safety movement will be assured."

Now, fellow safety men, unless my memory serves me falsely, it was just such a frank statement of facts, forcefully presented to a certain Big Boss by an embryonic safety man some forty years ago, that gave birth to an idea which germinated and grew into the greatest of all humanitarian movements, now known as the National Safety Council.

If such strength of character was and is necessary in land industries, where our work has had a chance to demonstrate its effectiveness, how much stouter must be our hearts and our determination to succeed in marine industries, which, by com-

parison, are mere infants, to say nothing of the greater multiplicity and magnitude of marine hazards.

Many safeguards which a landsman would demand for his protection before ever starting to work would be scorned and deemed unseamanlike if even suggested for adoption aboard ship. Many traditions of the sea are in themselves hazardous—much more so than any land traditions with which I am familiar. Consequently, I trust you will pardon any personal satisfaction I may have had when recently, I reread an article I wrote several years ago for the *Marine Review*. I checked up on the results obtained, and can draw many parallels. They exist today just as then, but I am thankful to say they are looked upon in an entirely different light by the "Man Higher Up."

I wrote under the caption of "Reduce Accidents by Common Sense Methods."

"You are bound to have about so many accidents, no matter what you do. Accidents have to happen every so often." These words express an attitude toward systematic efforts to reduce accidents, which has been expressed time and time again. There has been a tendency in each basic industry to believe that their industry is 'different'; that safety educational work 'may be all right for some industries, but it can't get very far in ours'. This attitude has been particularly persistent in the shipping industry, due, perhaps, to the conditions peculiar to that industry. A ship is delayed and arrives only to have to sail on time. This means that the cargo must be discharged and the new cargo loaded in double time order. The very nature of the work is such that every man must depend upon his own carefulness for the prevention of accidents.

"The workers themselves come and go, drift from one pier or ship to another, and it is common knowledge that they are floaters. This condition has made organized safety work look practically impossible to executives in the shipping industry.

"As a matter of fact, there has been a reluctance to engage upon any very comprehensive program of accident reduction, because it was felt that nothing of any importance in the way of results could be accomplished, and that therefore it would be better not to start a project that could not be carried to a successful conclusion. It was felt that any attempt to install an accident reduction program would cut down efficiency and that less tonnage would be handled if the dangers of the job were emphasized in the minds of the men. If a ship had to be discharged under pressure of making ready to sail at a certain time, there was a conviction that it would be inconsistent to ask the men to 'make it snappy' and at the same time caution them to be careful."

In the face of these apparently insurmountable obstacles, certain executives felt that a start should be made and at the end of that year they found much human suffering had been prevented, one hundred thousand dollars saved, and the ships were being discharged and loaded with a time saving of from one to one and a half hours per ship per voyage.

Notwithstanding this change of attitude on the part of many marine executives, there are still many reactionaries, doubting Thomases, and supposedly big men who either do not know, do not realize, or do not appreciate the tremendous drain upon their company's treasury, needlessly caused by financial redress demanded for personal injuries to their employees.

An analysis of the financial costs for personal injuries, cargo loss and damage, and miscellaneous costs, covering collisions, ship and pier damages, discloses that the actual financial wastage or drain for personal injuries is greater than cargo losses and considerably greater than miscellaneous costs.

This analysis is made from the figures covering the largest marine activity in our country. With such an outstanding situation confronting us, it is not clear to those of the Marine Section of the National Safety Council, charged specifically with the reduction of personal injuries, that our effectiveness can be increased only by seeking a change in the attitude of our superior operating executives.

Robert F. Hand, vice-president of the Standard Shipping Company, very aptly emphasizes this point in a paper which he presented recently in Washington at the 3rd National Conference of the Merchant Marine, entitled "Safety of Marine Workers."

In discussing the necessity for educational safety aids, in the form of bulletin boards, posters, safety committees, etc., Mr. Hand makes the following significant statement: "But all of these will bear absolutely no fruit unless the employee himself, and every one in the company's management, realizes that safety is indispensable. We must not look upon safety as being unnecessary, or, as many probably still think, 'a necessary evil'."

Gentlemen of the Marine Section, here are some of our problems. What is our attitude toward them? Whom must we sell first on safety, before we can make any real headway? Here are some actual happenings, not products of the imagination.

1. Through misinterpretation of signals on docking, a ship went full speed ahead instead of astern. She rammed the dock causing about \$18,000 damage. The vice-president in charge of operations dropped all his other work to investigate the accident. It took three days of his time and also three days of the officers of the ship's time. The result of the investigation was that four of the officers were discharged. In a similar ship, a fireman stepped under a ventilator in the fireroom. The ventilator reach rod handle was frozen and sticking out at right angles to the reach rod. Someone on the boat deck turned the cowl of the ventilator thereby causing the handle of the reach rod to swing around and strike the fireman in the face with the result that one of his eyes was gouged out. The first intimation of this accident was a summons and complaint served by the injured man's attorneys. When a letter was written requesting details, the officials of the company had no knowledge of the accident. A verdict of \$20,000 was awarded in this suit. None of the company's officials considered the case serious enough to warrant an investigation such as was made in the case of the \$18,000 dock damage, yet the cost was greater.

2. In heaving up anchor, the ship loses it because of the cable breaking. The end of the chain whipped across the fore-castle head breaking a seaman's leg. The case was settled for \$1,200. The anchor was worth about \$600. There was an investigation made to ascertain the reason for the loss of the anchor, but no specific investigation to ascertain the cause of the breaking of the man's leg. How much more important is the loss of \$600 for an anchor as compared with the loss of \$1200 paid to the man whose leg was broken?

3. Upon the arrival of a vessel in port the chief engineer turns in his log abstract showing a saving of 100 barrels of fuel oil over the previous similar voyage. He is very proud of this record and is complimented by the company officials for saving approximately \$100. During the same voyage a floor plate was removed for repairs. No guard of any kind was placed around the hole, nor was any light placed so as to call attention to the removed plate. The dockey man, in the course of his regular duties, stepped into the opening and fractured his leg. He was awarded \$750 for the injury. The accident report read "nobody was careless and nobody to blame. Just an accident". The chief engineer who was so anxious to report the \$100 saving in fuel did not recognize his responsibility for the \$750 loss on the same voyage because of an injury to one of his men. Nor was this phase of the situation brought to his attention by the company officials.

4. Part of a cargo of flour was damaged by taint. The flour was appraised and \$300 awarded for the damage. In the same ship, after the cargo had been discharged, a stevedore, going into the empty hold, falls and breaks his back because of a broken hand grab on the hatch coaming. The injured man received \$1800 and it was considered a cheap settlement for a serious injury. No time spent on investigation and broken hand grab not even put on ship's repair list.

Saving at the spigot and losing at the bung-hold. All due to habit, custom and being in a rut.

Just as the crew reflect the attitude of the bosun, the bosun the mate, the mate the Master, so in turn does the Master reflect the attitude of his port captain, the port captain the general manager, the general manager the vice-president in charge of operations.

I believe this to be a true picture of the situation, and until we safety men secure the cooperation of our general managers and vice-presidents in charge of operations, by having them realize that a thousand dollar check to pay for a human damage is just as much of a drain on their treasury as a thousand dollar check for cargo or property damage, we cannot feel that we are masters of the situation. We may reach first base with the help of the Goddess of Good Luck, but we will never make a Babe Ruth home run.

CHAIRMAN TODE: I desire to take this opportunity to introduce Mr. Nichols, and to thank him for his paper, which was read earlier in this session.

MR. NICHOLS: I am delighted to be here and glad that you have delivered my address. I think, as Mr. Jewett said, we must investigate every accident promptly, and determine and eliminate its cause. We investigate our accidents and keep records of them. There is no man of the 500 or 600 who have worked for us, of whom we don't know the age, something of his past, and what he has done in our service. I think we find it very much worth-while. We owe it to our fellowmen to make working conditions safe. For ten years we have been trying to teach them to work safely, and I think we are now in a position to demand safe operations.

CHAIRMAN TODE: The last paper of the day has been prepared by Mr. Wm. S. Wollner, General Safety, Fire Prevention and Welfare Agent, Northwestern Pacific Railroad Co., and Southern Pacific Golden Gate Ferries, Ltd., San Francisco. Mr. Wollner, from the Pacific Coast, advises us that he is unable to be present, and his paper will be read by Mr. Dabney Smith of the Export Line.

Accident Prevention in Operation of Ferry Boats

By WILLIAM S. WOLLNER

General Safety, Fire Prevention and Welfare Agent, Northwestern Pacific Railroad Company, San Francisco

Safety is not a tradition of the sea! To the contrary, sea tradition deals with the dangers and hazards of navigation. It tells of startling and courageous deeds which had their foundation in anything but safe practices. It was perhaps because of these very hazards, cheerfully invited and bravely faced, that the venturesome, carefree, devil-may-care sailor became typical of those who sailed the seven seas. Those who undertook to place "Safety First" alongside of, or perhaps ahead of, "women and children first" as the sea tradition, are entitled to the undying gratitude of those who "go down to the sea in ships," either as a profession or on the passenger list.

Because it has to do with inland waters, generally speaking always within sight of land, the safety of ferry travel may seem an insignificant part of the general topic of marine safety. But measured by the number of persons exposed to hazard and the number of vessels confined to limited lanes of travel, the safety of this phase of marine endeavor is far from unimportant. Likewise, the almost unbelievable safety with which such a large number of persons and enormous value of property have been transported in ferry service should be an inspiration to the marine operator in other fields.

During a single year, 1929, nearly fifty-eight million passengers were transported across San Francisco Bay, and, in addition to this, five and one-half million automobiles were carried across this bay on ferry vessels, while thousands of tons of

freight were moved on car floats and barges. Add to these figures for a single port similar traffic in other ports and on inland water-ways, and a fair conception will be gained of the relationship of ferry traffic to the general subject of marine safety.

The United States Steamboat Inspection Service has control of ferry traffic similar to that exercised over other forms of marine transportation. As a matter of fact, the United States Steamboat Inspection Service has a closer control of ferry traffic because it is almost constantly under the eye of the bureau's inspectors. It is needless to mention how effectively the government steamboat inspectors function. While the service may at times seem bureaucratic and even autocratic, it errs always on the side of safety. This is important as, before the modern conception of safety invaded the marine field, many operators limited their accident prevention activities to the actual requirements and orders of the bureau, and it is possible that even today some operators continue this practice. Because the regulations and procedure of the United States Steamboat Inspection Service are so well understood by this group, their functions and activities will not be further commented upon in this presentation. An additional reason for this is that a proper conception of accident prevention in the marine field takes the federal regulations as a minimum requirement and starts to build safety from the point where they leave off.

Safety Fundamentals

Safety in the operation of passenger, vehicle and other ferries depends upon the same fundamental consideration as does safety in any other field. Stated briefly, these fundamentals are:

- 1—Correct design and proper construction of units with prime consideration to the avoidance of accidents and the minimizing of results if an accident should occur.
- 2—Carefully planned operating practices in which safety must not be sacrificed or even infringed upon for speed, economy or other considerations.
- 3—Careful selection of personnel followed by thorough training so as to assure personnel safety as well as the prevention of injury to patrons and others.
- 4—Frequent and thorough inspection to determine that plant and personnel are in accordance with the foregoing and that no changes that create hazards have been made.
- 5—While stated last, the most important fundamental consideration is that every person who has anything whatsoever to do with ferry operation be thoroughly imbued with the spirit of safety.

Design and Construction

The inception of design is not too early to build safety into vessels and other plants, and everything that will help to prevent accidents should be included in the construction program. Without mature consideration, it might be assumed that this advice is not needed in the present state of the art. But that this assumption is incorrect is demonstrated by incidents that indicate that even today mistakes in design or judgment sometimes creep into the marine architect's plans. What makes these mistakes even more serious is that frequently their presence is not known until a more or less serious accident occurs.

Tripping and falling cause by far the largest number of accidents that occur in ferry operation, and especial attention should be given to the design of passageways, ramps and stairways so as to make them as nearly accident proof as possible. While some changes might be necessary, the National Safety Council's safe practice pamphlets on stairways should be consulted by the designer, and modern non-slip metals should be freely used instead of wood or metals that are not inherently slip-proof.

Wherever layout permits, terminals should be so designed as to give straight-away passages for both passengers and vehicles and where turns are necessary they should be built with the longest possible radii. Where loading and unloading of vessels is simultaneous, care should be exercised to see that the exits are as far as possible removed from the entrances to vessels and that there is no need of either on or beyond the terminal for lines of traffic to cross or converge. As terminal facilities are usually built over the water, it is especially important that railings be so designed and constructed as to make it impossible for passengers, especially children, to fall overboard. A survey of your respective properties today would probably reveal many unthought of places where children might fall into the water. The fact that none have done so is no guarantee that some precocious or adventurous child will not wander from its parents and fall through an unprotected space.

At some such places considerable ingenuity is needed to eliminate the hazard, but it is questionable whether there is any place that cannot be adequately safeguarded. As an instance of what may be done in this direction, it was found that in the type of folding bridges used for upper deck gangways to ferries on San Francisco Bay, when the apron was lowered there was a space between its railing and that of the bridge that a good-sized child might fall through. It was quite a problem to design a guard but one was finally applied that consisted of several one-fourth by one-inch iron bars attached to the railing of the bridge that fitted through slots in the apron when it was folded to the vertical position. This is merely an illustration of how simple it is to guard against most hazards when the right solution has been found.

Walkways and ladders for crew use should be given as much careful thought as stairways and runways for passengers and vehicles. During the early part of the century, a class of ferry boat was designed with inclined horizontal engines. The oiler's runway ran around the end of the connecting rod and was protected with a toe board and railing about thirty inches high. This seemed sufficient until an oiler, who for some reason leaned over the railing, was instantly killed when he was struck by the pin in the end of the connecting rod. Recurrence of similar accidents was guarded against by surrounding the connecting rod pit with woven wire mesh, making it impossible for anyone to be struck.

In the design and construction of vessel appliances and parts that are difficult to reach for inspection, and the failure of which might be even the remote cause of accident, should be given special attention. The failure of a heater pipe in an oil storage tank illustrates this point. This failure permitted water to accumulate in the tank and it found its way into the feed pipes of the four Diesel engines which were the prime movers of the vessel's power plant. The engines stopped and the ferry drifted perilously close to the jagged face of an island. Fortunately, it was a calm moonlit night and the tug, which responded to the disabled ferry's distress signals, got a line aboard before it struck the island.

Because it is not the most pleasant job for one unaccustomed to it to climb down engine room and fire room ladders and to poke into crew quarters and other under-deck spaces, these places are frequently neglected by the industrial safety engineer or inspector. But it is in just such places where accident breeders and foci of spontaneous ignition exist. Because they are constantly working with fire, men in the fire pit and engine rooms frequently fail to recognize ignition hazards and permit them to exist without realizing how a very small fire may endanger the entire vessel and its occupants.

It is not possible in a paper such as this to recite in detail the things that must be guarded against in order to insure the safety of ferry vessels; but, insofar as possible, it should be emphasized that planning for safety should begin with the planning of the vessel and that accident prevention be as important a considera-

tion as speed, economy of operation, or the other things that the designer and builder always keep before them.

Carefully Planned Operating Practices

It is hoped that the day of overcrowded excursion vessels is gone. I am certain this is so in the part of the country from which I come. Unusual speed is not common in ferry operation but there does exist the laudible desire to maintain vessels on published schedules. This is especially true where there are competitive lines but it is not necessary to say to this audience that the maintenance of schedules must never be stressed where hazard of accident is thus involved.

On San Francisco Bay, we have fog at times, but I am pleased to be able to state that all of the companies operating ferries have co-operated to the utmost in fog schedules and, as a matter of fact, in everything else having to do with the safety of passengers. There is not much more than can be said under this heading.

Careful Selection and Training of Personnel

Too much stress cannot be placed on the careful selection and training of personnel, and personnel as used here includes everyone connected with ferry operation from the president or managing director to and including the most humble worker. The supervising force must be composed of men of a type who along with other desirables truly realize that safety is first, last and all the time of fundamental importance.

Requirements for crew officers positions, and in fact all crew jobs, should be carefully considered and standard job specifications prepared. The necessity for this is shown in the matter of masters or captains. Without due consideration it might be thought that the "old salt" who had been master of sea going or coast-wise vessels would be the ideal selection for the captaincy of a ferry boat; but this is not always true. Men who have worked their way up on bay ferries from deckhand to captain seem to acquire a specialized knowledge that is far more valuable than that acquired at sea. Men with long experience in a particular locality can in foggy weather identify vessels by the tone of their whistles; know the eccentricities of masters and pilots of other vessels, and have a better all-around knowledge of ferry service.

Deckhands on ferry boats have a multitude of duties to perform and these have a wide range of service. However, they have no more important duty than that immediately connected with the vessel's navigation and this should be borne in mind when vacancies are being filled. The fact that deckhands and deck officers may, without a moment's notice, be called upon in emergencies must not be lost sight of. It has been the experience in some places that a particular type of man giving consideration to age, family status, nativity, etc., is especially fitted to ferry deck service. If you have not done so, it will be well worth while to study your deck crews and, as already suggested, create a job specification to be used when employing men. Similarly, a survey will indicate that men with certain types of experiences can be most successfully used in the engine room and fire pit. Even greater care in the selection of engine forces is now made necessary through the use of Diesel engines, steam turbines and electric drives in ferry service. While men who have had experience only on walking-beam engines can, if they are sufficiently versatile and ambitious, prepare themselves to qualify on Diesel and turbines, a far more active individual and one with a far wider scope of knowledge is needed in the engine room of modern vessels.

Thorough training is as important as careful selection of personnel. This refers not only to life boat drills and what might be considered the crew's maritime duties but also to the direction of the movements and conduct of passengers and vehicles.

The mass transportation of motor vehicles has brought an entirely new transportation problem to ferries. The ones we first think of are: The prevention of smoking; the prompt stopping of engines as soon as vehicles are in place and not starting them again until conditions are right for them to leave vessel, etc. But actual experience has shown that there are some things of apparently minor importance which cause most of the property damage and injury. One of these is the opening of vehicle doors while other machines are moving on and off boats. Members of crews should be trained to politely but emphatically insist upon the observance of no smoking regulations, the unnecessary running of engines, the keeping of vehicle doors closed while other vehicles are moving, etc.

Realizing that when all is said and done deck forces are employed primarily for other purposes and that they may not have the ability to call attention to common infractions of the safety rules such as smoking, running of vehicle engines, etc., without giving offense to patrons, it has been found an excellent practice to have cards, on which is printed the reason for asking compliance with safety regulations, that deckhands can hand to violators. A matter of extreme importance is the training of deck crews in clearly indicating when machines are to stop and move and where they are to go. The motorist is easily confused and this is aggravated if more persons than one are giving signals. On the San Diego-Coronado ferry, the man directing the placing of machines holds red signal flags in his hands so as to emphasize his directions. On Southern Pacific Golden Gate Ferries we have discovered that persons driving from the bright light do not easily distinguish signals given by men on the boats and we are going to equip them with white armlets which will accentuate their motions.

There are many other reasons why personnel should be selected with the greatest of care and why it should be thoroughly trained for efficient service after its engagement; but there is no better reason than the fact that while equipment, material, etc., are extremely important features of marine safety, there is no more important factor than the men who man the ships and work on the terminals.

Frequent and Thorough Inspection

Familiarity breeds contempt. As this is true of other things so it is with the breeder of accident and fire. A hazardous condition is created as a matter of expediency and it is planned to correct it when practicable. The longer the hazard exists, provided it does not cause an accident, the less its potentialities are realized. The man who is in constant contact with the hazard soon forgets its presence. While frequent and regular inspection should be demanded of those in charge of vessels or other property units, there should be superimposed inspections under the direction of higher authorities or by an engineer trained in accident and fire prevention. Because of his lack of daily contact with it, he will discover the hazard that the local inspector overlooks. Incidentally, as one who devotes his entire, or greater part of, time to inspection work, he has developed a sixth sense in discovering the weak links in the safety chain. Unincumbered by the responsibility for the obtaining of economic results and clothed with an authority which permits him to be super-critical; with a knowledge of what is being done elsewhere to eliminate hazards, the safety inspector brings to the job an attitude of mind that not only leads to the discovery and correction of accident and fire breeders but also tends to imbue the officers and employees with whom he comes in contact with the safety idea. For this reason, frequent, thorough inspection by trained men is imperative. But this should in no way weaken the responsibility for the man immediately in charge being constantly on the lookout for the discovery of hazards.

The prevention of accidents on land or at sea, on the great trans-Atlantic liner, or on the small craft plying land-locked waters, depends upon one thing more than all others combined; that is, the sincere wholehearted desire to avoid accidental

injury. If in any organization every man willed the prevention of accidents only the absolutely non-preventable ones would occur. This may seem a radical declaration but if you will visualize such an organization you will realize that it might easily be fact. If the executive officer said that accidents must not occur, that money, trouble and brains must not be spared in the discovery of hazards and their obliteration; if the technical staff built safety into every job and was constantly alert for the discovery of safer equipment and appliances; if those responsible for operation placed accident prevention ahead of all other things and insisted that their subordinates be made to account for any infraction of the safety code in the same manner that they must account for the infraction of any other rule; if the theory and the belief that most accidents are preventable and that to be hurt as the result of one's carelessness or neglect is a disgrace, would be made the constant thought of every worker—there would be but few, if any, avoidable accidents.

In case someone might remark that industry is conducted for profit, let me repeat what has so often been said and so frequently proved: with increased safety, operating costs are lessened.

This paper opened with the statement that safety is not a tradition of the sea. Let us establish safety as the principal item in the sea-faring man's code of ethics and whether it is on the broad Pacific or on the waters of an inland harbor; let us convince the old salt, the master of a vessel and his officers, and the company's executives that safety is worth while for its own sake and that it adds to the prestige as well as the operating efficiency of a vessel and its owners; teach every man from the chairman of the board to the deckhand and fireman that safety is something to brag about and it will not be long before accidents are reduced to a minimum.

ADJOURNMENT

Wednesday Afternoon Session October 1, 1930

ARTHUR M. TODE, Chairman
The Texas Company, New York City

The second session of the Marine Section convened at two o'clock, Chairman Tode presiding.

CHAIRMAN TODE: Before proceeding with our program I will read a communication which I received today from Mr. D. J. Murphy of Murphy, Cook & Co., Stevedores, Philadelphia:

My dear Arthur:

I regret my inability to attend the National Safety Council Convention to be held in Pittsburgh.

It is regrettable from different angles, because I would have enjoyed being with you, and secondly I had some important things to take up before the Convention.

At a Meeting held this morning, between the Stevedoring and Steamship interests of the Port of Philadelphia, and the Representatives of the I.L.A., it was my privilege to frankly state, without mixing words, that if some action was not taken by the I.L.A., to eliminate from their Membership, men having infectious and contagious diseases, I would be forced to take the matter up with the State and the National Health Bureaus, to force some action.

We are of the opinion—for humanity's sake, and for the sake of all concerned, working in the Stevedoring interests, that some action should be taken by the National Safety Council, to force all Unions to have their men, before being admitted to Membership, pass a Physical examination, to conclusively prove that such Memberships are comprised of men, who are physically fit to perform their duties.

We have had accidents during this last year, and paid compensation to our men for quite a period, and upon a thorough investigation from Hospitals and X-rays, we have learned to our sorrow that many of these men have infectious diseases; this we can substantiate by the Medical statements from Hospitals, etc., where the men were treated for such diseases, prior to having been injured with us.

As this is a serious matter, and one which commands immediate attention for the safety of the co-employees of such men, we commend, and commend strongly, to the National Safety Council this problem for some action.

Yours very truly,

(Signed) D. J. MURPHY.

CAPT. W. P. KAIN (Shipowners Claims Bureau, New York City): I move this be referred to incoming officials for action.

(The motion was seconded and carried.)

CHAIRMAN TODE: The first paper of the day will be delivered by Mr. R. E. Hall, Director of the Hall Laboratories, Inc., Pittsburgh.

Safe Operation of High Pressure Water Boilers at Sea

By R. E. HALL
Director, Hall Laboratories, Inc., Pittsburgh, Pa.

The many factors that must obtain simultaneously to insure safe operation of a boiler, whether in marine or in a land steam generating plant, may be divided into two classes; namely, those external, and those internal to the boiler proper and its accessories. If there is to be safety, certainty and continuity of operation, no factor of the latter class requires more careful and diligent attention than maintenance

between the containing metal and the water or steam of hose contacting relations that will assure no deterioration of the metal itself or its rate of heat transfer. To this factor, namely, *water conditioning*, the present discussion is directed.

The General Problem of Water Conditioning.

The general problem of water conditioning; namely, maintenance in the water contacting the metal of those conditions that will insure prevention of scale formation, corrosion, unsatisfactory boiling conditions, and metal cracking, is identical for land or sea-going boilers.

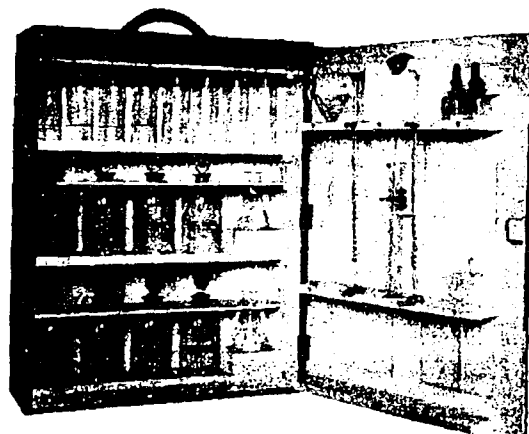


Figure 1

The keynote in boiler-water conditioning is to establish and maintain in the boiler water a desirable concentration of conditioning chemicals. Routine tests at satisfactory intervals serve notice as to amount of chemicals to use to maintain the desired condition. The chemicals maintained in the boiler water are the actively engaged line of front defense against scale, corrosion, foaming and metal cracking; the routine tests on the boiler water are the roll call to determine the number of casualties since the preceding test; and any change in rate of addition of chemicals is merely the pro-rating of reinforcements to maintain the front line at full fighting strength. Thus any change in make-up water or in rate of condenser leakage becomes apparent at once because when the test is made it indicates change in amount of conditioning chemicals required; but since, by change in amount of chemicals, the strength of the front line defense is maintained unimpaired, cleanliness of evaporative surfaces and protection thereof from corrosion or cracking are attained continuously and indefinitely, and turbinizing becomes a relic of past experience.

Thus boiler-water conditioning becomes an exact art, as definite and certain as the art of navigating the ship.

Because it is exact, boiler-water conditioning is marked by simplicity. Two chemicals suffice, namely, one of the sodium phosphates, to prevent formation of scale; and caustic soda, or less preferably, soda ash, to obtain proper adjustment of the boiler-water alkalinity, and thus protect against corrosion, foaming and boiler-metal cracking. These conditioning chemicals are standard heavy chemicals; they are purchased in pure form on the open market at the market price.

One invariable rule suffices in their use, namely: maintain in the boiler-water the minimum of both phosphate, and alkalinity, that will suffice for their respective purposes. This is no rule of mere economy; it is vital to safety of the boiler plant and of those associated therewith or neighboring thereto.

More than the minimum of either the phosphate or alkalinity, and especially the latter, is helpful in inaugurating or accelerating foaming or wet steam conditions.

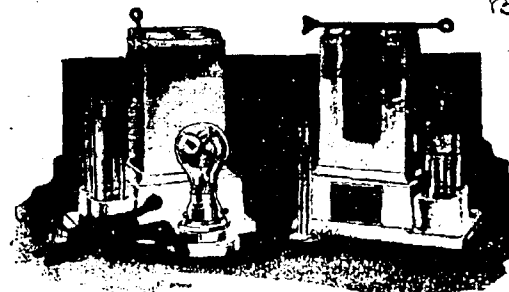


Figure 2

However, from the standpoint of safety of all concerned, limitation of the boiler-water alkalinity to its minimum is of even greater significance. Alkalinity is the Dr. Jekyll and Mr. Hyde of boiler-water conditioning. In extremely low concentration, it is protective to the boiler metal; but used under uncontrolled conditions, it becomes the most insidious of enemies to the integrity of the boiler metal. In conjunction with the heavy varying stresses inherent in the boiler and with carelessly controlled usage, it may develop especially in the seams weakness of metal that caught in time, cost replacement of equipment only; but that, if unchecked, may end in the disaster of explosion with attendant property damage and irremediable loss of life.

Thus success and safety in water conditioning demand use of only pure chemicals of known composition, and result primarily from continuous maintenance of essential concentrations thereof in the boiler-water. Investigational work, carried on by the author and his associates for almost nine years now, has defined the requisite concentrations of the above specified chemicals to maintain in the boiler-water, and has developed simple routine tests whereby the boiler operator can assure himself of such maintenance at all times. Responsibility for clean surfaces and safe boilers finally rests with the operator, because it is his duty to compass the maintenance at all times of the requisite conditions. However, he is a master of his own destiny

because whether he takes on water in New York or San Francisco, or whether he has a tenth per cent or ten-fold that amount of condenser leakage, he has a definite condition to maintain in the boiler-water, and definite chemicals with which to produce the condition. Amount of chemicals that he must use will vary largely, according to conditions, but his tests signify the amount to use and are as certain guides in charting his course through various changes as his compass in charting the course of his ship.

Control of the Boiler-Water

We have emphasized the necessity for exactness in controlling the boiler-water conditions. We will now outline briefly the methods that make this exactness a simple matter for the operators of the boilers.

A sample of boiler-water is drawn from blowdown line, water column blowdown, or other point that assures a sample which is representative of the circulating boiler-water. The higher the operating pressure, the more essential it is that the sample under pressure pass through a cooling coil, to avoid change because of flashing of steam.

A part of the sample, cooled to room temperature, is titrated with standard acid to determine its *alkalinity*. The burette and the standard acid for titrating constitute merely a yardstick for measuring alkalinity, and the measurement is as simply made as a measurement of length with an actual yardstick.

To another portion of the sample from which any sludge has been removed by filtering, appropriate ingredients are added, and if *phosphate* is present the water turns blue. The amount of phosphate is determined by matching this blue color with the appropriate member of a series of standard blue-shades, whereupon the concentration of phosphate in the boiler-water is known.

To a third portion of the boiler-water sample with sludge removed, ingredients are added which render it milky in character if *sulphate* is present. The amount of sulphate is found by determining the degree of milkiness and this is simply done by finding how much the solution must be diluted to allow light to pass through it.

Figure 1 illustrates the necessary equipment for determining alkalinity and phosphate; Figure 2 that for determining sulphate.

The readings as taken are set down on record sheets for the purpose. These sheets should be retained as a permanent record, that will serve as a history of boiler-water conditions maintained in case any development in the boiler should require reference thereto.

If the operator is one of our clients, he has before him a curve showing what phosphate and alkalinity ought to be present in the boiler-water for the concentration of sulphate he has found. The curve of Figure 3 is typical. If the phosphate is low, he increases, and if high, he decreases, the amount he is feeding to the boiler water. Likewise, if the alkalinity is low or high, he varies the amount of caustic soda appropriately.

In this simple manner, the operator has complete control over maintenance of desirable conditions of phosphate and alkalinity in the boiler-water.

We emphasize again that the boiler-water alkalinity be maintained at the lowest value compatible with protection from corrosion. With desaturation of feed water as complete as possible, and under the very best conditions of boiler-water, our recommendations would be to maintain from 2 to 5 grains per gallon of caustic alkalinity in the boiler-water; under ordinary conditions, from 4 to 8 grains; but if chloride concentration is relatively high, then the concentration of caustic alkalinity must be higher somewhat in proportion. At the higher operating pressures which are characteristic of the newer boats, the essential concentration of caustic alkalinity for high chloride concentration would be greater still; but the better answer in this

case—in all cases, in fact—is to decrease condenser leakage, thus reducing the chloride concentration in preference to increasing that of caustic alkalinity.

Statements are made at times, that the presence of organic matter in the boiler-water offsets the effect of caustic alkalinity in promoting boiler-metal cracking or embrittlement. As a matter of fact, organic matter, colloidal or otherwise, has no recognized standing as a preventive of this type of boiler-metal deterioration. Furthermore, it should have no recognition, for degradation of organic bodies into divers substances is accelerated by increase of operating pressure (*i. e.*, temperature) and placing dependence thereon for safety is equivalent to building foundations on shifting sands.

On the other hand, certain ratios of sodium sulphate to total alkalinity in the boiler-water are recommended by the A. S. M. E. Boiler Code for protection from

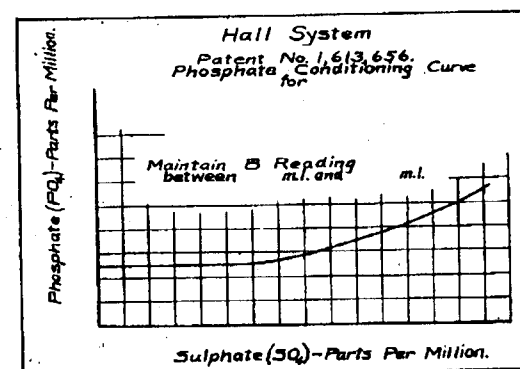


Figure 3

the caustic type of boiler-metal cracking. These range from one for operating pressures of 150 lbs. or under, to three or over for pressures above 250 lbs.

Key to simplicity in maintenance of these ratios is low, carefully controlled alkalinity in the boiler-water. In the ratio—

$$\frac{\text{sodium sulphate}}{\text{boiler-water alkalinity}}$$

we may obtain desired quotient either by making the numerator (sodium sulphate) large, or by making the denominator (boiler-water alkalinity) small. In our own work, we choose the latter alternative as inestimably the better practice since it represents greater safety to the boiler, better quality of steam, and greater economy of operation. It is uneconomical to be careless in control of boiler-water alkalinities, and then attempt to overcome the ills thereof by adding excessive amounts of sodium sulphate to the boiler-water. Expense of the sodium sulphate may be negligible; but outages of boiler due to superheater failure or turbine trouble caused by carry-over of boiler-water in the steam are too costly to tolerate if avoidable.

Examples of Application of Boiler-Water Conditioning

We will illustrate the foregoing general statements by their application to specific conditions under which success has been obtained, and is being obtained at the present moment. We may take as example, for instance, the largest boiler in the world, which has already delivered 1,650,000 pounds of steam per hour at 400-lb. pressure. Make-up water, about 3 per cent in quantity, is New York City water. Cooling water for condensers is the salt water from the East River, so that conditions are approximately the same as those pertaining to ocean-going ships. The city water make-up is a good quality for boiler-feed purposes, but any condenser leakage is high in scale-forming bodies, and a trouble-maker unless properly cared for.

The chemical used for conditioning the water to prevent scale formation is sodium phosphate. The chemical for adjusting properly the alkalinity in the boiler-water, and thus protect against corrosion, is caustic soda.

These two chemicals are purchased in pure form on the open market at the market prices.

In order that they may be added to the feed water most simply, and within reasonable limits, in proportion to the feed water, they are dissolved in a tank of water (both in the same tank) and allowed to flow by gravity into the feed water through an orifice of appropriate size.

The "Phosphate Conditioning Curve" which has been supplied in connection with our work, specifies the requisite phosphate- and alkalinity-concentration for the boiler-water.

Let us consider just what this maintenance of phosphate means. Phosphate combines with calcium to form calcium phosphate, which is insoluble, and an extremely finely-divided substance, so that as it forms it remains in circulation in the boiler-water, and is removed when the boiler is blown down. We know, of course, that some calcium is present in the make-up water, and as this arrives in the boiler each atom of calcium becomes joined to phosphate, whereby its possibility of forming scale is immediately removed. Some calcium comes also from condenser leakage, but as it arrives at the boiler, its fate is similar to that of the calcium from the make-up water, it is joined to phosphate, and therefore cannot form scale. So long, therefore, as the phosphate maintained in the solution in the boiler-water, serves as a reception committee to meet each incoming calcium atom, and combines with it, scale in theory cannot, and in practice, does not form.

When he starts use of this system the boiler operator does not know how much phosphate to dissolve in his tanks. But he dissolves a few pounds and starts it flowing into the feed water. At the end of several hours, or a day, perhaps, he draws a sample of boiler-water, and tests it as described above, to find if he has any phosphate therein to serve as his reception committee for calcium atoms. Let us suppose that he finds none. He therefore increases the charge to his tank a few pounds, and again tests after a few hours. He may or may not find phosphate in the boiler water. If he does not, he increases his charge again, and keeps up this procedure until the phosphate is present in desired amount in the boiler water, and he knows that every entering calcium atom is met by phosphate as it enters the boiler and is disposed of.

Consider the case in which with phosphate being maintained in the boiler-water and everything going smoothly, suddenly the test on the boiler-water shows no phosphate present. That can mean only one thing; namely, that some condenser tube has started leaking, and a new and greater supply of calcium is getting to the boiler. Is it necessary that the operator let scale form? Not at all. He immediately increases the rate of flow of phosphate chemical, tests again in an hour or so, and keeps on increasing the chemical until it is again present in the boiler water. Thus, whether the leak is mended quickly or not, the boiler surfaces do not suffer, being

just as thoroughly protected by use of more chemical, as they were before the leak developed, when less chemical was used.

Or consider the case of a vessel going from New York to San Francisco by way of the Canal, and having to take on water for boiler feed at the Canal and at San Francisco. The change from New York water to the water taken at the Canal or San Francisco occasions no trouble, for the operator guided by his tests on the boiler-water changes the amount of chemical he feeds to the boiler sufficiently to maintain the phosphate reception committee for calcium atoms, whatever the feed water he is using. Hence no calcium atom can penetrate his defenses to deposit scale.

If these simple methods of preventing scale formation are correct, why should any scale formation be permitted to occur in a boiler? The answer is perfectly definite: there is no need whatever for scale formation, and that holds true whether the operating pressure is 200 or 2,000 pounds. In fact, cleanliness is apt to be more readily attained in high-pressure than in low-pressure boilers, because with the greater responsibility of high-pressure operation, the operator is more careful to maintain the essential conditions in the boiler-water. A boiler of one of our clients, using phosphate conditioning, and operating at high rating at 400-pound pressure, with close to 100 per cent make-up of untreated water, was inspected recently after evaporating one billion, five hundred million pounds of water with no turbing, and without turbing at this inspection, was declared in perfect condition. While the application of these simple methods to marine boilers is in its infancy, uniformly excellent results have been obtained at pressures from 100 to 300 pounds, operating pressures.

It is the author's good fortune to cooperate in the water conditioning of boilers ranging from 90 to 1,450 pounds, operating pressure, and operating at ratings of 75 to 700 or 800 per cent. There is no doubt that many of the operators as they start using these simple methods, requiring only simple, pure chemicals, are incredulous of their success. For generations, they have pinned their faith in boiler compounds, and have become bitter skeptics because the florid pictures painted in none too scrupulous sales propaganda of the compound peddler have failed to materialize for them in the cold reality of their own particular conditions. Honest in their efforts, they have not known how to better conditions. It is natural that they should be "doubting Thomases," and adopt the "show me" attitude of Missouri.

But let three months drift by, during which the operator—a conscientious fellow in practically all cases—has learned to call the roll of the boiler-water phosphate molecules every day, and to adjust his use of chemical to the varying amounts required to maintain his defenses intact. During this time he has come gradually to know exactly what is going on in the boiler-water, exactly what he must do if his boiler, when opened, is to be found clean. He has learned the great lesson that success in preventing scale, comes not from miraculous properties of a chemical, but from his own conscientious, well-directed efforts. He has learned that change of make-up water from that of New York to that of San Pedro presents no difficulties to him, because his check-up each day on his boiler water tells him exactly what to do to prevent trouble, whatever the source of the feed water. He has confidence in himself, and he gets results. Some of the happiest experiences I have are in my cooperation with men who are most skeptical in the beginning; for they are justly enthusiastic when they find that certainty of cleanliness of their evaporative surfaces resides in their own well-directed efforts, and not in any fabulous concoctions they might introduce into the boiler-water.

High-Pressure Marine Boilers

Many marine boilers have been operated in the years heretofore with little more than exposure to some sort of water treatment. Some have carried on with soda

ash as treatment. The Navy Compound, resulting from the able work of Commander Lyon, has been widely used. Compounds of vile smell and evil appearance have held sway to some extent. In later years, a prevalent mode has been colloidal treatments. But mark you, the din of the scale-removing turbine or hammer has resounded from the boiler rooms of the vessels lying in port; condemned tubes and cracked seams and plates have given employment to the repair forces.

Some years ago in the land plants, similar chaotic conditions existed quite generally. The old low-pressure boiler plant could run along with its many small boilers with indifferent attention. What did it matter if one or two boilers were off the line with blown tubes or for turbinizing or other repair? Why spend money on careful water conditioning when it was possible to avoid it?

The urge for greater efficiency in the boiler plant has revolutionized the situation. Economy lies in fewer but larger units—higher and still higher operating pressures—higher and still higher ratings. Realization of the possible economies in these modern installations demands minimum of boiler outage. Hence, it has happened that their sponsors have given careful heed to exactitude in water conditioning, and have thereby obtained results to the limit of their desires. The careful testing of the boiler-waters, and the maintenance therein of satisfactory conditions by the use of simple, pure substances are as much a part in the routine of operating these plants as is the control of fuel and air entering the combustion chamber.

The economies inherent in higher pressures and ratings are obtainable in the marine as in the land steam generating station, and the marked movement thereto characteristic of the land plants during the past decade is rapidly developing likewise in the marine field. For instance, the Shipping Board has announced fifty-two new ships authorized under the Jones-White legislation, all to be equipped with high-pressure, water-tubular boilers. The higher pressures spell the doom of return-tubular boilers. In the first three months of 1930, sales of marine boilers by 81 manufacturers were as follows: Scotch type, 19,873 square feet. Water-tubular, 197,922 square feet. B. & W. boilers alone in merchant ships now exceed ten million square feet. The Dixie, operating at 350-pound pressure, is generally considered the pioneer high-pressure installation in this country, but will soon be considered of moderate operating pressure in view of the 400-pound, 500-pound or even higher operating pressures in the offing.

From the economic standpoint, there is every reason that the new boilers should be of high operating pressure. Fear of the problems engendered should be dissipated by accumulating uniformly favorable experience therewith. As an example, the accomplishment of one of the large engineering organizations of this country may be noted: a year and a month ago, ground had not been broken for construction of the plant in which today large sinuous-header type, cross-drum boilers are operating at 670-pound pressure and high rating, using as feed water, softened Mississippi River water undiluted by condensate, and protecting the evaporative surfaces from deterioration by careful maintenance of requisite phosphate and minimum alkalinity concentrations in the boiler water.

For the higher operating pressures in the marine field, it is germane to this discussion to answer the question whether evaporation is an absolute essential for the small per cent of make-up water, in view of the accomplishments of exact water conditioning. The example just cited illustrates that careful conditioning of the boiler-water removes any cause for worry regarding deposition of scale on the boiler surfaces. We have already referred to a boiler—with practically 100 per cent make-up, 400 pounds operating pressure, and solely dependent for its water conditioning on the maintenance of proper phosphate-alkalinity concentrations in the boiler-water—which after evaporating a billion and a half pounds of water is declared in perfect condition. At the Kips Bay Station the huge boilers each evaporating well-nigh half a million pounds of New York City water per hour maintain cleanli-

ness of surfaces in similar manner. In view of these precedents, and the small per cent of raw water make-up characteristic of marine boilers, we may conclude as follows: wherever the heat-balance is such that installation of evaporators is economic, they should be installed. Also, the advantage of as high per cent of condensate return as possible is apparent. But on the other hand, these are not indispensable adjuncts to that cleanliness of surfaces essential for uninterrupted continuity of operation, and the engineer designing a plant need not necessarily sacrifice other desirable features or go to uneconomic costs, in order to include them, but may exercise his best judgement for greatest utility and economy.

Evaporation of make-up water is an aid to water conditioning, but cannot supplant it. At higher pressures especially, exact maintenance and limitation of boiler-water alkalinity is essential. Also, condenser leakage, and carry-over of evaporator are sources of calcium that, disregarded, readily bring unhappy consequences to evaporative surfaces. Safety of all boilers, regardless of pre-boiler arrangements and operating pressure, demand the careful maintenance in the boiler-water of those conditions known to render it innocuous to the metal surfaces.

Other Features of Exact Water Conditioning

One of the differences in boiler water conditioning on sea and land consists in the greater difficulty that the marine operator may experience in making the necessary tests on the boiler-water. On land there is little difference whether a blizzard or the calm of a summer's day prevails. It has been necessary, for marine work, to so devise testing apparatus that it will be easily usable whatever divergence of angle from its normal position the ship may assume. In Figure 1 you will note all solutions and equipment have been clamped in place, and will remain so, no matter how rough a sea is running.

Another difference is found in character of condenser leakage. Again the marine plant gets the worst of it. For instance, on the basis of calcium, a 1 per cent leakage of sea water (East River Water) is equivalent to 38 per cent of Detroit City Water; on the basis of chloride, to 2,071 per cent of Detroit Water. These large differences serve to emphasize the care that the marine operator must exercise at all times to maintain satisfactory conditions in the boiler-water.

In specifying for water conditioning simple pure chemicals that are purchased on the open market, we hurdle another difficulty. Sometimes, we are told, the quality of results reported from use of a compound is more in proportion to the personal predilections or gain of the operator, than to the actual condition of the evaporative surfaces. Such practice cannot be tolerated, if the boilers are to be maintained safe from deterioration by scale, corrosion, or metal cracking. We have shown however, that successful exact water conditioning at all operating pressures, and under the most diverse conditions, is attained by the use of standard heavy chemicals, and by the careful attention of the operator to the maintenance of requisite conditions in the boiler-water. With the element of empiricism thus removed, the chief engineer need accept no alibis for poor condition of boilers. He sees to it that the conditioning chemicals are supplied to the operator. If the latter maintains conditions properly, the boilers remain clean; if he is at fault in maintenance, his records, as well as the boilers, will show it. If, perchance, his records should look good, but the boilers look bad, the chief engineer is justified in crediting the operator with carelessness or worse, and in taking appropriate measures to eliminate any such anomalous conditions.

We have discussed briefly some of the major factors that comprise Boiler-Water Conditioning. Success lies in right choice of simple chemicals, and careful application thereof to the boiler-water in accordance with tests made thereon. Under these conditions, Boiler-water conditioning becomes an exact art, and does not recognize any difficulties in increased operating pressure, or in varying types of

make-up water, whether these be from New York or Hong Kong. The boiler operator, guided with certainty by his test on the boiler water for phosphate and alkalinity, is master at all times of the condition of his boilers; reference to the record of conditions maintained in the boiler water, will notify him at once of their condition, without their being opened for inspection.

In fine, the reward for carefully and continuously maintaining properly chosen conditions in the boiler-water is relegation to the scrap heap of guesswork, uncertainty, and worry over the condition of the boiler surfaces, and the assurance of safety and certainty of operation.

HENRY S. GLENN (Engineer, Mass. Bonding and Ins. Co., Boston): Did you ever consider the Edgemore boiler that the Boston Edison Company operates at 1,200 pounds pressure at Weymouth?

MR. HALL: Yes. They had trouble at the start, but two years ago they switched over and I think that now they can open that boiler up and find the surfaces clean.

Yesterday I was in a boiler operated at 600 pounds pressure at Tyrone; the West Virginia Pulp & Paper Co. That is a Springfield boiler operating with a 60% mixture of alkalinity control on the water and phosphate to prevent formation of scale.

CHAIRMAN TOOE: We will proceed with the reading of the next paper. It is by Mr. W. L. Bull, Asst. to Vice President, Eastern Steamship Lines, Inc., New York City. In Mr. Bull's absence, Mr. Charles H. Flathers will read the paper.

Safe Handling of Cargo Through Side Ports

By W. L. BULL

Assistant to Vice-President, Eastern Steamship Lines, Inc., New York City

The subject assigned to this paper is likely to prove misleading in the light of what is to follow. It is the writer's understanding that we are to deal, not with the safe handling of cargo, but with safety measures to be observed for the prevention of accidents to workers employed in the handling of cargo through side ports.

The hazards of accidents resulting in personal injury are unquestionably much greater in the handling of general cargo to and from side-port vessels than in a straight overall operation. It is not difficult to understand this when it is realized that side-port work necessitates the rigging of a more extensive variety of gear and the use of a wider assortment of terminal equipment than does the overall operation. In addition to this, in the overall operation, aside from the fixed number of men assigned to work in each hatch for the stowing or breaking out of cargo, and who are usually selected because of their ability and familiarity with the requirements of the job, none of the other laborers have occasion to enter cargo compartments, but perform their work on dock levels or on lighter decks, whereas in side-port work, where a more nondescript variety of unskilled labor is employed, increasing the risk of accidents, all of the laborers, with the exception of the comparatively few men loading or tiering cargo on docks or lighters, are obliged to enter the steamer and perform their duties, oftentimes, in confined and congested spaces, while the surfaces over which the truckers haul their loads are rarely level except on docks.

The manner of rigging a side-port vessel for work depends to a large degree upon tidal conditions. At those ports where there is any considerable rise and fall of tide, docks are usually equipped with adjustable bridges or ramps which are lowered or raised by chain gears and counterweights and ordinarily the vessel is breasted off the dock from fifteen to twenty feet by means of a pontoon. When preparing for the rigging of the skid or trucking plank between the dock and ship's port, care should be taken to adjust the bridge or ramp at such level as will result in a minimum incline and as tidal conditions change, further adjustments should be made to meet the demands of safety for a trucking surface as level as possible.

While various methods are employed for the placing of trucking planks or skids into position, we have found that because of their size and weight the least hazardous method is to swing them into position by means of a block secured to a ringbolt or pad eye on ship's side, in some instances the hoisting being performed by man power, but usually by leading the fall to winch located either on the dock or on the vessel. As in the case of all gear used in stevedoring operations, careful examination should be made to make certain equipment is in safe working condition; that snatch blocks, where used, are properly secured and that where the fall is led any considerable distance from the skid all persons not directly employed in the operation are warned to stand clear. To shorten the drop from the ship end of the trucking plank to the deck and to lessen the likelihood of tripping, it is desirable that the surface of the plank come flush with the port sill, which ordinarily is some ten or twelve inches in height. Broad flat hooks about eight inches in depth and countersunk in the surface of the plank for a distance of about thirty inches from the end, serve this purpose admirably. The securing of the plank at both the ship and shore ends must have careful attention. Rope lashings led from ringbolts on the outside of the sides of the plank at both ends are carried on the ship end to cleats located at either side of the port inside the deck and on the dock end to cleats placed on each side of the bridge, so located as to prevent men tripping over the lashings as they approach or leave the plank.

With the trucking plank in position, the brows are now placed at either end. Innumerable accidents have been caused and much damage to cargo has resulted through carelessness in the placing of brows and through failure to keep them in proper position as the surging of the plank causes them to shift. Where space in the 'tween deck permits, the brow leading from the port sill to the deck should extend fairly well in to avoid too sharp a drop as a sudden jar might cause a trucker hauling a heavy load to suddenly release his hold on the truck handles, probably resulting in an accident to fellow workmen. It is necessary, too, that this brow be secured hard against the sill, so that between the end of the plank and the brow there will be no wide gap in which truck wheels might be caught as they pass over. The best arrangement for the shore end is a brow hinged to the trucking plank so that it can be thrown over onto the plank when not in use. At certain stages of the tide it may be necessary to lead up to this brow with iron plates and when these are used, they should be watched as they are easily jarred out of place by trucks passing over them. It is a mistake to attempt to keep these plates in position by nails or spikes, as too often they cause men to stumble and painful injuries are apt to result.

The sides of planks should be approximately ten inches high and above these should be rigged either wooden or rope net savealls, at least four feet high, extending from the shipside to the dock shed to protect workmen who stumble or are accidentally shoved, as well as to prevent the loss overboard of packages which might fall or be knocked off trucks. Rope net savealls are preferable because their flexibility permits of their quick adjustment as they become displaced.

Where ramps or bridges are equipped with escalators to assist the movement of trucks on steep skids, or where portable escalators are to be used, this machinery should be tried out and found to be in proper working order before the commencement of the operation.

At low tide, when the plank is on a downward grade from the dock to the ship, and particularly where the incline is such as to require truckers to duck their heads as they enter the port, a bumper should be hung across the top of the port so that if a head should strike, the blow will be softened. A simple but satisfactory bumper may be fashioned from a piece of scantling slightly longer than the width of the port, serving as a stiffener and packed well around with excelsior and covered with canvas or burlap. Lanyards are fastened on the protruding ends to hang the bumper from the deck above.

In stormy weather, when the trucking plank is wet, it should be thoroughly sanded

prior to the commencement of the operation and kept sanded during the operation to prevent slipping, and a canopy should be rigged between shipside and pier shed for the protection of workers and cargo.

Having rigged the trucking plank, we now enter the steamer to prepare for the operation. The majority of steamers operated today in the larger coastwise lines are combination freight and passenger vessels with but one overall hatch located forward and serving the No. 1 Hold, the remaining holds being served by so-called "Blind Hatches"; that is, hatches which open on the Main or Upper 'Tween Deck and are not carried to topside. Ordinarily, these vessels have, in addition to the lower hold, an upper and lower 'tween deck, while some have an additional 'tween deck forward usually referred to as the Main Deck. The largest proportion of cargo is handled through the ports serving the Upper 'Tween Deck and from that deck cargo is struck below to the Lower 'Tween Deck and Lower Hold. Whether the "Blind Hatches" referred to are served by elevators or by cranes is dependent largely on the requirements of the trade in which the vessel is operating. Where large lots of lumber and other rough bulk commodities are carried, cranes are employed, but for straight general cargo work elevators operated either by steam or electricity are becoming more generally used.

One of the principal requisites for safe work and the prevention of accidents is adequate lighting. Since the hatches are not carried to topside and the only natural light is limited to that which comes through the port openings, artificial lighting must be depended upon and because of the number of obstructions and openings in a steamer's deck, such as stanchions, manhole covers, hatches (and in coal-burners, bunker hold covers) the lighting system should be designed to clearly reveal these hazards. Where cluster lights are used they should be so placed that they will not throw a glare into the eyes of truckers as they enter the compartment and possibly blind them to some obstruction which may be located between them and the light.

In preparing hatches for the operation covers should be removed only from those hatches which will be worked and the covers, which are made in sections, should be stacked neatly in the wings and well out of the path of truckers. All elevators should be brought to the deck level and those not to be used should be kept there. At hatches served by cranes it is advisable to hang rope hand-holds from the beam directly over or near the coaming for the hatch tender to hang on to when he leans over the hatch to catch the signals from below and lifelines should be rigged across the openings through which cargo will not be handled. Where a hatch is located directly opposite, or in very close proximity, to the port through which the operation will be carried on, and especially if there is a steep, down-grade skid entering that port, the side of the hatch nearest the port should be roped off and cargo should be handled from the opposite side.

Steel decks do not afford the best trucking surface under the most favorable conditions and when wet the trucker's hardship is increased. The judicious use of sand will greatly assist in the prevention of accidents.

After a careful inspection of all winches, falls, blocks, slings, etc., everything is in readiness for the operation, and while time will not permit of the following out of the complete operations of both discharging and loading, certain suggestions are made in the interest of safety and accident prevention.

Trucking on cargo planks deserves careful supervision. It is advisable to require all truckers to pull and not push hand trucks. When trucking down an incline with a load, a pushing trucker is likely to lose control of his truck and crash into the man ahead who, if he also be pushing, will undoubtedly be injured by the blade of the runaway truck or possibly by the freight on the truck.

Where escalators are not employed on skids to ease trucks down or assist them up, a sufficient number of men should be assigned for this purpose and truckers should be taught when going downgrade with a load to swing the truck partially sidewise to engage the right wheel on the side of the trucking plank to serve as

a brake. On exceptionally steep grades the trucker should swing his truck as he approaches the plank, allowing one of the skid men to insert a wooden lever under the truck axle and ease the load down in this manner. Under these conditions not more than one truck should be allowed on the skid at one time. If escalators are in use, operators should be cautioned to regulate speed to keep it within reasonable limits. This warning is timely when the downgrade leads to the ship so that the trucker with a heavy load will not leave the escalator with a too great momentum as he enters the port and strikes the steel deck.

When trucking heavy packages from a hatch, trucker should swing the truck parallel with the hatch coaming for loading so that when "breaking" the truck over there will be no danger of the truck slipping from under and falling down the hatch with its load.

When trucking cargo to a hatch the truck should be swung parallel with the hatch coaming before dumping up to avoid the possibility of dumping package down the open hatch.

As the discharging of cargo progresses, dunnage should be picked up and racked in the battens as soon as it is cleared and not be scattered around the deck where it obstructs truckers and is apt to cause accidents.

Men trucking to and on elevators to go below should not attempt to get on or off elevators while in motion or after signal to start has been given by hatch tender.

Longshoremen breaking out cargo stowed in 'tween decks adjacent to open hatches, should be careful to work away from the hatch and never with their backs to the hatch when breaking down heavy cases from upper tiers. Fatal accidents have resulted from carelessness in this regard.

Although nothing up to now has been said of offshore work, it is a fact that a large proportion of cargo handled on side-port vessels is worked to and from lighters and obviously such work should be surrounded with equally as effective safety measures as apply to the balance of the operation, the same general principles being followed as are observed in the handling of cargo to and from piers.

It will probably have been remarked that this paper has so far dealt with an almost entirely manual operation. This has been intentional, to enable us the better to study the problem with a maximum of the human element involved. Although it is true that by far the greatest proportion of all general cargoes is as yet handled on sideport vessels by means of the lowly hand truck, more and more companies are year by year turning to mechanical methods and great strides are being made in the use of tractor-trailer equipment, lift trucks, conveyors and other labor-saving devices.

Where this class of equipment is employed, careful examination and inspection for the determination of its proper working condition before the commencement of an operation is, of course, essential and a few of the precautions to be observed in the course of the work will be set forth.

Although expediency may at times demand it, the working of tractor-trailer equipment through the same port in which a hand trucking operation is being conducted is inadvisable. Such a combination, aside from increasing the risk of accidents to truckers, will usually be found to impair the actual efficiency of the one method of operation or the other. If the cargo compartment is sufficiently large and other conditions permit, the conduct of a handtruck operation from offshore and the working of tractors and trailers from inshore can usually be carried on without much conflict.

Where reasonably steep inclines are to be traversed by tractors with trailers in tow, care should be taken to see that the coupling of trailers is properly performed and tractor drivers warned to proceed at reduced speed over brows and port sills to avoid the dislodging of coupling hooks causing trailers to run amuck and probably resulting in injuries to workmen or in damage to cargo. The use of automatic couplings, designed to prevent just such contingencies, is recommended.

At the time of placing trailers in position for loading or unloading in the cargo

compartment, the front or swivel wheels should be securely chocked. The use of old rope has been found best suited to accomplish this.

Where automatic lift trucks are employed, the skids they carry should not be loaded in such manner as to obstruct the view of the operator, particularly when he is to negotiate a fairly steep plank to enter the steamer.

In the use of mechanical conveyors for the carrying of cargo between pier and steamer, operators should be cautioned to regulate speed to a degree which will enable the removal of packages by workmen without risk or accident.

Rules providing for the safe operation of tractors and trailers, escalators, conveyors and other mechanical equipment and against "horseplay" should be rigidly enforced.

In stevedoring work, as in all other branches of industry, the degree of success attained in the prevention of accidents is largely dependent upon careful forethought in the planning of an operation and upon intelligent supervision and direction while the work is in progress.

CHAIRMAN TODE: The next paper was prepared by Mr. Byron O. Pickard, Safety Engineer in Charge, Accident Prevention Department of the Pacific American Steamship Association, San Francisco. He regrets exceedingly that he is unable to be present today to deliver his paper personally, but his pinch hitter is Mr. Frank C. Gregory, Safety Engineer, United States Employees Compensation Commission, Washington, D. C.

Marine Accident Causations

By **BYRON O. PICKARD**

Safety Engineer in Charge, Accident Prevention Department, Pacific Coast Shipowners' and Waterfront Employers' Association, San Francisco

This paper will bring before you a discussion of the analytical studies made in my Department of 7,754 lost-time injuries to longshoremen on docks and ships employed in the Pacific Coast ports of San Francisco, Los Angeles, and Portland, and 1,899 lost-time injuries to seamen employed by the Pacific American merchant marine. This is the first time that this statistical information has been released and it is done now in the hope that it will be of service to the Marine Section members in their efforts to prevent accidents, and also, that I may be favored with suggestions and criticisms which will enable the department to better serve the marine industry.

In February, 1927, the Accident Prevention Department of the San Francisco shipowners' and waterfront employers' association began assembling and analyzing personal injury reports; a year later the waterfront employers in Los Angeles and San Diego harbors began to favor us with their experience; and in 1929 the waterfront employers in Portland and other Columbia River ports sent their reports to the Department's headquarters in San Francisco; and now in 1930, we are being favored with the experience of Seattle and other Washington ports. However, the 1930 experience will not be included in any details furnished here.

The program for prevention of accidents adopted by the Department is based on the assumption that there are only two reasons for accidents, viz., uncontrolled hazards and exposure to hazards. Theoretically, then, the elimination of one or the other will prevent all accidents; and reasonably controlling both, will eliminate such accidents as are not directly attributable to Acts of God and to that variable and uncontrollable trait of human beings known as "behavior." Given the power to absolutely control, or if you will, to mechanize human behavior, or even to be able to surround it with positive guards, the safety engineer would soon work himself

out of a job. But, while human behavior can be influenced to a large extent, it will never be entirely controlled, and consequently, industrial accidents will always be with us and safety engineers will have jobs in such industries as use manual labor.

Included in the uncontrolled "hazards" of our industry are mechanical defects; condition of materials; working conditions, practices or methods; habits indulged in and tolerated; attitude, aptitude, and physical condition of workmen; and what is most important, lack of preparation and organization for a job. "Exposure" may be considered as the length of time that a workman is exposed to the hazards and the length of time it takes for the law of averages (which is the gauge of the severity of a hazard) to catch up. One might speculate that "exposure" may also include the length of time it takes an industrial concern to organize for and to put into effect an intelligent safety program, which when done undoubtedly reduces the degree of any formerly serious hazard.

It should be made clear that I am not using the words "injury" and "accident" synonymously for I consider that an accident was the reason for the injury; that all injuries are the result of accidents and that many accidents do not result in injuries. I also consider that less than 2 per cent of all accidents are excusable by being Acts of God; that 98 per cent of all accidents resulting in injuries are predictable and the causes are so common that the word "accident" should be changed to "common mistakes" because accidents, as such, are no longer unforeseen or unexpected occurrences except probably to the particular employee involved. Not having data to the contrary, I frequently use the Travelers Insurance Company's factor "ten accidents to one injury", but as the number of injuries received in the hand-handling of materials (stevedoring is practically entirely hand-handling materials) is impressively large, the factor "ten" is really not needed to convince stevedoring employers and employees that injuries alone represent a sufficient measurable wastage of material, equipment, and human bodies to necessitate drastic preventive methods.

I persistently endeavor to force acceptance of the thought that every "man-made" accident (98 per cent of the total) is the result of a mistake made by a human being, and that the controlling of the mistake is entirely a problem of management. No one will deny that the person who actually prevents an injury is the one who is liable to injury, that is, the worker who is exposed to the hazards; but, he being under the influence and control of his employer is subjected to the hazards tolerated by his employer and to the rules imposed; consequently, he should not be held solely responsible for the non-prevention of any injury except the one he deliberately and intentionally inflicts on himself.

It may be roughly assumed that approximately 75 per cent of all industrial injuries could have been prevented by those injured if they had been properly trained, properly disciplined, physically fit and properly selected for the job—in other words, properly supervised; but physical conditions, such as lack of guards, defective equipment, poor lights, poor ventilation, poor sanitation, congestion, etc., account for a sufficient number of industrial injuries and accidents, and when corrected, so definitely create a state of safety-mindedness in the worker that, even though relatively unimportant as a basic cause of accidents, it behooves an employer to have all working places 100 per cent safe.

If it is agreed that accidents are common mistakes resulting from controllable tolerated hazards and exposures, then an accident prevention program definitely provides opportunities for and places responsibility upon the employer to intelligently organize, prepare, and do safely, every job, and above all, to provide a safe place of employment. It provides opportunities for and places responsibility upon the employee to work and to think in a safe manner, when so taught, and to comply with all the rules for safety laid down by his employer.

There are two reasons for making studies of accident causations; the first is to determine the faults or errors due to tolerated controllable hazards, the second,

to prove that the so-called "accidents" are so common and predictable that they can definitely be assigned as tolerated mistakes.

Accordingly, I determined in 1927, when I was placed in charge of the marine accident prevention work on the Pacific Coast, to pay little attention to the causes and costs of injuries, but to endeavor to determine within the limits of the information furnished on a report of injury, the primary cause of the accident which resulted in the personal injury, it being evident, as previously pointed out, that costly accidents do not always result in personal injuries and that major injuries, and frequently fatalities, result from accidents that were theretofore considered inconsequential, and that in order to prevent all personal injuries we must prevent accidents. It is known that there may be more than one cause of an accident. Accordingly, I use two separate classifications, viz., one called "primary" the other "contributory" causes and the statistician so analyzes each accident.

To illustrate what is meant by the foregoing: "a man is struck by a falling boom which dropped through the failure of a topping lift." The primary general cause of the accident according to the Department's classification is "falling object"; whereas, the principal contributory cause is "gear failure"; the failure may have been due to a poor or unsafe practice, to over-loading, to lack of inspection, etc.

To further illustrate: "a workman slips on the deck, and falls and has his fingers amputated in the gears of a winch." The injury cause would be "unguarded machinery", but according to the Department's policy, the Primary cause of the accident or that which if prevented in the first instance would not have resulted in an injury was really slipping and falling. Also if "a man is struck by a sling load and knocked into an open hatch", the accident would be charged as "moving object."

The Department has adopted for its primary general causes of accidents thirteen general causations, they are namely:—

1. Falls of persons.
2. Falling objects.
3. Moving objects not falling objects.
4. Flying objects.
5. Hand-handling objects.
6. Striking against objects not being handled.
7. Stepping on objects.
8. Hand tools.
9. Haulage.
10. Commercial traffic on docks.
11. Machinery.
12. Fire, hot, poisonous and corrosive substances.
13. Physical violence, illness, and occupational diseases.

Inconsistency in the foregoing classification may be discovered under "Haulage", but haulage accidents are segregated on account of the hazards peculiar to haulage.

Only such accidents as are due to operating, adjusting, cleaning, oiling, repairing, etc. of machines, are charged to "Machinery."

Under each of the thirteen general causations are from five to fifteen detail causations so arranged as to provide detailed information on such places or operations, or conditions, or equipment, or gear, as may be common to the industry. Accordingly, data relative to such gear as slings, strongbacks, hatch covers, booms, hatches, chutes, conveyors, jitneys and trucks, winches, etc., or to haulage, or stowage, or repairing or handling gear, etc., can be quickly assembled.

The classification for the secondary or contributory causes of the accident is based on what was actually responsible for the non-prevention of the accident—that is, the contributory cause is the principal reason for not preventing the occurrence. For example: "a workman stumbled over dunnage on the deck and fell into the gears of an unguarded winch"; the contributory cause in this instance was entirely supervisory, in that the foreman charged with supervision tolerated unsafe working

TABLE NO. I

General Causes of Accidents Resulting in Lost-Time Injuries to Pacific Coast Longshoremen

GENERAL CAUSES	NO. OF ACCIDENTS REPORTED				TOTALS No. of Accidents
	S. F. Bay 1927-1929, Inc.	L. A. Harbor 1928-1929, Inc.	Col. River 1929	Per Cent	
Hand-handling Objects	1,061	641	171	24	1,873
Falling Objects	1,048	549	176	23	1,773
Moving Objects	538	293	118	12	949
Falls of Persons	530	229	120	11	879
Haulage Equipment	476	337	61	11	874
Striking against Objects not Handled	322	171	69	8	562
Hand Tools	170	85	25	4	280
Flying Objects	117	85	8	3	210
Stepping on Objects	89	52	15	2	156
Fire, Hot, Poisonous or Corrosive Substances	46	47	12	1	105
Machinery	18	6	2	0.5	26
Commercial Traffic on Docks	17	1	3	0.5	21
Physical Violence, Illness or Occup. Diseases	7	2	0	—	9
Not Apparent from Report	26	11	0	—	37
Totals	4,465	2,509	780	100%	7,754

conditions and unsafe practices; if we consider the failure of a topping lift permitting the boom to fall, it is unquestionably a gear failure accident. The contributory causes are divided into three major headings, weather, gear (or mechanical) and supervisory. Under gear, there is listed gear failures and unguarded machinery. Under supervisory, there is listed (1) correctable working conditions, such as light, poor house-keeping, and congestion; (2) lack of organization; (3) tolerated unsafe practices, such as poor or over-loads, stowage, improper or poor tools or gear; (4) the violation of safety rules; (5) physical unfitness, etc.; and (6) the tolerated unsafe habits of workmen. Weather includes the so-called "Acts of God."

It was noticed that even the Department's statistician, in spite of instructions to base his opinion as to the contributory cause of the accident on "why was the accident not prevented", charged the major portion of the accidents under "tolerated unsafe habits of workman." This was quite natural in that practically all the reports received by the Department were the foreman's "alibi" as to the cause of the injury. It now has been thoroughly drilled into the office staff that to attribute the carelessness or drunkenness of a workman as the main contributory cause of an accident is to confess lack of capable supervision and that certainly such an abstract cause as carelessness suggests no concrete means of prevention. Back of tolerated carelessness, drunkenness and other unsafe habits, there usually lie signs of inefficiency within the company itself which commonly are the result of poor or lack of organization, unfit foremen, poor selection of personnel, poor housekeeping, lack of discipline and haphazard practices. It is well-known that less than 1 per cent of our workers intentionally get hurt and certainly only a few workers would willingly harm a fellow-man.

*Note: 55% of the accidents occurred in longshoremen working aboard ship.
45% occurred to longshoremen working on the docks.

It is with no thought of comparing the frequency rate in the three harbors that the table has been furnished, but rather with the idea of portraying a group picture of the Pacific Coast and proving that wherever stowage is done certain causes are outstanding in frequency.

The results of the group and separate individual company studies are released at quarterly intervals to the more than 100 company managements contributing to the Department. At the end of each calendar year, assemblies for the entire year are prepared and distributed to members.

It was recognized in the beginning that for comparative company and port purposes it would be necessary to have compensation to such accidents as resulted in the disablement of the injured man for one day or more following the date of the injury, as there is over present a variability in the reporting of injuries which did not result in disablement. Many companies do not see the necessity of making reports for injuries where, after the injured worker went to the doctor or hospital for treatment, he immediately returned to duty. Others report every injury regardless of severity.

The accompanying Table I is an assembly showing the results of a study of the Primary general causes of accidents resulting in lost-time injuries to longshoremen in the three principal harbors for the years 1927 to 1929, inclusive, it being remembered that San Francisco reported for the three years, Los Angeles reported for the years 1928 and 1929, and Columbia River only for the year 1929.

Referring to Table I: two principal causes account for nearly half (47 per cent to be exact) of the total number of accidents. They are "hand-handling" and "falling objects", with only 1 per cent difference between them. "Moving objects" is third and adds another 12 per cent; "falls of persons" is fourth, and "hauling" fifth, each slightly over 11 per cent of the total.

Five principal causes, therefore, over a three year period, account for four out of every five accidents resulting in lost-time injuries to longshoremen on the Pacific Coast. This is more or less consistently true in each of the three major ports and is so generally true, month after month, that accidents must be common-place and due to controllable conditions.

Some of the most frequent detail causes under each of the five most important principal causes are: For Hand-Handling one-third of the injuries were due to improper lifting; another third from getting caught between an object being handled and some fixed object; for Falling Objects, one-fourth were due to cargo falling out of the pile; one-eighth to cargo falling out of a sling load and one-half to miscellaneous falling objects; for Moving Objects, the greatest hazard (two-thirds of the total) is being struck by sling load or cargo hook. The exposure to this hazard is so great that the law of averages is continually exacting its toll. For Falls of Persons, three-fourths were due to the slipping, tripping and stumbling hazard—that is, to poor housekeeping, endeavoring to overcome Newton's "law of gravity" and to gradually improve upon the four-footed habits established by our monkey ancestors. For hauling, practically two-thirds of the injuries were due to getting struck by or caught between shifting loads or trailers or trucks, another third were due to being struck by or run over by jitneys, trucks or trailers.

Do not these causes indicate definite recognizable hazards and does not exposure to these hazards account for each of the injuries?

The twelve most important detail causations, the total of which caused more than three-fourths of all the reported lost-time injuries to Pacific Coast longshoremen, are:

- Struck by falling objects, not otherwise classified, 11 per cent of the total;
- Struck by moving hook or sling load 9 per cent;
- Slipping, falling and stumbling 8 per cent;
- Improper or overlifting 7 per cent;
- Striking or bumping against inanimate and stationary objects 7 per cent;
- Getting caught between objects being handled and a fixed object 7 per cent;
- Struck by shifting, moving, and falling loads on trucks, jitneys, etc. 7 per cent;
- Striking against sharp or rough objects while handling 5 per cent;
- Struck by cargo falling from piles 5 per cent;
- Struck by or run over by jitneys, trucks or trailers 4 per cent;

Struck by cargo falling from slings 4 per cent;

Struck by materials dropped while carrying 3 per cent of the total.

Each of the above detail causes accounted for from 250 to 840 injuries with a total of 6,000 out of the 7,734 being discussed.

Others of lesser importance, each, however, causing over 100 lost-time injuries in the three Ports, are falls of persons from piles; falling strongbacks and hatch covers; miscellaneous moving objects; miscellaneous rolling objects; caught in loop or bight, miscellaneous flying objects; poisoned or burned by materials handled and stepping on nails.

The 1929 accidents in the three ports seriously injured three executives, 10 general foremen, 18 gang leaders, 12 hatch tenders, 13 winch drivers, and 23 jitney drivers, the remainder being the rank and file longshoremen.

The parts of body affected are hands and feet, each about 25 per cent, legs 16 per cent, backs, arms and heads, each about 10 per cent, chest and trunk, together about 5 per cent, the hips and entire body received the remaining injuries. One-third of the longshoremen injured were between the ages of thirty and thirty-nine; 25 per cent were from forty to forty-nine years of age; men over fifty years of age received less than 10 per cent of the total number of injuries reported.

The *Contributory causes* study revealed the interesting detail that less than one and one-third per cent of all the longshoremen accidents were due to actual failure of gear; less than 1 per cent were due to unguarded machinery; 4 per cent were directly attributed to working conditions not under the control of the immediate gang boss; 60 per cent were due to tolerated unsafe habits and 25 per cent to tolerated unsafe practices.

I am asked frequently why I have not considered the comparative costs of the several causes of injuries—my answer is that my Department is primarily interested in prevention of accidents and, as pointed out previously, each accident is a potential fatality or permanent disability. The total cost over a given period is used as a measurement of progress; however, it has been found that as a prevention campaign progresses and workmen become compensation-minded, and operators become medical and hospital-minded, the average cost per injury increases until intelligent personnel programs with physical examinations, pensions, and rehabilitation plans become a part of the company or group organization.

To such members of the Marine Section of the National Safety Council as may be interested primarily in accidents to seamen, permit me to say before discussing injuries to seamen, that as each ship must pay its proportionate share of all the bills contracted in the marine industry, and as longshore accidents comprise no small portion of the total bill, it behooves shipowners to provide safe working places, safe gear, and safe cargo stowage for longshoremen.

As for the sailors, it has been found that, for every Pacific American freighter going to sea with a crew of less than 50 men and where the said crew is not required to handle cargo, there is an average of six incapacitating injuries per year or one injury for every eight men which fact does not seem to interest many masters. However, if this rate was compared to other industries, it would be found high and would be almost prohibitive in plants where injured men go to compensation and additional men must be employed as substitute workmen.

The study for Pacific American tankers operating on the Pacific Coast developed that there are two incapacitating crew injuries per year per tanker. The injury rate difference between the general cargo and tank ships is due to the extreme necessity for caution on account of the explosive nature of the tanker cargoes.

The average 50 man crew of a freighter, with six injuries per year, will experience one injury for every seven in the deck department; one for every ten in the engine room and one for every ten in the steward and miscellaneous departments combined.

TABLE NO. II

General Causes of Accidents Causing Disabling Injuries to Seamen on
Pacific American Ships—1928 to 1929, Inc.

GENERAL CAUSES	ACCIDENTS REPORTED				TOTALS	
	Per Cent	No. of	*Gen. Cargo Per Cent	No. of	Per Cent	No. of Accidents
Falls of Persons	30	125	32	475	31	600
Hand-handling Objects	17	70	11	162	12	232
Striking Against Objects						
Not Handled	12	48	8	120	9	168
Moving Objects	6	25	7	111	7	136
Machinery	5	21	8	114	7	135
Falling Objects	7	28	7	104	7	132
Fire, Hot Poisonous						
Substances	5	20	7	99	6	119
Hand Tools	5	22	6	91	6	113
Flying Objects	7	28	4	68	5	96
Physical violence, illness or						
Occup. Diseases	2	8	5	76	4	84
Stepping on Objects	2	6	3	38	2	44
Haulage	—	1	—	4	—	5
Commercial Traffic	—	—	—	2	—	2
Not Apparent from Report	—	12	—	21	—	33
Totals	100%	414**	100%	1,485***	100%	1,899

The general causes of the accidents causing sufficient disablement to seamen to incapacitate them for duty, are shown in Table II.

Falls of persons, as might be expected, cause 31 per cent of the incapacitating injuries to seamen or two and one-half times as many injuries as any other primary cause. The next highest is Hand-Handling Objects, with only 12 per cent of the total. It is rather interesting to note that Machinery occupies fifth place, with 7 per cent of the total.

There are variables between tankers and general cargo ships which are readily noticeable in the table. The comparison of the number of accidents at sea and in port between tankers and general cargo is surprising at first glance but the difference between the port practices is undoubtedly the explanation.

In studying detail causations for "Falls of Persons", it is noticed that about 25 per cent of the falls of seamen at sea are from ladders and stairs; in port about 20 per cent. (Fall at sea due to bad weather are 10 per cent of the total.) The largest number of falls of persons for both "at sea" and "in port" are miscellaneous falls on decks from causes other than weather, amounting to nearly 50 per cent at sea and over 50 per cent in port.

Most of the "Striking Against Objects not Handled" occur while ships are in port and are undergoing repair. Contrary to expectations, disabling strains or sprains are about the same at sea and in port and account for less than 4 per cent of the total incapacitating injuries to seamen.

Some of the more important detail causes of injuries to seamen, each accounting for more than 5 per cent of the accidents resulting in disabling injuries, are:—slipping, tripping and stumbling; striking or bumping against miscellaneous objects

* Also includes several large passenger carrying vessels.

** Tankers had 63% of accidents at sea; 37% in port.

***General Cargo had 63% of accidents in port; 37% at sea.

not being handled, such as nails, splinters, railings, machinery, etc.; falling from ladders; burns in the engine room and galley; struck by own hand-tool; struck by miscellaneous falling objects; sprains and strains; struck by flying object, by ship machinery (shops only), by ship machinery, other than shop and deck machinery; physical violence.

Of the foregoing detail causes "slipping, tripping and stumbling" is three times as great as any other.

The study of contributory causes developed that physical conditions, such as gear and mechanical failures, accounted for only 4 per cent of the serious injuries to seamen. Working conditions not under the control of the immediate licensed officer 7 per cent. The remainder come under the classification described for longshoremen as "supervisory" and include tolerated unsafe working conditions and tolerated careless habits. The small number due to weather is negligible.

Thus it is proved that there are uncontrolled hazards common to ships at sea and in port that are not necessarily associated with the handling of cargo and that with the comparatively untrained personnel (so far as safety is concerned), being exposed to the hazards, seamen, as well as longshoremen, are injured.

It is the law that seamen are not specially compensated for their injuries unless it is proved that the ship is negligent. This might be considered as tending to place as much responsibility on the seamen for prevention of accidents as it does on the ship. But still the injury frequency is unreasonably high and should be controlled in the interest of required efficiency and to overcome the wastage due to the destruction of material, equipment, and property, due to accidents. The unsolved ships' personnel problems, resulting in high turn-over, however, are at present the greatest retardant of successful accident prevention; but the tankers have shown the way through training and selection of licensed personnel, and requiring strict enforcement of minimum standards for safety. Is it not within the province of all operating managers in the American merchant marine to imitate the tanker in this respect?

In concluding, I should like to repeat for emphasis, that accidents resulting in injuries either to longshoremen or seamen have common causes that are predictable. A large percentage are avoidable through reasonable control of the hazards and limiting the exposure to the hazard.

It is agreed that stevedoring presents what is called the "casual" labor problem, which coupled with the hourly pay basis does not make for loyalty but this problem can be and is solved through thoughtful preparations for a job, "close" organization, intelligent selection, and training of foremen and gang bosses, and enforcing strict discipline for safety infractions.

The huge turn-over of seamen is the most serious problem confronting accident prevention to sailors, but it can be and will be controlled through active personnel work in the operating departments.

It is a matter of public record that the Pullman shops at Richmond, California, employing 700 men in occupations that were considered hazardous, working two and one-half million man-hours last year, had no compensable accidents and did not pay out one cent in compensation.

It is within the realm of possibility and certainly it is the sincere expectation of the Safety Engineer that some fleet in the Pacific merchant marine will eventually equal and better this record for its seamen and longshoremen by solving the causes of accidents and applying remedies.

MR. GLENN: Do the figures presented include only lost-time accidents or do they also include non lost-time accidents?

MR. GREGORY: This compilation covers only those which involve the loss of one or more day's time.

MR. GLENN: Are the different concerns required to report all accidents?

MR. GREGORY: The same forms are used in all but two of our seaboard states. Companies are required to report all accidents whether causing lost time or not.

CHAIRMAN TODD: The next paper is by Capt. W. N. Davis, Vice President, Merritt-Chapman Scott Corp., New York City.

Safety In Salvage Operations

By CAPTAIN W. N. DAVIS

Merritt-Chapman Scott Corporation, New York City

In the salvage of distressed vessels there are, of course, many hazards to be encountered, and if some salvage cases are to be brought to a successful conclusion, the personnel must accept considerable risks. As in all other hazardous occupations, however, a knowledge of the dangers to be met is one of the most effective safeguards against them.

One of the most obvious dangers is that of capsizing or pitchpoling the small boats which in many cases must carry men and gear through the breakers to a stranded ship.

In some locations the sea will go down after waiting only a few hours; in others, it may rage for many days; its behavior varies widely. In the trade wind regions, for example, or where land and sea breezes blow, there is usually some period in the twenty-four hours when boating conditions are better than at any other time. In any place where there is considerable rise and fall of tide, boating conditions are apt to be better near high water than at low water, as the swell then will have to be heavier before it breaks; but this by no means may be taken as a certainty, as there are places where a heavier swell comes in with the tide.

These are all factors which test the mettle and judgment of the salvage officer. He must consider them all in deciding whether he will send a boat at once or await better conditions. It must be recognized, however, that there are many locations where, for weeks at a time, more or less danger is involved in every trip to or from a stranded vessel. The proper kind of boats and, above all, experience and care, can lessen the danger; nothing can do away with it entirely.

In the old days of wooden ships terrible risks often were necessary to take the crew off a stranded vessel, or for the salvage crew to get away, with bad weather coming on and the ship in imminent danger of breaking up. But today, with strong steel ships of large size, the ship is very often safer than the best of lifeboats and one is wiser to remain aboard than to risk life in getting off in a small boat.

I recall many instances where lives were lost in the attempt to get off a stranded vessel, when later events proved that the vessel itself would have been an entirely safe refuge. One case of this kind comes distinctly to my mind. It was about thirty years ago when the British steamer "Ariosto" stranded on the coast of North Carolina, near Hatteras Inlet. There was a heavy swell prevailing at the time and the ship was swung broadside on the outer bar that parallels the beach at a distance of several hundred feet. The steamer was loaded with a full cargo of wheat and cotton and, as she rolled and pounded, beating up on the bar, she commenced to leak badly and soon the water in the engine room was rising fast. It was decided to leave her. Rockets were sent up for assistance.

The night was so dark and cloudy that the beach could not be seen. The captain thought they were on the dreaded Hatteras Shoals and the order was given to launch the lifeboats on the lee side. The two boats were lowered and the entire crew, with the exception of the captain, the chief engineer and the third officer, got into them. Just then a Coast Guard patrol discovered the ship and, standing on the beach abreast of her, burned his red flare to show the ship that he had seen her.

The captain, realizing that help was near, advised the men to come back on board and a few of them did so from the second mates' boat, which was leaking badly. But the sight of that red flare burning on the beach was too much for the others, and, with a cheer, the boats started for the beach. No sooner were the boats away from the shelter of the ship than they both capsized and not a man reached the beach alive. Thirty-one lives were lost.

This happened on Christmas Eve and, from the following day until the end of March, a salvage crew lived on the ship, in safety if not in comfort. The cargo of cotton was saved, the wheat thrown overboard, the ship was pumped and patched, and, had it not been for bad luck with the weather, the ship herself would have been saved.

There is still another instance: In 1917, a Coast Guard Cutter lowered a lifeboat to endeavor to take the crew off the stranded tanker "Louisiana", ashore near Ocean City, Maryland. The first boat capsized, and a second boat sent to the rescue shared the same fate, with the loss of both boats' crews. The shipwrecked crew of the "Louisiana" remained on board until the weather improved, and a few days later the ship was floated by the salvage forces.

On the other hand, when a ship is on one of the outlying shoals, has water in her, and the weather threatens, it is good practice to go while the going is good. There have been numerous instances where nothing but the masts of large steamers have been left showing above water after a heavy storm.

To sum up, when a breeches buoy can be rigged to the shore, it is good practice to rig it; but when one cannot have this "line of retreat" to fall back on, experience and judgment must decide the best course.

The hazard of fire on shipboard is one that is most universally feared and when a ship strands or partially sinks, with the consequent relaxing of discipline, this danger becomes even more serious; especially is the hazard multiplied many fold should the vessel happen to be an oil burner, and, maybe, has leaky tanktops or margin plates which permit the fire room bilges to fill with oil.

When a stoke hold fills with water under these conditions and later is pumped out, a heavy coating of oil covers everything so that, when fires are started in the furnaces and things get warmed up, a flareback is apt to start a blaze. This, however, appears to be rather an unavoidable risk as, in many cases, it is absolutely necessary to have fire on a wrecked ship's boilers if she is to be saved; about the only thing that can be done, therefore, is to keep fire extinguishers handy.

Before the day of the oxy-acetylene torch, it was a mighty tough job to cut through bulkheads or decks to install pumps; today, this work is done in a mere fraction of the time formerly required, though a prudent salvage officer will have hose rigged and chemical fire extinguishers ready if there is anything near that can take fire.

It is often necessary or desirable to cut holes for drainage from one compartment to another, particularly when holds are blocked by cargo that will take a long time to handle. For example, one sometimes can remove cargo down to the top of the shaft tunnel, cut through the tunnel top, enter the tunnel and cut drain holes through its side into each hold through which the tunnel passes. By using this method and putting suction into the tunnel, the whole after end of the ship can be pumped; this, of course, refers to vessels having the engines amidships.

But it is obviously impracticable to use an oxy-acetylene torch where everything is covered with fuel oil, so we have worked out a method of our own for doing such work safely: we make such drainage openings while the place to be cut is under water, using a diver and the Underwater Cutting Torch. It is a wise precaution, of course, when cutting a hole down through the top of a tunnel, where explosive gases might possibly be trapped, to drill a small vent hole before attempting use of the Underwater Cutting Torch, using for that purpose a ratchet or air drill.

And sometimes, before pumping, it is necessary, for stability's sake, to cut holes through between-decks to allow water to drain to lower holds and thus prevent

listing or capsizing when the ship is being pumped. In such cases, where there is danger of the unburned gases from the torch being trapped, the oxy-electric Underwater Cutting Torch, rather than oxy-acetylene, must be used if we are to avoid the danger of an explosion which probably would kill the diver using the torch, if it did no other damage.

Perhaps the greatest danger to the ship salver, and certainly the most insidious one, is that created by gases generated by petroleum or by decaying vegetable matter. There is an acute hazard of this kind in vessels where holds are supplied with fresh air by wind sails, as gas may accumulate very quickly should the wind die out; this danger is present also if only the ship's ventilators are being depended upon for the fresh air supply.

There was an instance of the kind some years ago when the S/S "Boston City" was raised, after lying on the bottom of New York Bay for several months. The holds were being cleaned out, preparing the ship for drydock, and rotten grain was being discharged into scows. The wind died out during the noon hour, and when the men returned to the hold, they were immediately overcome. Captain Sharp, the salvage officer, and his son gave their lives in a brave but ill-considered attempt to rescue the men who already were down. In a few minutes, a man protected by a diver's helmet went down and sent up the bodies. Captain Sharp, who was a very powerful man, with tremendous chest development, still breathed; in spite of the best medical assistance, however, he died of pneumonia within a few days.

This accident might have been avoided by keeping lighted lanterns in the bottom of the hold, where the men were working; this, in fact, had been done at the start of the job but nothing had happened and everyone had become careless. Today, when we discharge wet grain, we often take it out with a suction, using a second pump to carry the necessary water into the hold. The work below is done by divers or by men in wading dress, who wear hose masks.

So many vessels nowadays are oil burners that we are constantly on the alert for explosive gases, also. There naturally will be a lot of fuel oil floating around when tanks are leaky, and in hot weather, petroleum gas sometimes is generated in such quantities that ordinary lanterns cannot be used for detection purposes, because of the explosive risk. Our salvage vessels, therefore, are now all equipped with miner's safety lamps to avoid this hazard. The manner in which the safety lamp burns will show the presence of explosive gases and, if there is not enough oxygen present to support human life, the lamp will go out.

The gas from grains or coffee is very irritating to the mucous membranes. The first symptom is a feeling as of a bit of sand in the eye; this is followed by conjunctivitis and, in a few hours, by photophobia and the men are incapacitated for several days. The best preventive, and also the best cure that I know, is a ten percent solution of argyrol dropped in the eye morning and night. I have used gallons of boracic acid solution on such cases but, while it helps, it is not nearly so effective as the argyrol.

Of course, one will be on the lookout for gas when there is decaying grain in a ship's hold but it is sometimes very difficult to detect and manifests itself in strange ways. I was present on a ship some years ago when a man was gassed while lowering a suction into a hold filled with partly melted sugar and water. He fell into the hold as if something had struck him and floated there on his back. He was dead when taken from the water a few minutes afterward, though no water was found to have entered his lungs. The weather at the time was extremely hot and dead calm.

The occurrence which I am about to relate will illustrate how insidious is this danger. The S/S "Steel Inventor" was ashore in the Caribbean; dry cargo had been discharged from one of her holds and it was empty. The adjoining hold, loaded with steel and cotton, was flooded to sealevel and the ship's pumps could not pump it. To free the flooded hold of water, salvage pumps were installed in the empty one

and rivets were cut out of the bulkhead, near the bottom, so that water would flow from the flooded hold to the empty one. Three men did this preliminary work. The rivets were burned by an oxy-acetylene torch, then punched out, wooden plugs were inserted until a sufficient number of rivets had been removed.

The salvage officer visited the hold and found that the men had completed the rivet removal and were beginning to pull out the plugs. An inspection an hour later showed several feet of water in the hold, but the men were nowhere to be seen. After a fruitless search for them all over the ship the pumps were started, the water was pumped out and there on the bottom were the three bodies where they had fallen, quickly overcome, it appeared, by gas.

Thorough investigation of the case and consultation with the United States Bureau of Mines established the fact that the water in the flooded hold had been charged with gas by decomposition of the cotton. The water rushing through the rivet holes released this gas which quickly took the place of the air in the lower part of the empty hold.

Contrary to usual belief, the gas generated by grain and other decaying vegetable matter is an irritant gas, not a deadly poison. It is deadly, however, in the sense that it is an inert gas which displaces the air. One full breath of this gas, without any oxygen, will cause a man to lose consciousness, and unless he be moved to a place where he can get oxygen death will ensue in a little while. This danger can be guarded against by carefully watching safety lamps, which should be kept constantly burning in the bottom of the hold, and getting the men out immediately if the lamps should cease to burn.

It should perhaps be unnecessary to point out that, as most of the machinery used in modern salvage work is gasoline-driven, steps must be taken to prevent the accumulation of carbon monoxide gas below decks by carrying the motor exhaust well up into the air. Gasolene vapors, also, must of course be guarded against. There was a case about fifteen years ago where amateur salvors had been carrying on protracted operations on a steel sailing ship; their pumps, driven by old automobile engines, had been running intermittently for some weeks in the between-decks of the ship. After salvage operations had been completed and repairs were being made, a man was sent into the fresh water tank to clean it out. He carried a candle and an explosion followed which ripped the tank to shreds and caused considerable other damage and, of course, the man was killed.

There is another instance of gas hazard which comes to mind. The S/S "Columbia" stranded on Gaho Island, Paspi side, while laden with general cargo, a considerable portion of it stowed in Nos. 1, 2 and 3 holds. At the time of pumping ship there was a great deal of trouble with gas, particularly in discharging and cleaning No. 3 hold. This hold had a trunk hatch in the forward end; its ventilation was so extremely poor that it was necessary to blow air down from one of the salvage portable electric blowers as well as through lines of 2½ inch corporation hose, connected up to one of the large air compressors, the hose discharging into the after end of the hold. Conditions were such that it was only possible to work the men in one hour shifts; that is, one hour in the hold and one hour on deck. There was, of course, a good deal of suffering caused by eye irritations and the ship's doctor was kept busy.

Now, during the salvage operations it had been necessary to put air-tight hatches on Nos. 1 and 2 holds and on the main deck. At the time of delivering the ship to drydock, the shipyard men were observed slacking up the air-tight hatches and dropping them down into the hold so that workmen might enter and wash down fuel oil. This, of course, should not have been permitted without first blowing out the holds with air; that precaution was not taken, however, and as a result five negro laborers were killed as soon as they arrived in the bottom of the hold.

But we must not dwell so long on gas that it will appear to be the only hazard; there are many others. There is your old enemy the "falling object" hazard, and

many more that are peculiar to this business. It was the custom in the old days, when salvage operations were started on sailing ships, to send down topgallant and royal yards and topgallant masts and, sometimes, topsail yards and topmasts as well. The object of this was twofold: to give the ship greater stability and so that the yards and mast could not come down on the heads of the salvage crew when the ship pounded on the bottom. Now there are no sailing ships but the danger from falling gear still exists, though to a very modified degree. It is necessary to watch funnel guys and the stays and shrouds of the masts and slack them up, if necessary, to prevent them from parting.

The hazard encountered by men working around cables and holding turns perhaps should not require mention, as it is so universally recognized, but proper precautions are often neglected and, sometimes, with very serious results. Men so engaged should never be permitted to stand where they will be injured by the carrying away of a rope or block. And they should never be permitted to stand in the bight of a rope. The momentum acquired by a hundred pound snatch block in flight is little short of devastating and the blow from such an object literally crushes a human body when it strikes. Despite the great experience and extreme care instinctively exercised by our men, we ourselves have not wholly avoided such accidents; one man lost his leg at the hip from the blow of a snatch block; another lost an arm when a cable parted.

This parting-rope hazard has to be watched with extra care under certain conditions. For example, when a stranded ship is being hove off by cables, extremely heavy purchases are used and breaking strains may easily result when a ship is swung around by the surge of the sea or by heavy tides. These salvage cables are 15 inches in circumference so that, should they let go, the men must be out of the way.

To revert to some of the other hazards peculiar to this business: when a ship is straining heavily and the bottom is being pushed up under the boilers, there is danger from bursting steam pipes. When steam must be kept on the boilers to save the ship, this danger has to be faced. When portable boilers are placed on a wreck by salvage men, no precaution is too great to make them secure as there is nothing more disconcerting than a boiler with a full head of steam and a heavy fire when it breaks its connections and starts sliding around the deck of a pounding ship.

No discussion of marine salvage hazards would be complete, of course, without considering the dangers encountered by the divers in carrying on salvage work. They are the first on the ground, the "eyes of the salvage officer" and must face conditions "in the row." Among the many risks the diver runs, perhaps the one he dreads most is that of "getting foul." This can occur in innumerable ways but it happens much more easily when diving on a wreck than when on construction work.

Sometimes the current or the undertow will carry a diver into a position from which he finds it extremely difficult to extricate himself. I have in mind cases where divers have crawled through openings barely large enough to squeeze through and where it took skill and determination to get out again; and other cases where, in order to get clear, a diver has had to cut his air hose, or his lifeline, or even both.

There used to be a saying: "There is a sweet little Cherub that sits up aloft and takes of the life of poor Jack", but I think that the divers also must have their "Sweet Little Cherub" when recalling how many have been the narrow escapes and how few the fatalities.

Perhaps one of the most dangerous of the diver's jobs is that of breaking out cargo on a completely sunken ship. In such a ship, sometimes, when breaking out such cargo as cotton bales, the whole cargo floats as soon as a tier is broken, thus jamming the diver up against the deck or fouling his hose and lifeline. There is a like danger, too, when breaking out cargo in the far corner of a hold for the cargo whip may cut off the diver's hose. Some divers, when doing this work, make it a rule to work the whip on the same side of the stanchions or pillars as the hose and lifeline so that, in case these are fouled by the whip, the diver will be dragged out of the hold instead of having his hose and lifeline parted.

It must be remembered that submarine lights are useless in the murky waters of most of our harbors or even in the holds of ships when a diver stirs up the water; he must work entirely by feeling his way around. The high degree to which the best divers have developed these senses of feeling and of direction is marvelous as is their skill in taking measurements. But the diver cannot see some piece of wreckage or cargo which may be poised above his head, ready to fall on him and foul or crush him.

Divers are hardy men and usually in good physical condition but, occasionally, temporary illnesses lead them into trouble. A diver never should go down when feeling nauseated as, should he become violently ill, there is danger of choking to death. A fine young man, who was a skillful diver, lost his life in this way not so long ago, and I am convinced that other unexplained deaths of divers have had a similar cause.

And now we come to the dreaded "Bends", or compressed air sickness, of which we have all heard and read so much. This disease has been the subject of exhaustive investigation by the United States Navy and the United States Bureau of Mines, and we are indebted to them for much of our organized knowledge of the subject. It is an ever-present danger when men are diving in water more than 50 feet deep. Some men are more susceptible to it than are others and these men should not attempt to dive in deep water. Even those who seem to be almost immune to the bends should decompress in accordance with the official scientific "Tables" or, soon or late, they surely will suffer for it. A recompression chamber should invariably be used on jobs where there is much diving to be done in depths exceeding 60 feet.

MR. SMITH: What is the depth that a diver can go down with an ordinary diving suit?

CAPT. DAVIS: The United States Navy divers went down 312 feet a good many years ago,—I think perhaps 24 or 25 years ago when a submarine sunk at Honolulu. They have done useful work in 180 feet. We have had four divers down to 200 for special work, making examinations, but they have to take so long to decompress. The subject is fully covered by publications of the United States Bureau of Mines. They are putting men down artificially in a tank, with air connections that have 190 pounds pressure to the square inch.

MR. SMITH: Can they work at that pressure?

CAPT. DAVIS: No, they can't do real work; they can only observe. They are carrying on those experiments in connection with the artificial lung. When a diver goes down, the pressure increases roughly a half pound per square inch for each foot that he descends into the water. To be more exact, it is 45 pounds to the hundred feet of depth. Air must be pumped into his diving outfit to offset this outside pressure. This pressure must be increased as he descends, and decreased as he comes up. When a diver is down, nitrogen is absorbed into the blood stream. To let him get rid of the nitrogen, we use what they call stage decompression. We pull the man up a certain distance and let him stay there a certain time. Then we bring him up higher, and so on. There are regular decompression tables published by the United States Navy; they have conducted regular experiments. But in a tideway or heavy sea, it is impossible to work the stage decompression in this way, so it is the practice to bring the diver right up, take the helmet and boots off, and rush him into a decompression tank. The pressure is lowered in the tank then as the tables direct. They are making experiments on a mixture of helium gas and oxygen. The helium gas takes the place of nitrogen. It is not absorbed into the blood the same as nitrogen.

CHAIRMAN TODE: There are numerous steamship companies today who have bonus systems for various services, and there are a few companies who are now giving to their crews some compensation for safe operations. Among those companies, the Export Steamship Corporation was probably one of the earliest to

install a bonus system. The title of the last paper of the afternoon is by Mr. John Wright of the Export Steamship Corp., New York City. In his absence, his paper will be read by Mr. Dahney L. Smith, Assistant to Mr. Wright.

The Advantages of Bonuses in Safety Work

By JOHN WRIGHT

The Export Steamship Corporation, New York City

The question of the advantages or disadvantages of a case bonus system in connection with the advancement of safety work in an organization, is one which furnishes a wide field for discussion. Many logical arguments are advanced by its opponents, but the weak spot in these arguments appears to be that they are usually advanced by those who have had no practical experience in the workings of such a system. The objections advanced are largely theoretical and are not based on actual experience.

For the past four years the Export Steamship Corporation has had in operation a safety bonus system, and it is from a careful study of the results attained by its use that we assert that the advantages greatly outnumber the disadvantages, and that a safety bonus system is of definite value and plays an important part in a well organized safety campaign. To those concerned in the operation of the Export Steamship Corporation the importance of safety work is too well recognized to be lightly regarded, and every means that will advance the cause is given careful consideration. The adoption of any new procedure in our safety work is not the result of any hasty impulse or idea, is not simply a gesture in the general direction of safety. It is put into operation and then carefully watched for results. It must prove its worth or be discarded. The fact that the bonus plan has stood the test of four years of service shows that it must have a very important place in our safety program.

In every phase of life man will put forth greater effort if there is held before him the definite prospect of a reward for work well done. If you care to carry the analogy so far, you might recall that little Willie always eats his spinach much more willingly if he knows he will get ice cream afterward. Safety campaigns may be carried out to the highest degree of efficiency, they may be so intensive that they will impress on every individual member of an organization the importance and the necessity of being safety minded, they may even establish a 100 per cent record for safety, but unless there is some definite reward held out for those whose care and watchfulness have established this record, the interest after a time will lag. Without this reward the vital spark is missing. A safety pennant flown from the mast head may cause a brief thrill of pride to those responsible for placing it there, but only a brief one. The constant shifting about among the crews of vessels, particularly among the unlicensed personnel, means a constantly changing organization and a consequent need for unremitting effort on the part of the employees whose terms of service are longer, to keep alive the spirit necessary to attain the wanted results in safety matters.

Here then is where the bonus system becomes an important factor in the work. When the men on a vessel know that their efforts to prevent accidents will, if successful, bring them a definite financial reward, they have the incentive to spur them on to greater effort. To the new employees it brings the realization that the safety posters, the instructions, discussions, etc., mean something. They know that when you back up your talk with money, you mean business. To the old employees it brings the realization of their responsibility to watch the new men, to caution them, and to work with them to keep up the record of the ship for safety. It is the opinion of the writer, based on actual observation, that no part of the safety program of the

Export Steamship Corporation is of greater value in building up the spirit of co-operation in safety matters than is the safety bonus. All hands come to realize that safety for all is the winning factor. Winning the bonus is not simply a matter of looking out for number one—they have to look out for the other fellow, also. His hard luck is their hard luck, insofar as the bonus is concerned. The men become imbued with the spirit of watchfulness, of carefulness, of safety mindedness.

Actual experience shows that this spirit does exist on the vessels of the Corporation. As a part of the regular safety program, every vessel is boarded, immediately upon arrival in port, by a representative of the Corporation's Safety Committee who checks up on all accidents which may have occurred on the voyage, inspects the vessel to see if there are any matters which require the attention of the Committee, etc. Invariably he is approached by various members of the crew, the Master, the boatswain, a steward, perhaps, all with the same question—"How do we stand on the bonus?" or "Well, we ought to stand a pretty good chance this year. No accidents last voyage, and only one slight one last trip". Then there is always the question of how the other ships are faring. The spirit of rivalry between the crews of the various vessels is keen. Masters call at the office and ask to be shown the records for comparison. Ex-members of crews write in asking how their old ship fared during the year, and in many other ways the interest in the bonus is shown.

A few days since the shore representative of the Safety Committee boarded one of the steamers on her return from a foreign voyage, and was engaged in conversation with one of the officers. A passenger standing near evidently overheard the conversation, which was naturally on safety matters, approached, and, introducing himself, said in substance "On this entire trip I have been struck with the constant attention given to the subject of safety. I have noticed the officers cautioning the men to be careful, have heard the men telling each other to watch out for this, that and the other thing. The attention paid to the matter of safety on this ship has opened my eyes. It has put the matter before me in a new light and I have learned some things which I shall put into practice in my own business." Comments of this nature from a disinterested outsider certainly show that the matter of safety is something to which the men give more than a passing thought. Incidentally it was this vessel which won the last safety bonus. It is a strong contender in the present bonus period and you may draw your own conclusions as to just what part the hope of winning another bonus plays in building up the spirit which inspired the comment of the passenger.

A word descriptive of the bonus system in operation might not be amiss at this point. In the operation of our vessels, four complete voyages constitute approximately one year of operation. A careful record of all injuries, etc., for four voyages is made, and after allowing due time for all accounts to be rendered and the books closed, the vessel showing the lowest expenditure for the period, is declared the winner. Two weeks salary is then paid to every member of the crew who has completed the four voyages taken into account. Naturally there are many changes in personnel during a year, particularly among the unlicensed personnel, therefore this two weeks salary is pro rated according to the number of voyages made by the men. One voyage, one-half of one week; two voyages, one week; three voyages, one and one-half week; four voyages, two weeks. In this way every man who has had a part in the operation of the winning vessel receives a fair share of the reward.

One of the principal arguments advanced by the opponents of the bonus system is that there is a tendency on the part of the officers of the vessel to minimize the injuries received by members of the crew, to cover up accidents, to ignore reports of injuries made to them and to fail to report accidents occurring on their vessels, on the theory that this mode of procedure will advance their prospects of winning. This results, say the opponents, in many claims being presented about which no information has been received. The vessel has ended her voyage, has, perchance, sailed on another one. The witnesses are scattered or unavailable and the actual facts are

unobtainable, and the shipowner finds himself confronted with claims which he must either settle on a nuisance basis or take the chance of facing long and expensive litigation, with the possibility of losing in the end, whereas, had the matter been properly reported at the time of occurrence, all this trouble might have been avoided. To a very small extent this condition did obtain on some few of our vessels at the inception of the bonus plan, but the officers in charge were soon shown that such a procedure was a hindrance rather than a help in their efforts to win a bonus, and the condition no longer exists. An unreported accident is a very rare occurrence and the officers of the vessels are trained to make out their reports with every detail complete. Even accidents of a minor character are fully reported and thus we are enabled to dispose of claims arising from injuries to better advantage. This is reflected in the lowering of costs on the vessel in respect to injuries, and thus the men learn the importance of reporting all accidents.

Another argument favored by the opponents is that only the officers benefit by a bonus system. That due to the constant changes in the unlicensed personnel of the ships, the men do not keep in touch with the vessels, do not claim their money, and so take little interest in the operation of the bonus. An examination of the lists of crews on the winning ships during the past three bonus periods disproves this. A surprisingly small number failed to appear and collect their share.

In this connection we might note that the bonus system has some effect in keeping men in our employ for longer periods. Sailors are by nature, wanderers. Signed on, as they are, from voyage to voyage, there are numbers of them, good men, too, who will not stick in one place for long. They grow tired of seeing the same ports, they form dislikes for certain officers, for certain ships, and when they have finished the voyage they go on looking for another berth. We find frequently that men will remain with a certain ship for the sole purpose of "being in the money". They know their chances are good and they want to remain on the ship for the entire period of the bonus in order to increase their share of the winnings. The advantage to the shipowner of having men used to their particular system of operation remain in their employ is so obvious that we do not need to call it to your attention.

After all, the proof of the pudding is in the eating. The fourth bonus period of the Export Lines is nearing its end. In another three months the winner will be announced. As these lines are written, seven out of our twenty four vessels are running neck and neck in the race. Actual figures have shown a decrease in our costs for injuries and illnesses year by year. In the past year there has been a decrease over the year preceding, of over 50 per cent. The success of our safety work can be ascribed to no one particular cause, but if you ask the man on the deck the chances are that he will give due credit to the Safety Bonus Plan.

MR. HUNTER: What do you do when you shift officers? Suppose a man had put in about three-quarters of the year on a ship that earned the bonus, and then for your own convenience you transferred him to another ship.

MR. SMITH: He gets his three-quarters. We try to operate so every man will have an equal chance, and we treat officers and men alike. We find the bonus system does work. It also helps in keeping men on the job; if you want to get in the money you must stay on the job.

MR. LYNN: Do you know of any other companies that have this bonus system?

MR. SMITH: No, I do not. They give medals, but you can't eat medals.

MR. GLENN: I know one stevedoring company that does general freight handling. They told me that most of their accidents are on handling steel and lumber, and by the simple expedient of telling the foreman, "Here Bill, if you handle this ship without accident it is a ten dollar bill in addition to your wages", they cut down their accidents 75 per cent.

ADJOURNMENT

Thursday Afternoon Session October 2, 1930

ARTHUR M. TODE, Chairman
The Texas Company, New York City

The third session of the Marine Section convened at two o'clock, Chairman Tode presiding.

CHAIRMAN TODE: The first paper of the day has been prepared and will be delivered by Mr. F. H. Cogan, Chief Tug Dispatcher, The Delaware, Lackawanna and Western Railroad Co., New York City.

Safety in Railroad Lighterage Operations

By F. H. COGAN

Chief Tug Dispatcher, Delaware, Lackawanna & Western Railroad Co.,
Hoboken, N. J.

In common with all other railroads which serve the port of New York, the Lackawanna owns and operates a vast amount of floating equipment which is used to transport freight to and from the rail terminal.

Ferryboats are operated as well as lighterage equipment, but this paper will deal entirely with the lighterage operations, and all data submitted will apply to that division only.

Exclusive of ferryboats, the fleet is composed of the following units: (a) 20 tugboats—(b) 5 steam lighters—(c) 34 car floats—(d) 105 covered barges—(e) 59 hoisting lighters—(f) 34 grain boats.

A total of 525 men are required to man these vessels.

During year 1929, the total number of man-hours worked was 1,599,390.

Except during slack periods, additional equipment must be chartered in order to insure prompt movement of freight.

In addition to the men employed on the boats, a shore force consisting of supervisors, clerks, etc., is maintained. These men are a part of the lighterage division organization, and any injuries incurred by them are charged against that division.

A 24-hour tug service is maintained every day in the year, each tug carrying the following crew for an 8-hour tour of duty—1 licensed master who also acts in the capacity of pilot—1 licensed engineer—1 oiler—1 fireman—either 2 or 3 deckhands. These craft range in size from 150 I. H. P. to 1,000 I. H. P. and are employed in the towing of the non-self-propelled units of the fleet to various points in the port of New York. They are capable of handling large flotilla tows, but due to the traffic congestion in the harbor, we feel that it is in the interest of safety to limit the size of the tows; therefore we make it a practice not to give a tug more than 12 boats in tow and then only under favorable conditions. For the same reason not more than two carfloats are given to a tug to tow at one time when bound to any point in the East River.

The crews of these tugs are subject to many of the hazards found on a larger steamer and some that are not found on a ship.

A highly trained personnel is required for satisfactory results; teamwork and the ability to work together without friction is essential. While maneuvering to pick up and land a tow, signals are sent from pilot house to engine room almost continuously; failure to have these signals answered correctly and promptly is sure to result in an accident to either personnel or property. Firemen must watch water in boiler to see

that it is neither too high nor too low in the glass, as this is very important on a tug. He must also watch the steam pressure to prevent boiler blowing off as this is most annoying and interferes with operations. The deck crew must familiarize themselves with methods used by captain handling tugs, so that they will know when and where to place lines without being told each time.

Under working conditions such as these, it can readily be understood that it is to the advantage of all concerned to practice safety at all times. If one of the regular crew has to lay off due to an injury, a substitute must be placed on the boat, and even though he may be experienced and competent, it takes time for him to become acquainted with the methods used on that particular boat.

Tugboats are apt to list very suddenly and sharply, especially when snubbed with a line. This is a hazard for the engine room force as they are not likely to get any warning before it occurs. Sufficient water must be kept in boiler to allow for this, in order that fusible plug may not be burned out.

Tugs are fitted with a steam ash ejector and have forced draft blowers so that the smaller sizes of anthracite coal may be burned.

The deck crew are subject to all the risks found in handling lines on a moving vessel and also to the danger of falling or being kicked overboard. The mate is required to act as lookout on the tow and this means that he must climb over boats that may be rolling and tossing in swells. He must at times walk along the outside of barge, where the only protection he has to prevent going overboard, is a wire life line fastened to freight house on barge, but across the hatch and doors a rope line must be stretched. These life lines are of such importance that failure of any captain to keep them in perfect condition would result in his being immediately disciplined.

During freezing or even wet weather, practically every move that is made on the deck of tug or tow is fraught with danger to life or limb, but as this is realized by all hands they work slowly and use more caution than under normal conditions which of course to a certain extent slows up the operations; and we expect it to.

Steam lighters carry a crew of 8 men each, and as the name signifies they are self propelled freight carrying steamers capable of carrying approximately 250 tons of cargo. We have one steam lighter that can lift 40 tons, and this vessel is also used in wrecking and salvage operations. The crews of these vessels are subject to the risks usually found in stevedoring operations, as freight must be either trucked or hoisted in slings to and from boat. In addition the deck crew must handle lines, but not to the same extent as is the case on tugs.

Carfloats are craft fitted with rails, so that freight cars may be placed on them and carried to various points in harbor. When ready to load or unload cars, floats are placed in bridges, fitted with rails, in order that cars can be handled by locomotive.

One man, known as float captain, is assigned to each float while under load; his tour of duty is 8 hours, and if float has not returned to terminal when his time is up, he is relieved by another man. These men must handle lines on the float, and as at times there is but little room in which to do so, the hazard is greater than on any other type of craft operated by us.

Floatmen must examine seals on car doors, and if proper care is not taken while doing so, a badly cut hand will result.

They must handle the chocks which are used to prevent cars from rolling over the ends of float into river. These are heavy and cumbersome and handling them carelessly usually results in a personal injury report.

Covered barges are used in handling freight which must be protected from the weather. These boats will carry from 200 to 500 tons of freight. There is a captain assigned to each one, and he may live on board with his family, if he so desires. The loading and discharging of these boats is done by a stevedoring contractor.

When barge is being towed, captain must handle his lines. He also has the risk of having to get across other boats to get ashore and then walk along string piece on dock; often he has to climb over the side of a steamer to reach the dock.

Derrick lighters are fitted to handle heavy and bulky commodities and hence they are fitted with a mast and boom. The various types are capable of lifting from 3 to 40 tons. A captain is assigned to each one. On the gasoline and oil hoisters, he also acts in capacity of engineer. On those boats having a steam boiler, a licensed engineer is carried as well as a captain. These men have the same risks as barge captains and in addition must sling and hoist heavy packages.

Grain boats are deep hold boats fitted with wooden hatch covers over nearly the entire length of boat. Handling these hatch covers constitutes the greatest hazard on this type of craft, although captain must handle lines when under tow.

During the year 1929, there were 30 "lost time" personal injury cases in the entire lighterage division, 16 of which resulted in a loss of less than four days each. The 1928 record was approximately the same. In 1930 there were 10 during the first four months, so that the average is holding about the same. In spite of all our efforts, we have not yet succeeded in bettering our 1928 record. But at least we are holding our own. One very encouraging feature is the fact that there have been no fatalities or cases of permanent disability in several years.

A careful analysis of the 1929 records showed not a single case of injury was due to any act of a fellow employee, neither were any caused by defective or insufficient equipment, nor lack of any safety device. On the contrary, each injury was the result of the man's own action.

All injuries, no matter how slight, occurring to any person while on board any boat of ours, must be immediately reported and it is a serious matter to any employee who fails to obey this rule.

There is no question but that we could reduce the total number of cases that we have recorded as "lost time" ones, if we were to disregard the doctor's advice to the injured man, as many organizations interested in a good safety score are inclined to do. For example, a man falls and cuts his head slightly, then goes to the doctor to have it dressed and wants to return to work, but the doctor tells him to stay home a couple of days, as he might get a dizzy spell and fall overboard. A man goes to the doctor to have a cut attended to, with the intention of returning immediately. The doctor dresses it and advises man to go home and stay there for a couple of days to prevent risk of infection. Man falls and hurts ankle or limb and does not think much of it, but doctor tells him to keep off it, to prevent swelling or inflammation. In any case where the doctor advises man to take time off, we make absolutely no effort to induce the man to disregard the doctor's orders.

We maintain a first aid station at the Hoboken Terminal, with a nurse in attendance. Medical service is furnished injured employees, at the company's expense. First aid kits are furnished each tug, and are also placed in the various supervisors' offices around the terminal. When use is made of these kits, a report must be forwarded to the manager's office for record.

The accompanying table shows the causes of all "lost time" injuries that occurred to employees during entire year of 1929, together with percentage of frequency and seriousness.

It will be noted that 77.5 per cent of time lost was due to two causes:—(a) Slipping or falling; (b) Having foot squeezed between boats or dock.

Following are extracts taken from the Personal Injury reports, showing the manner in which they occurred:—

Floatman dragging line along deck of float to stow it away, stepped on a banana, fell and bruised knee cap. Lost one day's time. Float had brought in cars of bananas, so man knew they were lying on deck. These bananas are cleaned from float as soon as possible after unloading.

Cause of Injury—	Percentage of Total Number Injured	Percentage of Total Days Disability
<i>Slipping or Falling—</i>		
Floatmen	13.3%	17.9%
Tugs—Deck Crew	13.3%	3.4%
Tugs—Engine Crew	3.4%	1.3%
Barge Captains	3.4%	0.9%
Shore Forces	3.4%	4.1%
<i>Handling Lines—</i>		
Tugs—Deck Crew	10.0%	1.8%
<i>Handling Float Chocks—</i>		
Floatmen	10.0%	3.6%
<i>Handling Taggle Pin—</i>		
Floatmen	3.3%	0.5%
<i>Handling Hatches—</i>		
Grain Boat Captains	6.7%	9.1%
<i>Handling Freight—</i>		
Steam Lighters—Deck Crew	3.3%	1.3%
<i>Handling Barrel of Oil—</i>		
Tugs—Engine Crew	3.3%	1.3%
<i>Getting Foot Squeezed—</i>		
Floatmen	3.3%	42.9%
Steam Lighters—Deck Crew	3.3%	5.4%
Shore Forces	3.3%	1.6%
<i>Burns and Scalds—</i>		
Tugs—Engine Crew	6.7%	2.8%
<i>Hand Caught in Engine—</i>		
Lighter Captains	3.4%	0.6%
<i>Foreign Substance in Eye—</i>		
Tugs—Engine Crew	3.3%	0.6%
<i>Stepped on Nail—on Dock—</i>		
Floatmen	3.3%	0.9%
Total	100.0%	100.0%

Tug picking up car float, deckhand out on float handling lines, fell over one of the bits on float. Slight sprain right ankle. Lost five days.

Tug picking up tow of five barges, deckhand out on tow supervising placing of lines, stepping from tug to barge, slipped and foot was caught between boats. Lost three days.

Tug deckhand went aboard lighter to let go lines from dock, slipped on the deck of lighter. Man said he was not hurt, but stayed off two days.

Barge captain returning to boat, but not on duty, lost his footing walking down dock, fell and injured knee. Felt sick next morning and remained in bed. Lost two days.

Floatman passing between cars on bridge, stood too close to cars, when engine pulled them ahead, lost balance and fell.

Captain coming aboard tug to go to work, stepped on line, which could not be seen in dark. Wrenched ankle which swelled next day and he lost two days' time.

Tug picking up two-car floats. Floatman handling line, lost balance and fell overboard, rescued by deckhand of tug. Man left service after injury occurred. Estimated he would have lost 30 days.

Watchman going aboard tug, which was laid up, slipped on ladder going down to fireroom. Lost 14 days. Cut gash in head.

Oiler standing on rail around engine to oil engine, jumped down from rail, a couple of hours afterwards, felt pain in knee. Estimated lost 15 days' time.

Floatman walking along dock, but not on Lackawanna property, ground caved in, causing man to fall through pier, injuring hand, leg and stomach. Lost 30 days' time.

Out of the 11 mishaps listed, eight happened in the dark, one in the engine room and two in the daylight.

Floatman handling lines from float to dock, while tug was shifting float, stepped on line to breast float in close to dock, had foot squeezed between side of float and pier. No permanent injury but man did not return to work for five months. This was the most serious mishap of year.

Deckhand on steam lighter, passing lines across two barges to tie them up, put his foot outside of guards and had it squeezed. Lost six days.

Checker hauling barge belonging to another company, put foot over side of boat and when barge came alongside pier, his foot was squeezed. Time lost, 18 days.

All three of above injuries occurred in daylight.

The balance of the injuries, due to various causes, were all of the same general character, that is due to no negligence on part of any one else.

The first Marine Safety Committee was organized on the Lackawanna over 20 years ago, and once the safety advocates were able to convince all the doubters that safety methods would not slow up the operations, if common sense were used, so as not to go to extremes; safety work has received the approval and support of everyone in the organization.

One of the first duties of the original committee was to prepare and distribute a book of Safety Rules. These rules have been revised twice since issued; but many of the first rules remain unchanged, following are a few of them:—

Employees are forbidden to:—

(a) Stand on rail or guard to throw or receive line.

(b) Jump from boat while it is moving.

(c) Stand close to a line with strain on it.

(d) Stand under boom of derrick or under a load which is being lifted.

(e) Stand or walk on rail of floats when approaching dock or bridge.

(f) Attempt to replace hatches while men are working in hold of boat, as the hatch is liable to drop on someone below.

(g) Smoke on boats loaded with oil or other flammable material.

(h) Go ahead of a hand truck down a steep grade.

Deckhands must be careful when walking the guards of covered barges, and always use hand rails.

Any defects in hand rails noticed on any boat must be reported in writing to the assistant manager.

Decks must be kept clear of lines and anything else likely to cause one to trip or fall.

Chains used for lifting must not be patched with bolts or patent links, but sent to shop to have new links put in.

When putting ladder down in hold of light boat, captain must see that it is made fast from the top rung with a line to rail on deck to prevent ladder from slipping.

Captain must keep a deckhand on lookout on any boat or float whenever captain's view is in any way obstructed.

Each employee must sign a receipt for his book of safety rules reading as follows:—

"The undersigned having read and familiarized himself with the rules contained in the Book of Safety Rules, revised August, 1926, agrees to comply therewith and to return the book at the termination of his employment." This receipt must be returned within 10 days to the issuing officer.

We believe in the value of posters and other safety literature and use same when

obtainable. We do, however, find it difficult to find any posters to illustrate the specific hazards that we are interested in.

We are continually on the lookout to learn about the troubles that other people have, so that we can take precautions to prevent the same thing happening to our men. We do not assume the attitude that because a certain type of accident has never occurred with us, that it never will. We do not hesitate to use other people's ideas when we believe them to be of value.

On January 1st, 1929, the Lackawanna inaugurated a safety contest to take in the entire system, it being the belief of the officials that by encouraging a spirit of competition between the employees of the various departments, the number of personal injuries could be very materially reduced.

At the end of this year trophies will be awarded to the department and division showing the greatest improvement over 1929.

In the interest of safety, our tugs are not navigated during a fog.

During a gale of wind we do not tow boats to exposed parts of the harbor. If there are any boats lying in a dangerous position, we shift them immediately.

We employ a rigger who spends his time going on each boat periodically to inspect the gear and rigging and renewing any worn parts.

Not a great deal has been mentioned about the preventive measures that were being taken to reduce the number of injuries. However, we have spent a great deal of time to devise methods that would be successful in combating the type of injury that we have to contend with. Practically all of them being caused by overconfidence, thoughtlessness, absentmindedness and occasionally through being in too much of a hurry. Another year, we may be able to report on the efficiency of some of the plans which we now have under consideration, and also on some of those which have already been adopted.

Discussion

JOHN S. HUNTER (Atlantic Refining Co., Philadelphia, Pa.): On our ships last year, slipping and falling accounted for 33 per cent of our accidents.

F. C. GASKOVY (U. S. Employees Compensation Commission, Washington, D. C.): The Lackawanna has a remarkable record in comparison to the industry as a whole. If the marine industry as a whole would recognize that when there is a definite increase of hazard that you have to sacrifice speed proportionately, the industry would have a much better record than at present.

C. F. FLATHERS (Eastern S. S. Lines, Boston, Mass): What measures do you take, if any, to reprimand those who do not report accidents?

MR. COGAN: We have them so well trained now that very rarely do we have a case they don't report. We have taken disciplinary action in the past and they now report the most trivial sort of an accident.

A. R. BUSH (The Barber Asphalt Co., Maurer, N. J.): What disciplinary measures did you resort to?

MR. COGAN: The manager of the Marine Department has reprimanded various individuals. Sometimes he has discharged them.

CAPT. T. H. SHERIDAN (President, Alumni Association, New York Nautical School): The captain of a vessel once told me of an instance he had in very bad weather: fog, hail and snow. He kept going full speed. When asked why he didn't slow down, he said, "Why you got to be in on time; you know it is always clear weather in the manager's office."

CHAIRMAN TODD: The next paper is entitled "Prevention of Accidents and Explosions on Tank Steamers." There is probably no better authority on this subject than Mr. G. Guy Via, Certified Chemist, Newport News Shipbuilding and Dry Dock Co., Newport News, Va. Unfortunately, Mr. Via is not able to be with us, but the paper will be presented by Mr. Edward J. Robeson, Jr., Personnel Superintendent of the Newport News Shipbuilding and Dry Dock Company.

Prevention of Accidents and Explosions in Repairing Tank Steamers

By C. GUY VIA

Newport News Shipbuilding and Dry Dock Company, Newport News, Va.

Many fine papers have been read before this Congress on the subject of marine hazards, including the prevention of accidents and explosions on tank steamers. Information and suggestions have been presented, which, if understood and put into practice by all persons working in, on or around tank steamers, would further minimize the possibilities of disaster from this source and usher in the long-hoped-for era of safety always in this class of work. It is doubtful if the writer can contribute anything new to the subject, and he must therefore rely on the hope of being able to present an old story in a new light, believing that the clearer our understanding of the risks involved, the greater will be our determination to enlighten our less-informed brother—the man on the job—whose ignorance has so often in the past brought about explosion with its attending horrors.

Dangerous Cargoes

Listed in the order of their potential danger, the cargoes carried in tank steamers are:

- (1) Highly flammable (naphtha, benzene, gasoline, etc.).
- (2) Flammable (crude oils).
- (3) Less flammable (engine oil, fuel oil, lubricating oils, etc.).
- (4) Coal.
- (5) Miscellaneous (Creosote, molasses, coconut oil, etc.).

In point of danger, the distillates (naphtha, benzene, gasoline, etc.) head the list. These are extremely volatile at ordinary temperatures, and a comparatively small quantity of the liquid will render a large space explosive. For illustration, one quart of gasoline completely evaporated will render explosive a space of 525 cubic feet.

The vapor of gasoline is very heavy—so heavy, in fact, that in behavior it may be looked upon as an invisible liquid. Three negroes were cleaning the pump room of a tanker which was undergoing repairs in a dry dock. In the absence of the boss, one of them decided to smoke a cigaret, which he proceeded to light. Nothing happened until he threw his cigaret down and stepped on it, when the tanker exploded with a violent blast, killing and injuring several workmen. The explosive vapor, being very heavy, lay close to the bottom and was ignited only when the cigaret was thrown into it.

On another occasion a tanker at our own plant was, through a misunderstanding, allowed to discharge ballast out of a tank which had been previously filled with gasoline into the dock which had just been pumped dry. Workmen burning rivets out of the rudder ignited the vapor from this small amount of gasoline, and a series of minor explosions tore the floor boards of the dry dock loose, and set fire to the grating. Fortunately no one was injured, and little damage was done. Subsequent gas tests revealed the presence of more vapor in the dock which it was imperative to remove before work could proceed, and as the bottom of the dock is twenty-four feet below sea level, a real problem presented itself. It was finally solved by reflooding the dock, and hosing off the surface of the water in the presence of a strong following wind, to carry the vapors out into the river.

Undoubtedly many tankers have been blown up by these vapors of gasoline flowing along the deck into the aft passageway and thus into the galley, fire rooms or crew's quarters, where in one manner or another they were touched off. In this connection it is interesting to note that we have on one occasion recorded the presence of an

explosive mixture at a distance of sixty feet from a trough into which gasoline was being poured, and this, too, in the open.

Crude oil is, of course, petroleum just as it comes from Mother Earth, full of various gases, gasoline, kerosene, lubricating oil, wax, asphalt or what not which must be separated by the process of distillation at the refinery for the uses of man. Some crudes are particularly troublesome because of suspended gases which are continuously released at ordinary temperatures, and great care must be exercised at all times to prevent trouble.

The less flammable oils, such as lubricating engine or fuel oil are in general the residue of crude oil after the more volatile products (gasoline, etc.) have been removed. Under ordinary conditions these cause little worry except when confined in a closed space over a fairly long period. Many doubtless wonder what explosive risk there may be in a cargo or bunker of coal. Let it not be forgotten that many kinds of dust, notably coal or grain dust, are highly explosive; in addition some coals, long after being mined, continue to give off an explosive gas. Some time ago we made minor repairs on an Italian vessel which anchored in Hampton Roads after leaving our plant. A fireman entered the coal bunker on this vessel with an open light and the resulting explosion badly damaged the vessel and severely injured the man, who lay for weeks in a Norfolk hospital at the point of death.

Not long ago I crawled into the coal bunker of a vessel for inspection purposes, and discovered a negro shovelling coal amid a tremendous cloud of coal dust BY LIGHT OF A CANDLE! A perfect setting for a disastrous explosion! Needless to say, I had a personal interest in applying immediate corrective measures.

The miscellaneous cargoes of creosote, coconut oil, etc., offer little trouble other than the obnoxiousness of their odors and the ease with which most of them take fire. Of course all such tanks should be tested for gas as a matter of Safety routine.

Evaporation

Most oils, crude or refined, will evaporate readily at ordinary temperatures. The process of evaporation consists of the molecules of gas breaking through the surface tension of the liquid, and entering the surrounding atmosphere. Temperature and pressure both regulate the speed at which this process is carried on. The application of heat causes the molecules of gas to fly off faster, as will a decrease in pressure. The transfer slows up as the temperature falls or pressure increases.

What happens to the molecule after it has been released from the liquid depends upon the kind of gas it is. If it is by nature lighter than air, it will float on upward like a balloon. If heavier than air the molecules collect in dense masses along the surface of the liquid, diffusing themselves slowly into the upper atmosphere until the tank or container eventually becomes saturated with them if there is no means of ready exit.

This release of volatile constituents from oils was strikingly illustrated some months ago in a steamer which was tied up with the idle fleet in the James River for several years, and finally brought to our plant to be reconditioned and recommissioned. The fuel oil which had been left in her settling tanks when she was sent up the river had lost practically all of its volatile content during her idleness, and had taken on the consistency of jelly. It was necessary to dig it out with spades before work could proceed.

Fire and Explosion

Burning is the chemical union of molecules of combustible gas with oxygen or air, and the amount of air present determines the rate at which this burning shall proceed. A very rapid burning is, of course, an explosion and is most violent when there is present exactly enough oxygen to combine with every molecule of gas in the mixture.

There is then a possible range of explosive mixtures of gas and air beginning with a light explosion, increasing in violence to a maximum, and decreasing again to a steady burning, all dependent upon the percentage of gas present in the mixture. The empty tank which has contained oil then offers the greatest explosion risk in repairing vessels because of the presence of the gas and air mixture, while the tank full of oil calls for the exercise of extreme caution around all openings such as vents, hatches, etc.

Dangerous Gases

The gases which are encountered in this work are many and varied. Most of the explosive gases are hydro-carbons, so called because they are composed of two common elements, Hydrogen and Carbon, in various combinations. The variety of these combinations is extremely astonishing and interesting. Most of them are heavier than air, and settle in the lowest part of the tank.

One of the most interesting of these is known as methane (CH_4). It is a close relative of wood alcohol, which may be prepared from it. It is odorless, colorless and tasteless, intoxicating when inhaled, and explosive in comparatively small concentrations. It exudes through the seams of coal in most mines and is responsible for thousands of horrible mine explosions. It is also a product of decomposing vegetable matter, and has often been found in tanks of fresh water from the Tropics where vegetable matter decays rapidly. It is present in large proportions in sewer gas. Two young men in a neighboring city, slightly inebriated, were severely injured a few weeks ago when they ignited this gas over a manhole in the street "to see if it would burn". It did!

Another gas often occurring with methane is called ethane (C_2H_6) and partakes of the same general qualities. An even smaller percentage of this gas will render an atmosphere explosive, thus reducing the already narrow margin of safety.

Whenever a group of men are working in a small unventilated compartment with open fires of any kind, there are produced two other gases which, while not explosive, are asphyxiating or poisonous. The first of these, carbon dioxide (CO_2), bubbles merrily out of your glass of Coca Cola or soda water. It is also the end product of the natural process of breathing. Man breathes oxygen and returns to the air carbon dioxide. Plants absorb the carbon dioxide and return to the air life-supporting oxygen, thus preserving a sort of natural balance. It is a colorless, odorless and tasteless gas, non-poisonous, but when inhaled in sufficient quantities "water logs" the human lungs, and the victim keels over. A good dose of fresh air is the cure, and there are no particularly harmful after effects.

The other gas, carbon monoxide (CO), is also colorless, odorless and tasteless, but is deadly poisonous. It is produced wherever fires are maintained without sufficient air or oxygen for complete combustion. It will burn, changing into carbon dioxide. It is this gas which so often asphyxiates those who operate their automobile engines in closed garages. The poisonous effects are permanent because it changes the composition of human blood. In fact, this is one of the tests for its presence. Worse yet, the evil effects are cumulative—a little today unnoticed; a little tomorrow and so on until finally collapse or death.

Another deadly poisonous gas is called hydrogen sulphide (H_2S) and is found in many crude oils from Mexican or South American fields as well as in some of our own western areas. Its toxic qualities are so very pronounced that oil men refer to it as the "rattle snake". Unlike the other gases discussed, it possesses a most offensive odor (that of rotten eggs) and is dangerous in concentrations as low as .01 per cent. It is also highly explosive, and is perhaps one of the deadliest gases encountered in this work.

Apparatus for Testing

The quick turn around of tankers at a ship yard renders the use of the ordinary laboratory methods of gas analysis out of the question. It is often necessary to meet the vessel in the harbor in order to have the gas testing well under way by the time the vessel reaches the repair plant, and this necessitates quick and accurate determinations. Speed is impossible with a complete analysis apparatus.

There are many satisfactory rapid determination outfits on the market. In every case, the combustible gas is burned out of the sample, the difference between outfits resting in the manner in which the percentages are measured. One type absorbs the combustion products in water, and measures the contraction which the measured sample of atmosphere undergoes as a result of removing the combustible portion. Used with care, this instrument is fairly accurate and thoroughly dependable.

Another and later type depends for its operation on the principle that the heat of burning is directly proportional to the percentage of gas present in the sample. A continuous stream of the atmosphere is drawn through a combustion chamber where the gases are burned by means of an electrically heated platinum coil. The heat produced by this burning activates a thermo-couple, the meter of which is calibrated in percentages of gas present. These instruments are very sensitive and have the added advantage of permitting continuous readings in all parts of the tank under inspection. Of course, none of the instruments discussed determines the exact nature of gas present, which information is not at all necessary. It is sufficient to know that there is present an explosive or flammable gas.

Clearing for Tank

If gas is present in a tank, there are three handy means by which it may be evacuated: Steam, compressed air or water, used according to the dictates of judgment. Of these steam is most often used and very effective when properly handled. Compressed air may often be of service, particularly if time is pressing. Water is limited in its application to this work.

There seems to be a strong impression prevalent among the officers and crews of tankers (and indeed among many of our own ship yard people) that the injection of steam into a gaseous tank neutralizes or "kills" the gas. This impression is, of course, entirely erroneous; there is no chemical reaction at all. That is just what we wish to prevent. We explain the process to them thus: As the steam heats up the tank, most of the residue oil adhering to the bulk heads, beams, girders, etc., softens and flows or drops to the bottom of the tank, and considerable gas is driven out of it by the heat that would not be released at ordinary temperatures. The molecules of gas present affix themselves to the molecules of steam—"grab hold" as it were—and when the hatch lid is opened, the steam and gas both rush out into the air. That explains to them in a satisfactory manner why the last fourth of the steaming is done with the hatches open; otherwise when the steam condenses, it would simply "turn loose" the gas, and we are back where we were when steaming began.

As before stated, oxygen is necessary for an explosion. No air, no burning. Displace the air in a tank with steam, and the gas present has nothing to combine with (explode). A gassy tank full of steam is practically "fool proof" and steam should be kept in all gaseous tanks as a matter of precaution even when no work is contemplated in or around the tanks themselves.

In safety work, tanker repairs may be classified thus: (1) explosion risk; (2) fire risk; (3) asphyxiation risk, listed in the order of their seriousness. An ample supply of fresh air usually takes care of the last of these; fire extinguishers and fire hose handily located minimize the fire hazard, but CAUTION first, last and always is necessary to avoid explosion. It comes without warning and is all over instantly with its consequent horrors.

Causes of Explosions

The seriousness of the explosion risk brings forcibly to our attention the possible causes which should always be eliminated as far as possible before repairs are started. These causes may be roughly classified under three main headings, the first of which is electricity, either natural or generated.

Under natural electricity we may subdivide into (1) lightning, and (2) static. Lightning is unavoidable, and is to be considered as an act of God. Many tankers struck at sea have gone to the "Port of Missing Ships" without leaving a trace. Some years ago we practically rebuilt the tanker, "Swiftstar." After leaving our plant she sailed to New York, thence to South America where a cargo destined for Europe was loaded. She put to sea and was never heard from again. Months later her refrigerator washed ashore in the West Indies, bearing unmistakable evidence of explosion. Probably struck by lightning.

Static plays queer pranks. The flow of liquid along a rubber hose generates static. That little chain that dangles from the rear of an oil truck wasn't put there for an ornament, but to ground the static charge when delivering gasoline. The wise filling station attendant presses the metal delivery nozzle of his hose hard against the side of the automobile tank when filling. Some months ago, two seamen were washing down a gaseous tank by hosing with salt water. The nozzle of the hose made contact with bright metal on the hatch coaming and the tank exploded from the resulting spark of static, killing three men.

Under generated electricity we classify (1) short circuits; (2) faulty contacts with subsequent arcing; (3) lamps accidentally broken; and (4) ground currents or strays. Insistence upon the use of good materials, well insulated and properly installed will eliminate most of these hazards if reasonable care is used in handling portables, lamps, etc. A portable left dangling carelessly in a tank or lying under foot on the ship's bottom is an extremely poor advertisement of "Safety First."

Sparks as a possible cause of explosions may be roughly classed (1) steel against steel and (2) sparks from burning materials. A few years ago two tankers collided just at the mouth of the Mississippi. Sparks resulting from the impact ignited the vapors, set one vessel on fire and exploded the other which drifted helplessly out into the Gulf, a floating, blazing pyre for the crew. Fifty-one persons have just lost their lives as a result of the collision between the "Fairfax" and the Tanker "Pinthis." The horror of this regrettable disaster was greatly increased by the burning oil which enveloped both vessels immediately after the impact, undoubtedly ignited by sparks from the ripping, grinding and tearing of steel plates. The skipper of an oil barge had his shoe heels pegged on with nails. As he walked along the deck of his vessel, he struck a spark with his shoes which exploded his barge with serious damage.

Tools of steel carelessly used have ignited many a tank. In this connection it is very enlightening to stand in a tank and watch rivets being removed with a backing out tool. The shower of sparks which follows each rivet is alarming—to the observer at least—and causes one to reflect seriously on the dangers attending the promiscuous use of hammers, wrenches, drift pins, etc.

Under the heading "sparks from burning materials" we may note coals from rivet forges and sparks from ships fires or perhaps a nearby crane. But the most infamous villain of all is the tube of paper filled with tobacco—the cigaret. Restrictions regarding smoking around these vessels can never be too rigidly enforced, but something more is needed. All workers must be educated to the dangers involved in "stealing a smoke" away from the supervisor's line of vision. The natural tendency would be to crawl into some out-of-the-way compartment, probably containing some gas, and light up—a practice against which all workers must be admonished—and immediate and permanent discharge should be the punishment meted out to any wilful offender.

The third and last group of explosion causes arise through carelessness with fires or open flames. The use of burning or heating torches must be carefully and rigidly restricted; no torch should be lighted except with the permission of the certified chemist. Even in open air great care must be exercised because of vent pipes, etc., leading from the tanks. Perhaps a cargo line needs watching. Always one should know what conditions obtain on the side of the bulkhead or plate opposite the point where heat is to be applied. This is especially true in welding where good judgment must be exercised as to the depth of oil sufficient to dissipate the heat generated in the welding process. Hot rivets are suggested as another possible source of trouble, especially in dirty tanks subject to gas regeneration.

Exhaust gases from gasoline or Diesel motors may also be included. Not long ago a young man in our own city was driving an oil truck down the street which exploded from these gases, causing injuries which necessitated the amputation of both legs. Just one week previous a naval tender down South blew up from the same cause, killing two sailors and injuring several others.

Procedure in Case of Accident

Finally, let us consider for a moment the correct procedure to follow in case of an explosion. The most important thing to remember is that following the blast, the tank or tanks will probably be filled with the deadly and poisonous carbon monoxide, and to undertake rescue of the victims without gas masks will be a needless sacrifice of more lives—yours if you try it. Under no circumstances should you enter such a tank without a proper mask unless you wish to attempt suicide. Courage and discretion can go hand in hand. There are on the market satisfactory canister masks which afford ample protection in such an emergency. Rip the tape off the bottom of the canister, slip on the face piece, and hop to your errand of mercy!

Another equally important thing to remember is that these canisters require enough air (oxygen) to support life, converting the poisonous and asphyxiating vapors to a harmless gas before they reach the lungs of the wearer. There will be a deficiency of Oxygen in the tank after the explosion and this should be immediately supplied by promptly dropping an air hose or two into the tank. This may save the lives of the injured even before the masked rescuers enter. It is absolutely necessary if the rescue squad is to render effective service or, perhaps, even survive. Let us all then engrave on the tablets of our memories these three things:

- (1) Get air in the tank;
- (2) Get masked;
- (3) Get the doctor.

Mr. Gregory: I am very much impressed with Mr. Via's paper. I think that we in the Marine industry must put that kind of information over to the foreman on the job and to the men who are doing the work. I know a number of Jersey ship-building companies who are doing it and doing it well but the ignorance of the men on the job is lamentable and is responsible for a great many of our accidents. Along in January of this year I happened to be in a port where two men had suffocated in a tank through lack of oxygen. I made some inquiries and was interested enough to attend the coroner's inquest. Two superintendents of ship yards, men past fifty, were there. Both said they had learned nothing through experience or in reading that would warn them against this danger. A chemical analysis of the air of that tank taken two hours after the bodies of those two men who were killed were taken up, showed the oxygen down to five per cent. Still we had outstanding men in that port who had spent their lives in marine work who didn't know there was any danger of such an accident; none of their foremen had been instructed; they had no safety rules. I think we need to get this specialized knowledge over to the men who need that knowledge.

JOHN S. HUNTER (Atlantic Refining Co., Philadelphia, Pa.): Without exception, that paper is the most interesting I have heard at the Congress. I think if a set of safety rules along this line could be posted on tankers it would certainly be an asset.

CHAIRMAN TONE: The next paper of the day was prepared by Mr. Robert F. Hand, Vice-President and Assistant General Manager of the Standard Shipping Company, New York City. The paper will be presented by Mr. Henry J. Heidorn, of the Standard Shipping Company.

Tank Cleaning Made Safe

By ROBERT F. HAND

Vice-President & Assistant General Manager, Standard Shipping Co.,
New York City

Since the advent of petroleum tankers a form of industrial hazard has arisen which has resulted in numerous personal injury accidents. I refer to the system of tank cleaning by manual labor, the hazards of which are quite apparent.

This method requires steaming for long periods of time, then washing down with a hose, the water from which in many cases is cold. This washing operation is begun from the top of the tank, the workmen handling the hose descending slick ladders as the temperature and gas condition of the tanks will permit. After the washing operation is completed it is then necessary for the men to climb around in the darkened, greasy space to clean up the rust and sediment from the bottom. This operation is particularly dangerous, not only from the risk of injury from falling, but because there is always the possibility of men being overcome by gases generating in this scale and sediment.

When the cleaning operation is carried on in port it is usually done by large numbers of unskilled, foreign laborers, who are very difficult to supervise and to make understand the great dangers that exist. Much lost time and many accidents are inevitable under this system.

In tanker operation, due to the necessity of changing cargo from time to time, that is, carrying different kinds and grades of oil, as well as the necessity of gas-freeing the compartments for minor or shipyard repairs, frequent and thorough cleaning of tanks becomes necessary. As a general rule, tankers are gas-freed before they are sent to a shipyard, the only exception to this rule being when the tanker is in a sinking condition, or so badly damaged it cannot be cleaned or gas-freed without drydocking. It is also permitted to send a ship to a yard for repairs to the rudder, propeller blades and/or machinery without being gas-freed, in which case the tanks are sealed and special precautions taken to prevent unauthorized persons on board. On the east coast, some of the shipyards have their own gas-freeing establishment and therefore permit the vessel to enter the yard for the purpose of being cleaned and gas-freed prior to commencing work involving a risk which should be eliminated if a practical means of doing so is developed.

It is believed that if it could be accomplished without great expense or delay to the vessels that all tanker operators would prefer to gas-free a vessel entirely before allowing it to go to a shipyard for any repairs.

From the viewpoint of safety it is obvious that in order to minimize the possibility of accidents in tank cleaning operations we should avoid as far as possible using any other than the ship's own experienced personnel and avoid sending any men into the tanks until the latter are thoroughly and entirely gas-freed to the extent that they will remain so.

For the past several years the Standard Shipping Company has tried out and ex-

perimented with all types and methods suggested for tank cleaning that appeared to have any considerable merit. The only method tried out which eliminated the danger element at a cost not prohibitive, has been given thorough tests by our company and installations have been made on various types of ships and under all conditions. It is a method which does not require the steaming operation or the necessity of men entering the tanks. The whole operation is performed from the deck by two or three men who may be from the ship's own crew.

The method accepted after much experimentation is one whereby the tanks are washed by heated water directed against the sides of the tanks in a solid stream at high pressure from revolving nozzles, these nozzles turning slowly in a horizontal and perpendicular plane so that their positions change continually with each revolution, causing the stream to be eventually directed against all surfaces of the tank. The nozzles are part of the machine that is lowered down through an opening in the top of the tank, reaching down to about one-half the depth of the tank. The machine is made entirely of bronze, thereby eliminating any danger of accident due to projecting the machines into the steel tanks. The power to revolve the nozzles is supplied by a small air motor located on the upper end of the unit, which remains above deck. Water for this operation is supplied through high pressure hose connected to the deck fire-line. For most efficient cleaning operations the water should be heated to a temperature of approximately 160° F. and supplied by fire or general service pump at a pressure of 175 to 200 pounds. The most efficient and practicable method of heating the water appears to be to take the pump suction from the overboard discharge of the main or auxiliary condenser and through the evaporators. If additional heat is required a steam augments may be introduced into the fire-line.

Another important feature of the system is that it not only cleans the ship's sides, bulkheads and over head, but effectively cleans the floor of the tank as well, because of the continuous working of the cargo pump which strips the tank of the hot water used in the cleaning process, thus realizing the full force of the solid stream on the tank floor. It is obvious that by the old method tank cleaners would be unable to retain their hold on the hose if the water pressure were as great as that obtained in this new system. The great pressure exerted when the water, which is emitted from the nozzles in the new system strikes the tank surface, immediately pulverizes the rust scale and this falls to the tank bottom. The breaking away of this scale naturally eliminates the gas deposits which are always found in and behind the rust. When the tank is stripped of the hot water and residue, the cleaning and gas-freeing has been entirely completed and it is unnecessary even to send men down to swab up any debris.

This excess of water and slop oil in the tank bottom when stripped off is discharged through the cargo lines overboard if vessel is at sea, unless the ship's position is such as to conflict with the present regulations covering pollution of inland and coastal waters. In the event that this residue from each tank gas-freed and cleaned cannot be pumped overboard, it is then pumped into one special compartment known as a slop tank, and after the vessel has been moored to the dock the contents of this slop tank are either pumped into a slop barge or disposed of through some other channel where there is no chance of their contaminating the harbor waters.

The time required for gas-freeing a tank is usually from one to one and a half hours, depending on the nature of the cargo which had been carried. In a tank which carried gasoline the cleaning operation consumes about one hour's time, but for the heavier grades of oil, such as Panuco Crude and cylinder stocks, approximately 1½ hours are consumed.

This new method of tank cleaning is known as the Butterworth System and has been adopted by the Standard Shipping Company. The use of the system will, we feel, tend to reduce the number of lost-time personal injury accidents which in

turn eventually may have a salutary effect upon the P. & I. insurance rates. Aside from the increased safety features, the new system will, according to expert opinion, be a factor in prolonging the life of the vessel through elimination of the steaming operation which is required in the processes generally used heretofore.

CHAIRMAN TOOE: The next paper of the day is entitled "How and Why Marine Accidents Happen", and the speaker is Mr. F. C. Gregory, Safety Engineer of the United States Employees' Compensation Commission, Washington, D. C.

How and Why Stevedoring Accidents Happen

By FRANK C. GREGORY

Safety Engineer, U. S. Employees' Compensation Commission,
Washington, D. C.

A discussion of the causes of the accidents which result in the injury or death of workmen will be pertinent as long as such accidents remain uncontrolled. There are several ways of approaching the problem. The reason for the particular approach used here is the opinion commonly expressed by marine men that "the men hurt themselves through their own carelessness"; and having thus determined upon the cause, they argue that accident prevention, except by the men themselves, is futile. It is evident that no real progress can be made if we are to grant the correctness of these premises, and it is hoped here to discard "carelessness" as a vague and unsatisfactory generalization and to show the relation of accidents to more tangible causes.

It generally is not difficult to learn in a general way "how" an injury was incurred by a longshoreman. Even the briefest reports usually connect it up with some definite thing. He fell; he was struck by a moving load; something fell upon him; he caught his hand on a projecting nail; and so on through the hundreds of details which go to make up our list of how men can get hurt while handling cargo. For three years the U. S. Employees' Compensation Commission, through its statistician, has been classifying the injuries reported to it, (shipboard injuries only, as dock injuries do not come under its jurisdiction) in an attempt to show the industry "how" its injuries are caused. This information is of great value to those who are actively working to prevent a recurrence of the things responsible for the injuries. It shows at a glance the major sources of injuries and the seriousness, in time lost, of the different types of accidents. This may be illustrated by the result of one year's tabulation of 15,000 injuries to longshoremen while working on board our ships. In giving the time lost, approximately 1,000,000 days, the customary figure of 6,000 days is used for the 83 fatal accidents included.

Cause of injury	Percentage of total accidents	Percentage of total days lost
Struck by falling object	28	28
Handling objects by hand	26	12
Struck by moving object	18	19
Falls of persons	12	32
Sum	84%	91%

It is not necessary to go into further detail in this type of classification to see its value in pointing to the operations which need to be studied and corrected if the accidents which are injuring our longshoremen are to be controlled. Detailed classifications of this type are published in the annual report of the Commission.

Turning from "how" the injuries occurred to a consideration of "why" the accidents which caused them were allowed to happen or were not prevented, we have a more

difficult situation. This is true, mainly, because no one wishes to take upon himself the blame of having been, in any way, the cause of an injury. The result is an evasion of the real questions and an attempt to shirk natural responsibilities.

It is ultra-conservative to state that more than 90 per cent of our accidents are man-caused and hence should be capable of control by man. (A generally accepted figure of 98 per cent was the result of a comprehensive study of many industries by the Travelers Insurance Company.) If we are to discard "carelessness" as a cause, and substitute for it more tangible sources of the accidents, we must accept the statement "accidents do not happen, they are caused." There are a few other facts which have been accepted as axioms by those engaged in accident prevention work. An employee is entitled to a safe place to work. Responsibility for results should be no greater than the authority to control the conditions which produce those results. Conversely, those who have the power to control results cannot escape the responsibility for them through neglecting or refusing to exercise it.

If we accept these as truisms, we may begin to search for the source at which the accidents can be prevented and try to find out why they are happening.

The control of management over the physical condition of the working place, gear and machinery can hardly be questioned. Even with the contracting stevedore who must work the ships that come to him, the safe condition of those things which affect his men is subject to control through his contract with the owner. That this is not always done is merely an indication of the attitude of the industry. The prevention of accidents due to working place and gear is through proper inspection of working place, machinery and gear, followed by any necessary repairs and the selection of proper gear before the job is started. A common provision of laws designed to protect workmen from the physical hazards of a working place which has become dangerous is that "no one shall be allowed to work therein except such men as are employed to make it safe." The effect of a working place properly maintained, lighted and ventilated in promoting safe and efficient work is of much value in creating proper morale.

Examples of a few sources of this type of accidents are, improperly made or maintained ladders and gangways, worn out falls and topping lifts, hatch covers, worn out (but not discarded) gratings over steampipes rusted until dangerously thin, unguarded gears, unprotected steampipes and electrical conductors, poorly maintained winches, improper lighting, and wrong type of gear for the job.

More serious, both as possible sources of accidents and in their influence upon the morale of the workmen, are the working policy and operating methods of the employer. Here again there can be no question of the employer's control. His is the decision as to the place accident prevention is to have in his general plan of operations. He decides whether he is going to subject his men to unnecessary hazards or give them reasonable protection. He may never consider these things, but he still retains the authority to make the decision. His operating methods will indicate his attitude whether he has a definitely formulated policy or not. First he selects his chief stevedore and foreman; who are to carry his policies to the men and the job. When looking for the most available man, does he search for one with a thorough knowledge of the work, who can plan a job and see it through in an orderly, efficient manner, and who has sufficient control over himself so that he can be safely given control over others? Or does he select a "driver" whose voice and temper are used to cover up his shortcomings as a stevedore? The character of these foremen will have much to do with the safety record of the organization.

Under this heading also come the selection of working methods, where a choice is possible, and the choosing of the types of machinery, trucks, slings and other gear. Much knowledge and good judgment is required in choosing these to properly balance safety and efficiency against first cost.

Congestion of traffic, attempting to speed the work to a pace beyond the capacity of the machinery or the men, lack of attention to "good housekeeping" all contribute

to the number of accidents which are chargeable to operating policy and supervision.

Examples of such accidents are failure of gear through overloading, cargo falling from improper type sling or sling load, traffic accidents, those arising from working too many gangs in a hatch, from failing to remove or bolt strongbacks, not taking time to correct dangerous hatch covers, the various slips, falls and punctures from untidy working places and the tendency to declare an emergency which justifies the disregarding of usual precautions.

The adoption of the proper working policy is entirely in the hands of the management. In the carrying out of the details, working rules and standards are of the greatest assistance. The work which has been done by the various port and regional safety committees of the United States in the past three years in putting into print their best experience in various kinds of work is a big step toward controlling accidents, which arise in faulty judgment or methods. These rules need to be considered more seriously.

So far the management and supervision only has been considered. But the men are the ones who get hurt. Lost-time accidents reported to the Commission for one year showed 15,194 longshoremen and only 174 foremen and superintendents were injured. To what extent can we justly hold them responsible for their injuries? If we go back to our original proposition of responsibility following authority, we find the men are chosen by their employer and directed by him, through his foremen, to do work in the place, manner and under the conditions which he prescribes. So far, all the employee has done is to offer himself for employment. The employer would be the last person to say that each man should decide for himself what he would do and how he would work for his own protection. Nor can the men be blamed for their physical or mental imperfections. They must work to live, and seek employment where they can find it. The less fit they are, the greater the necessity for taking any job and working under any conditions that may be required. So the employer takes the responsibility for those whom he employs. If it is necessary to employ men who have no knowledge of the work, it is also necessary to give them some instructions and this should include how to protect themselves and their fellows, as well as efficient handling of cargo.

But the men have a very great part to play in avoiding injury. If we consider a company which is doing its part, then the men have the actual prevention in their own hands. Ignorance of the details of their work is one of the great sources of injuries, and this may happen to an old longshoreman who finds himself handling a new kind of cargo. The eagerness of certain types to curry favor with the boss often gets them into trouble. Others are thrown out of their mental balance through resentment. Mental and physical unfitness for the job undoubtedly are responsible for some of our injuries. Horse-play occasionally results disastrously. But the average man, working under favorable conditions, wishes to do a day's work in a workmanlike way and to avoid injuring himself or his partners. He is usually willing to submit to discipline and work according to the rules laid down for him. If left to his own devices, however, he should not be expected to exercise the same judgment as a foreman. If he had it he probably wouldn't be down in the hold. He should strictly obey the safety rules of the company, and he should be allowed to do so on all ordinary occasions, so that they become fixed habits. He should know how to do his various jobs, especially how to lift without injuring himself. There must be some source from which he can gain this knowledge, and the wise foreman will provide a source. He should stay sober on the job, and his foreman should see to it that he does! And he should keep his mind on his work and protect himself and everyone on the job from injury. Even here his foreman and his fellow workers can help him immensely if the job is organized for safety and efficiency.

The men who are injured from falling or by moving objects, while doing their regular work, can hardly be held responsible for being in the particular place, unless

they are disobeying orders. These two classes furnish about half of our accidents. A great part of the falls are due to slippery deck or cargo, or to stumbling over dunnage, gear, and litter. While it is true that many of these could be avoided by a little more care, it is better to remove the cause than to blame the man after he is injured. The injuries where the man plays the leading part are those which come from handling objects by hand. Here he seems at first glance to have control over the situation. There are, however, contributory causes here over which he has no control. Going from a brightly lighted hatch into dimly lighted wings, the change is too rapid for his eyes to accommodate themselves and he fails to see, or, more often, misjudges the distance to a stanchion or a pile of cargo, and strikes against it. He picks up a box or crate which has a nail or splinter on the opposite side. He is compelled to stand in an unscientific position to stow a piece of cargo. Or he is given a job of which he knows nothing, and does it the wrong way. In all of these he undoubtedly has a large part to play, but he should not be merely called "careless" and given the entire blame for his injury.

The responsibility of the men for their own safety increases, then, as their employer furnishes safe working place and gear, competent supervision, instruction in the proper working methods and definite safe working rules to follow. The skeptical employer will be agreeably surprised by the interest which his men will take in accident prevention if given a chance to work under these conditions.

So far we have considered only the stevedore and the longshoreman. The steamship operator also has an important role in the accident prevention program. He controls the working place and its maintenance. He also books the cargo and decides, in a general way, upon its storage, and, probably the most important of all, he chooses his stevedore. Recently there has been an improvement in the maintenance of American registry vessels and this is reflected in a decrease in the accidents due to gear failures. In some of our trade routes stowage methods are planned without consideration of the safety of longshoremen. But the greatest control which the steamship operator can exert over the causes of accidents is to let his stevedore know that they will not be tolerated.

If, in conclusion, we consider all of the reasons "why" accidents are not prevented, we will find that each one indicates a failure on the part of some one to properly carry out some duty. In other words, there is a lack of efficiency, due to lack of knowledge, poor judgment, physical or mental ineptitude for the job, and, to a great extent, to working under traditions which have been outgrown by other industries.

Conditions and methods which make for efficiency also prevent accidents. A high compensation insurance rate accompanies high cargo damage and unnecessary breakage of gear and machinery. Efficient work does not mean slowing up operations, but planning them so that they run more smoothly and quickly. If you doubt this, ask the manager of a steamship line or a stevedoring company which has its house in order, and you will find that reduced total costs, reduced cargo damage and low accident frequency go together.

JOHN S. HUNTER (Atlantic Refining Co., Philadelphia, Pa.): In line with Mr. Gregory's address, I have here a few copies of the safety rules for the prevention of accidents to longshoremen which were adopted by the committee in Philadelphia in May of this year. If you are interested in having a copy I shall be glad to give you one.

CHAIRMAN TONE: From the Atlantic to the Pacific Coast, gentlemen, there is a rapidly growing tendency to adopt some type of rules for the workmen. This booklet is in line with one recently adopted by the American Shipowners Association in New York and also similar to the one adopted on the Pacific Coast through the agency of Mr. B. L. Pickard.

The final paper of the day has been prepared by Mr. A. J. Smith, Engineer of the Marine Office of America, New York City. In his absence I will ask Past-Chairman Bush to read Mr. Smith's paper.

Motorboat Hazards

By A. J. SMITH

Engineer and Surveyor, Marine Office of America, New York City

The motorboat referred to here is particularly the pleasure yacht and small commercial craft plying our inland and nearby coastal waters in distinction from the sea-going or off-shore coastal motorship, even though the line of demarcation between the types is not very sharp and the application of this text straddles such line in varying degrees.

It is by no means our intention in reciting these hazards to throw cold water on a useful trade or a very enjoyable pastime; but this business or sport is no different from any other in that it can be improved from a sane safety viewpoint without losing any of its "kick" as a competition beater or promoter of thrills.

It is the intention, however, to note for each hazard recited or implied some prevention or remedy and the first point, as always in safety campaigns, is the personnel.

You have the exterior hazards of stranding, collision, heavy weather and fog, and the interior exposure of fire and explosion. The attitude of the navigator and engineer, professional or amateur, toward these ever present hazards is of paramount importance. To the underwriter who signs his company to cover these risks, this matter of personal ability and mental attitude toward "perils of the sea" is very vital. Too often, however, he can only guess at this factor and many a time pays the price of error in record or judgment. A boat, up to the mark in every particular physically, cannot be a good risk improperly manned, either to the underwriter from the pecuniary standpoint or to the owner from that of life and limb of all on board.

Of "ability and attitude" referred to above, the former is a matter of education, the best of which is experience, first under capable seamen, then on one's own; the latter is another story. The most dangerous menace to sane navigation is the type of marine "know-it-all" who delights (himself and his kind only) in posing as a swagger sailorman. His slogan is "If it didn't happen, it won't"; yet his course is punctuated by wrecks and injuries.

This attitude of bravado is almost always in inverse ratio to experience and ability. The real seaman is the one ready for any happening but determined to furnish none of his own making.

The Government requires a motorboat operator's license, obtainable for little more than the trouble of application, on boats carrying passengers or freight for hire; but there are no requirements governing personnel on thousands of boats operating in often congested waters or lanes of large as well as small boat traffic. While true that all are subject to navigation and equipment rules, the lack of the personal check on the operator still remains. Our contention is that all power boat operators, professional or amateur, should be licensed just as much as motor car operators, and that such license should entail an examination establishing the ability and knowledge of the operator at least equal to if not higher in standard than required of the road driver. There would then be an effective check on the "Captains" whose actions, either through ignorance or bravado, are a constant insult to the rules and traditions of the seas.

The remedy lies in such requirements; and in lieu of these at present, in every "man-jack" making a real "tar" of himself for his own and his brother's welfare.

The next step is to "go well found." The Government lays down very good and definite rules for lights, sound signals, life preservers and fire extinguishers on motor boats not over 65 feet in length, and provides for regular inspection and documenting for those over 65 feet or of 15 gross tons and upward if engaged in carrying trade; but there are several other points in a boat's findings worthy of note, specifically:

Ground tackle or anchor gear. There are cases without number where boats

insufficiently or improperly moored have drifted into trouble if not disaster; but the greater danger is that one such in a crowded anchorage may foul and free one or two and progressively start half of the fleet toward a dangerous lee; witness the Manhasset Bay disaster of 1924. Only two or three started to drag, but in a few hours over thirty were pounding on the beach.

In crowded harbors, proper scope is not always obtainable and "hull weight" is the alternative recourse. An empirical rule which gives a generous weight of anchors for ordinary conditions and also takes account of possible snubbed requirements is:—One pound of anchor iron for each ten cubic feet of molded displacement; or for ordinary molded or "V" bottom hulls, length by beam by draft to top of keel divided by ten. This weight should be carried in two fairly equal units as a matter of practical handling, so that one may be kedged out ahead of the bower, or if the bower starts, the boat may be dropped back and a second bower laid, all depending on circumstances wherein our personnel again looms high.

Cable for each anchor should be carried, never less than enough to give five depths of scope in any anchorage. The following table of manila and equivalent BB chain suitable for various anchor weights is at least a useful check though not an iron-bound rule.

BB CHAIN		3 STR. MANILA		Breakage	Strain	Anchor Wt.
Dia.	Cir.	Dia.	Cir.			
3/16"	1 1/2"	3/16"	1 1/2"	2300 lb		35 lb
1/4"	2 "	1/4"	2 "	4000		60
5/16"	2 1/2"	5/16"	2 1/2"	6100		90
3/8"	3 "	3/8"	3 "	8700		125
7/16"	3 1/2"	7/16"	3 1/2"	11600		175
1/2"	4 "	1/2"	4 "	15200		225
9/16"	4 1/2"	9/16"	4 1/2"	18800		280
5/8"	5 "	5/8"	5 "	22900		340

Another point worthy of note before leaving the subject of ground tackle. Watch your leads against chafe. As many boats have "sawed" themselves free as have dragged.

Pumps:—A little water in the bilges, like a few fleas on a dog, does no harm; but the boatman at all possible times should have that level under control. Nearly every boat is equipped with either a direct connected or independent bilge pump which has ample capacity to take care of the normal accumulation of water and often much more. Such pumps are not to be discredited; but while their capacity is usually ample, the connection sizes are small on account of the speed at which they normally run, and consequently the liability to foul at the suction is increased and in case of accident either engine or electrical source of power may be deranged or not immediately available. A second pump of the simplest construction is a valuable reserve and just often enough to make it an impressive and invaluable one. Carry a fisherman's pump or a tin portable as an emergency auxiliary. The following minimum discharge sizes for hand pumps of plunger or lift type are recommended where bilges are not cross bulkheaded.

L x B (Sq. Ft.)	I. P. S.	AREA
Under — 250	1/4"	.305
250 — 450	3/8"	.533
450 — 750	1 "	.86
750 — 1300	1 1/4"	1.50
1300 — 1800	1 1/2"	2.04

Where water-tight cross bulkheads are installed, the suction should be manifolded conveniently near the pump and the pipes led independently to each compartment. A bulkhead sluice is too often left open and non-workable.

From these items, it is but a step to a few notes on construction. One of the best protections against the hazards of stranding and collision, or, in fact, leaks from any cause, is proper bulkheading. It is seldom possible to obtain a two-compartment division in motorboats, i. e. one by which the boat will float with any two compartments flooded; but a one-compartment division is usually quite feasible. That is a matter of simple calculation for the designer. Even a small boat should have a W. T. fore'd and after collision bulkhead. A water-tight steel bulkhead is simple, particularly with the use of welding, but the wooden one is more difficult of construction. The best so far is double or treble diagonal planked with painted canvas between layers and neat fitting margin frames set up on stop-waters. It is good practice to make even partition bulkheads water-tight up to the level of the accommodation floors, both from the leakage and fire protection standpoint.

And now to a point of rigging or rather jury rigging. An amateur yachtsman, owner-skipper of a 36 foot motorboat, recently was caught off Sands Point with a nasty little blow and an engine breakdown on his hands by way of an afternoon's sport; but he was set for just such an emergency. With a pair of jury shrouds, a head stay and a canvas cover rigged on his signal mast and two oars and a piece of flooring for a leaboard, he sailed his near derelict around Oak Neck and into the shelter of Manhasset Bay with no personal injury and only a few replacements of broken clutch parts chalked up against the incident. A stranding in that gale would certainly have spelled trouble if not injury or loss of life.

Every motorboat owner should size up his particular craft and plan and try a jury rig. Being ready is the difference between a sailor and a lubber.

There are two other admonitions against hazards which exist only if created by the boatman himself. Do not ask an engine designed for an intermittent load, such as automotive, to carry a sea load and then if failure results, charge it up to an unkind Providence. Stay on the seas for which your boat is designed. Do not take a runabout or a power houseboat with a light high superstructure offshore, where if a sea does make up, its power is so vastly greater than in sheltered waters. Neither such boat has a fair chance.

To the last of the exterior hazards, fog, there is as yet no answer in close inland waters, though the submarine bell, radio beacon and synchronous signal are of assistance off shore. The best remedy is prevention. Don't go if you don't have to and remember that "reduced speed" is not 15 miles per hour just because your boat can make 20 or 25. Steerage way is the only legitimate "reduced speed."

The most dangerous of motorboating hazards is the interior one of fire or explosion; and yet it is the one of them all that has proven most difficult to impress upon builder and operating personnel,—excepting possibly those who have been "burnt." The "undesirables" mentioned earlier are particularly rank offenders against the natural laws of fire hazard.

To begin, let us cite a few established facts. Gasoline and fuel gases in liquid form will not explode. They will burn violently. These liquids will vaporize with varying degrees of rapidity under atmospheric conditions; but no matter how rapidly they vaporize, such vapors are all heavier than air and will not rise and float away unassisted. The vapor density of the lightest is about 1.18, of the heaviest about 3.5. These vapors are always at least as flammable as the liquids from which they emanate and within certain ranges of atmospheric concentration, much more so, i. e. explosive. This range of concentration for both gasoline vapor and fuel gases is approximately from 1 1/4 per cent to 5 1/4 per cent by volume, or in other words, one cubic inch of gasoline, vaporized, will make seven cubic feet of air as explosive as dynamite,—and that's no idle simile. 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 it is quite possible; and even diesel oil should be treated with respect.

The best protection, and so far as explosion is concerned, the only protection, is

prevention; and the best prevention is wittingly to permit no gasoline or fuel gas vapor to escape below deck, and to so ventilate the lower portion of spaces where vapor may accumulate in case of leakage, that a dangerous concentration will not be reached. And let it be remembered that these precautions apply as much to gasoline auxiliaries of diesel plants as to main gasoline installations.

Detailing of preventive measures against fire and explosion would carry this paper to an unpermissible length; but even that might be risked if such specifications did not exist in the National Fire Protection Association Marine Rules. The section of these rules pertaining to Internal Combustion Engines and Boat Equipment has been carefully revised and brought up to date this year by representatives of the National Assn. of Engine & Boat Mfgs. and Underwriters acting as a special committee for that purpose. These are being reprinted in leaflet form independent of the complete rules which treat of fire hazards on all classes of ships and are or will be available for the asking from N. F. P. A., 60 Battery March St., Boston; or Marine Office of America, 53 Beaver St., New York City.

In conclusion, it can be said that the common sense precautions in handling oneself ashore apply doubly to the moving foothold and close clearances found on board a small boat, and if the notations on the physical hazards, each in some degree affecting the personnel, have added anything to the safety afloat idea, our end has been accomplished.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Metals Section

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**Tuesday Morning Session
September 30, 1930**

**JOHN P. EIB, Chairman
Illinois Steel Company, Joliet, Ill.**

The first session of the Metals Section at the Nineteenth Annual Safety Congress convened with John P. Eib, Supervisor of Safety and Labor, Illinois Steel Co., Joliet, Illinois, presiding.

Opening Remarks by the General Chairman

**By JOHN P. EIB
Illinois Steel Company, Joliet, Ill.**

On behalf of your Executive Committee, I bid you welcome to the 1930 Congress and particularly to the Metals Section.

Your committee has worked diligently to prepare a program which we trust will prove of interest and inspiration. Whether or not our efforts have been worth while depends entirely on how much the members want to get out of the meetings.

The work of the National Safety Council is entirely cooperative. If we fail to get enough out of these meetings it is often because we fail to put enough into them, so in bidding you welcome I also want to urge you to participate. These meetings are yours and your officers are merely endeavoring to follow your wishes.

At this point in the program it has been the custom to present a review of the activities of your Executive Committee since the last Congress.

The first conference of your committee was held in Chicago immediately following the Congress with the thought in mind of obtaining reactions from the program just concluded.

This was followed by a meeting of the Executive Committee at Council headquarters on December 10, 1929. This being the first get-together after the Congress,

of the new officers, the details of the duties of the various chairmen and their committees were outlined. Another of the important items decided was that of the amended rules for the Iron and Steel Safety Contest. A program committee was appointed and topics for presentation at the next Congress discussed.

Another item discussed was that of a Foundry Research Committee.

The next meeting of the committee was held at Council headquarters on March 17, 1930, where reports from all of the committee chairmen were presented and a tentative Congress program outlined.

For a number of years past your committee has realized that a large percentage of our members are interested in the Foundry business, either wholly or in part, and has been gradually working out a plan for complete recognition of this division of our Section, and I am happy to report that very marked progress has been made during the last year by the committee under the leadership of Mr. Fred Bennett. The outcome has been that they have prepared an entire session which will be presented on Wednesday afternoon. This is a definite step and it is one that every member of the Section should aid in every way possible as well as attending the session.

The Poster Committee has had a very good year under the guidance of Paul J. Brand.

The Publicity Committee has had a most outstanding year and we are indebted to the excellent service of Mr. Robert L. Schmitt for the splendid way in which he has handled the work of this committee.

The Engineering and Safe Practices Committees are continuing their work for another year and plans are being made for increased activities.

Dr. R. C. Engel has also contributed some mighty fine articles as chairman of the Health Committee.

The monthly News-Letter is one of the definite and outstanding services of our Section and you all know what an excellent piece of work Harvey Hensel has accomplished in this position.

In view of the fact that I have had such an interesting year and have had such splendid cooperation, it is difficult and impossible to signal out one person over others but I do want to mention particularly the fine cooperation manifested by Frank A. Lauerman, who very kindly consented to do two jobs during the year in spite of the fact that he was not well. Frank was originally selected as chairman of the Membership Committee and proceeded to do a fine piece of work. Later on we were compelled to accept the resignation of W. E. Megraw as chairman of the Program Committee due to a change in his position. Frank Lauerman very kindly consented to take over this work in addition to the chairmanship of the Membership Committee. This is most outstanding cooperation and I commend him.

In addition to all of the regular meetings mentioned above, there have been numerous meetings of sub-committees and other members of the committee at Council headquarters. A number of the members were also present at Atlantic City in July.

During a large part of this year, your committee was confronted with the problem of continuing its activities and service in spite of the recession in general business conditions. It proved considerably slower to function by the medium of correspondence but very effective results were obtained.

Another problem which had to be met was that of maintaining memberships even though business conditions were not maintained and I am especially proud to present an outline of the work of our membership section.

The companies affiliated with the Metals Section have probably felt the recession of business as much, if not more, than any other section of the Council and we laid our plans with the cooperation of the Council headquarters' staff for a very extensive campaign and excellent results have been obtained. A complete report of all of our methods of approach would take too much time but an outline will appear in the minutes. Briefly, I want to say that this campaign resulted in maintaining practically all of our old members and in addition obtaining seventy-seven

new industrial memberships so that while the membership shows a slight decrease, we only lost nine members during a year of depressed and uncertain business, and I think this speaks exceptionally well for the membership activities.

The presentation of the slides which will be made later in our program by Mr. Oartel, bids fair to be larger than previously presented.

In conclusion I want to express again that I feel that it has been an honor to serve as your chairman and a privilege to be with the other members of the Executive Committee. Again I want to thank all of these members for their splendid help and also to show our appreciation of the fine work and assistance rendered by the members of the staff of the National Safety Council.

CHAIRMAN EID: That, gentlemen, is a brief outline of the reports.

We are indeed fortunate, and are honored by again being permitted to listen to Mr. Arthur T. Morey, formerly of the Commonwealth Steel Company, Granite City, Ill.

This part of our program has always been set aside for an inspirational talk by an executive. I don't know of anybody who can talk, both from the standpoint of experience and from the heart, better than Mr. Morey.

Address

By ARTHUR T. MOREY

(Retired), Past President of the National Safety Council, St. Louis, Mo.

I was saying the other evening to a group of friends that I thought the safety movement one of the greatest and most important that had ever come among men in the history of the world. They said: "That is a big statement. I wonder if the participant in a movement is unprejudiced and unbiased enough to give an impartial conclusion like that?"

I replied: "Well, do you know of any other movement among men upon which we all are agreed?" Men don't agree about democracy or government in any form. They surely don't agree in religious matters, as hundreds and hundreds of sects and denominations signify. They don't agree on political matters; not even on Boy Scouts, the Y.M.C.A., etc.

But on safety everybody seems to be agreed. I can imagine that if Gandhi of India were here this morning, and Mussolini of Italy, and even our Bolshevik friends from Russia, they could sit in, in agreement with us on the safety movement. I don't know of any other movement in the history of mankind like this safety movement; and there comes with that a dignity that we can feel, and an encouragement in our purpose.

And I wish our movement could grow more and more to become an international movement because of that very fact, to get men to agree on one thing, and then it would be possible to get them to agree on other things. So our safety movement may have a greater work to do than even we have realized.

And in our own country, while we consider the Red Cross—the Red Cross of Mercy—as something we must all help and respect on account of the wonderful work it has done, and the wonderful work it always stands ready to do, yet isn't the White Cross of Safety a more important thing?

We are never away from the need of safety. Right here in this building, now, there are boilers, electric conditions, and structural conditions which need safety to protect us. We are always under the protection of safety—right thinking, right doing, right construction, etc. Safety, the White Cross of Safety, is responsible for that protection, whereas the Red Cross of Mercy is but for emergencies. Prevention is better than the need of cure, and I hope yet to see the White Cross of Prevention a greater movement among us than even the Red Cross of Mercy.

Our President should be the Honorary President of the White Cross even as he is of the Red Cross. Let's have a big sense of our movement; let's be proud to be members of it; and by our fruitage let us attain to that place that is ours.

And we are succeeding. Just think of the marvelous report we had yesterday from the Cement Section, from the Portland Cement Association—years in important plants without a single lost-time accident. Many of our industries report 80 to 90 per cent reduction in accidents. We want to be with a successful movement.

Our Public Safety work, while it seems discouraging at times, is doing wonderfully well. It is very interesting and encouraging when you get to work in a community with school children, to see the accidents go right down because of intelligent, organized effort.

So we can feel the inspiration that comes with success. We are in a successful and a big movement. Let us get a proper perspective of it in order to continue and expand our efforts along these lines.

Now with regard to this Congress and the value we are going to get out of it. With what receptivity did we come to this Congress? Motoring out along one of the country roads near St. Louis, I recall there is a little spring with a little stream coming down a pipe from it, the stream being no bigger than your little finger. There is a barrel beneath it, and it filled that barrel.

Now you can take a tin cup down to the Atlantic Ocean, and get only a tin cup full. It isn't a matter of how much water is there; it's a matter of how receptive we are and, how ready and desirous we are of receiving a message.

Have we come here to this Congress with that spirit of service, that earnestness of seeking, that love of our fellow man, that prepares us with receptivity to get all there is out of this Congress? Or have we come to serve some other motive, to get a trip, or to do this or do that?

But if we keep with the singleness of purpose to put over this idea that has a principle behind it, we can get a tremendous message out of this Congress. Why, the place is rich with value—with the Exhibit downstairs, and with all these different sessions. So in entering into our discussions, let's have a barrel. Let's be equipped with a barrel to receive, instead of just a little tin cup, and we will get in proportion as we are prepared to receive.

To be in a receptive attitude we have got to get our convictions right. You know, there is something about this safety movement, something to it, a sort of spiritual appeal, almost, that grips you and makes you want more and more of that enrichment of character and relationship among men.

Now what is this safety movement? It doesn't concern the safety of animals. That is for the Humane Society. It doesn't concern the matter of materials. That is for the research and the manufacturing operations. Our safety movement deals with men. And what is man? He is a mental being. How grateful we can be that we are past the time when we hired men's bodies, and so many "hands" working for us, as the phrase used to go.

When we hire a man now, we hire his mind. We want his loyalty. We hire his spirit, his enthusiasm, his interest. Then we have a real man working for us. It seems to me that our safety problem is a mental problem, to understand men, and how to put the right ideas into their minds that actuate them, cause men to be moved mentally, because men do as they think, as they know, as they understand.

You have simply got to have the men with you in the safety movement. It isn't a matter of orders and fear. That is the lowest motive with which to govern men. You have got to have the men with you, and it seems to me the safety man stands in the finest position of any one in the works to develop that side of things.

Well, we say, treat men as men. But how will he know how to treat them? Each of us is a laboratory of all of us. Those things that mean the most to you also mean the most to other men. We are all fundamentally alike. We each need shelter

and clothes and food. We have the same ideas and ideals about our family and the children, and to get them educated and to give them a decent home.

We have our own self-respect, we want to do the things we ought to do as members of the community, and when we get right down to it, can't we see that all men want those things as much as we do? That is why the Golden Rule is so significant. That is all the Golden Rule is.

I suppose you have all read that wonderful thing by Drummond. He says: "The greatest thing in the world is love." It seems to me that this safety movement is a matter of loving interest and service in our fellowmen. Our contact with the men can't be a mercenary contact, something just to have a job. It seems to me we have got to get right next to the individual and be his friend, have an interest in him, increase his self-respect, increase our own self-respect, build up his morale and interest in his work.

There is one point there I would just like to speak of in passing. I think we have got to be very careful of our safety statistics. If we take a man who isn't properly able to go back to work, who shouldn't go back to work, but yet to save our records we put him in some job, perhaps almost prop him up in the watchman's shanty to say he is back on the job, that is not a wise thing to do; we are dealing with a thing that can have success with it, and we want the best success; and if we take some sort of a substitute, or we are not clear and fine about our safety records, we will hurt the attitude of the men. There must be a fine, inspiring, up-looking morale in the men about safety, and no substitute is necessary. Otherwise, we fool ourselves, and the worst fooled man is the fellow who fools himself. If we make a good record when we are not absolutely entitled to it, we cease to make the effort to actually earn a record. And the men know those things immediately. Sincerity is absolutely essential for the safety man and to the morale of the work.

I have spoken before of this, I think, at some of our meetings at another Congress. It has meant so much to me that I am going to speak about it again. I think the way to deal with men is to see the real man in the other fellow. I don't think there is any other, practical way. We are all alike in the fundamentals. We have got to sincerely feel that. And I believe that there is a real fellow in every one of us.

Now, we will say you have a little statue here, maybe a beautiful and exquisite thing. If it is all covered with mud, somebody comes in and says: "Isn't that an ugly thing!" And you say: "Why, no. Let me show you." And you take that mud off and expose the statue itself, and the person says: "Why, that is beautiful!"

Now there is that real fellow in every one of us, but we have covered him up with the mud of ignorance and prejudice and selfishness and misunderstandings and mistakes and what not. Sometimes we ourselves look pretty ugly. And the real friend is the fellow who can see that real being in us. You know from your own experience that the ones who have helped you most in life are the ones who have believed in you. And the art of friendship, the most exquisite art there is, is that art and ability to see the real man in the other fellow, and help him see it in himself.

I don't think we know the effect and meaning of a kind word or a show of interest. Why, I have felt it myself so many times. I remember very well one morning when I thought that the whole plant was on my shoulders, and that this and that wasn't going right. I had the wrong slant on everything that particular morning.

Going back and forth to the plant I often used to overtake the men and give them a lift. This particular morning there was an old darky walking along, and I stopped and picked him up. He was one of the boys in the shop, a fine fellow—and I have gotten over judging men by the color of their skin. I want to know the color of their heart—and I know some mighty white black men.

Well, that old darky said something nice to me that morning that just made the sun shine, and I felt different the whole day through. Well, we are all that way, and when some one in authority takes an interest in some fellow down the line, it means more to we sometimes have any conception of.

Now this thing must be a sincere thing. It can't be a gesture. It can't be something with a mercenary motive, the desire just to get something, or get around a fellow, or influence him, or be politic. There has got to be a sincere love and appreciation for the man, seeing through his mud, helping him, coaching him, helping him to be successful. I think that the biggest job of a foreman is helping his men to be successful, not just sitting up there and saying, "I want this", and if he doesn't get it, being dissatisfied, and perhaps discharging the man.

The successful foreman is the foreman who can help his men be successful. To see the right idea, and to help them achieve the result by doing a thing the right way is the function of a foreman. That protects their job. It helps them up the ladder. It helps them be successful. And I think in those lines the safety men can be wonderful helps to their plants, even leaving out that delightful experience of being surrounded by a lot of sincere friends in the work.

And the right has always principle behind it. The right idea has omnipotence behind it. That is why our safety movement is so wonderful in growing and doing. It is right. And nothing can stop a right idea, if we don't quit. So I would just like to leave that thought with you this morning, if nothing else.

In your relationship with your man, see the real fellow there, and address yourself to the real fellow, and help him see it himself. Help him get over his limitations and mistakes, and encourage him, and help him, and coach him, and he will make you know his loyalty as a safety man, and he will make you a far better worker.

I think in this question of safety we must all the time work with the right idea of discipline. Now there are all kinds of discipline. There is that perfectly asinine discipline that bawls out somebody before somebody else. There is that kind of discipline that is critical in judging. But if we are going to attain, we must have standards; we must have ideals and ideas; we must know where we are going. We have got to have an objective. We have got to hold the men to it.

I can perhaps illustrate what I mean more easily by taking a case that happened in one of our shops. We were having a lot of trouble trying to get the men to wear goggles. They weren't very pleasant to wear, because when the men would get sweaty the perspiration would roll down and steam up their goggles obstructing their vision. We provided sweat bands to help that, cleaning cloths, and everything we could think of. But, uncomfortable or not, goggles must be worn.

Now we have got to have a reason for things. When we started safety work we found nine one-eyed men in our plant. The accidents hadn't all happened in our plant, but some of them had. And by the way, it was Walter King who helped us in those early days to try and devise a goggle. At first I guess we had only window glass in them, but as time went on they were developed more and more. Anyway, the idea was to protect that marvelous organ of sight, the eye. It is terrible to have blindness, never to see the sun shining any more, to see friends no more, to see the beauty of Nature no more. Blindness is terrible. So the idea is to protect the eye, regardless of the inconvenience. So goggles must be worn.

I came through the shop one day and saw a man at work not wearing goggles. I drew his attention to his goggles and he immediately pulled them down from up on his cap. Well, as I dropped by there a little while later, I could see from a distance that he had them up on his cap again.

I sent for his foreman. I said to the foreman: "Why isn't that man wearing goggles?"

The foreman replied: "I have told him and told him and told him to wear his goggles!"

I asked him, "How many times have you told him that?"

The foreman answered: "Oh, I have told him a dozen times."

"That is entirely too many times," I said. "That belittles your foremanship. We don't hire you to tell men things. We hire you to lead men to do things. Any old

fool can tell things. The man worth while is the fellow who can lead men to do things." So I said to him, "Call that man out here."

The man came out. He was a man who had been with us for some years. I said: "Why don't you wear your goggles?"

He replied: "Well, I don't like them."

Now our work isn't very fine. I mean, chipping castings isn't like making a watch. And while there is some inconvenience in wearing the goggles, it doesn't interfere seriously with the work.

So I said to him: "Well, you ought to realize the value of your eyes. Now you take good care of your tools at night. You put them away carefully. You want them all in good repair. You want your air hammer working perfectly. And here are your precious eyes that you are leaving exposed."

Then I said: "Now, I tell you what you do. Your foreman tells me you have been told many times to wear those goggles. Now you just take your tools and go home. (I think this was a Wednesday.) Now you go home and think it over."

"And if you don't want to be a real Commonwealther, if you don't want to be one of us and help in this safety idea that is for your benefit and the benefit of everybody else, if you don't want to be a sport and have a part in this great company and its great work, and this beautiful idea of safety, don't come back. You are not happy here in doing the things that are necessary to be done. Now go and find some place where you will be happy. This isn't the place for you if you feel that way."

"But if you think it over and think this is a pretty good place to work, and that the safety idea is the right idea, and you want to have a part in this company's achievement and enjoy safe results, why, you come in and tell your foreman here Monday morning that you have thought it over, and want to be a good safety man, and you want to go back to work."

Well, believe me, Monday morning he was on the job. Now that didn't lose the man's job. He had some children. He had a home and was paying on it. It would have been a terrible thing for him to lose his job, but it would also have been a terrible thing to lose an eye.

He respected the safety idea more. He became a better safety man, and so far as I know, he wore his goggles after that all the time. I checked up on it. His job was protected. And it was a friendly thing to do. Now who lost by that? Everybody gained, it seemed to me, and yet we maintained the discipline.

I think we must be strict in our discipline. If a thing is right, it must be maintained. If it is wrong, change it. And another thing along that line is that I think our safety rules, gentlemen, must be practical, absolutely practical. We go over our safety rules every so often and we cut out anything that is not expected to be done. If it is expected to be done, it must be done. We have our safety rules practical, commonsense, and up-to-date.

It is not such a good plan to print up about a million copies and have them stacked up in the closet, and then when you want to revise them, why, you have got so many unused ones left over. Get only as many printed so that you have to revise them and get out a new copy at least once a year.

And then when they are all gone, or diminishing so that you only have so many left, then we used to talk to the superintendents and foremen and workmen and our safety committees, and we would get a revision that was really up-to-date, something that everybody expected to comply with.

We have been most interested to have a safety committee for all the different departments, a chairman and several members in each division. And once a month we have had those chairmen come into our noonday luncheons with the officials and superintendents, and each month we ask the chairmen to bring a different committee man.

And we sat down in the officers' dining room and had a nice dinner, and then after dinner we stayed and talked things over, and we had such a kindly feeling and

such confidence, that those fellows would just tell us everything on their minds. And the suggestions that have been made have been great. I will leave it to Mr. Quessell, our efficient safety engineer, if the results of that committee have not been wonderful.

The poor suggestions are so few I don't remember them. But having made a suggestion, and having discussed it and investigated it, if necessary, act upon it at once. Look it over thoroughly, and be perfectly frank. If it shouldn't be done, or if it can't be done, tell them why and satisfy the men. If it ought to be done, do it gladly and at once.

If a fellow makes a suggestion that he thinks is a good one, and a week, or two weeks, or three weeks, or a month go by without any action being taken on it, he just gets disgusted. But let a man make a suggestion, or let a workman send in a note to the committee, or let a committeeman himself bring in a suggestion, and then in twenty-four hours, or forty-eight hours the men see that thing done, why, it just electrifies the whole safety effort. It encourages the men.

Now, I think my time is up. I would like to say this, though: I hope we will all earnestly support our local safety councils. Let's make more of those safety councils. Make them sort of a pooling place for our ideas and our troubles and I think we can build up our local councils in our various communities to do a more effective and larger work, and spread their influence.

It is much like the palm of the hand. The national organization is the palm, and the locals are the fingers, all cooperating and working together and need each other. So let's build up the locals and strengthen our movement.

And in closing, if I may just add a word of counsel, let's keep our heads during this time of business recession. The idea we are serving is too big, the country is too wonderful, there is too big a future to let fear get in and rule us instead of the common sense that should rule us. Just let's keep our heads and do our best and be optimistic, and this whole business situation is going to straighten itself out fine. And our safety work will not be hampered in any way, I am sure.

CHAIRMAN EBB: Mr. Morey, on behalf of the Metals Section of the National Safety Council I sincerely want to thank you for your fine address. Words from you are to me always wise and of kindly service, and are a real inspiration.

Our next item on the program covers the accident statistics for the year 1929. There is a real message in the report that has been prepared for 1929. This time we will call on Mr. E. R. Rose of the Republic Iron and Steel Company.

Accident Experience of Members in the Metals Section During 1929

By E. R. ROSE

Safety Director, Republic Iron and Steel Company, Youngstown, Ohio

The excellent spirit of co-operation which exists in the Metals Section was proven by the response of our members to requests from sectional officers for their accident records during 1929. Reports increased from 448 in 1928 to 561, or about 25 per cent. The 1929 accident experience in the different industries in our section is the most representative we have ever obtained, as shown by the increase in hours of exposure from about 900,000,000 for 1928 to over 1,250,000,000 for 1929. Approximately 25 per cent of the man-hours reported by over 3,600 establishments to the National Safety Council were worked in plants of members of the Metals Section. Your sectional officers appreciate the co-operation you are giving in developing accident statistics for our section.

Among our various groups we had a gain of over 50 per cent in reporting steel plants with an increase in hours of exposure of 75 per cent. Last year, for the first

time, we requested each steel plant member to submit his accident record by departments, with very gratifying results—over 95 per cent of the members in that industry submitted detailed records, demonstrating excellent accident recording. Reports from our foundry members rose from 159 in 1928 to 229 for 1929—a gain of 44 per cent. Employees in that group worked a total of over 409,000,000 man-hours in comparison with 339,000,000 in 1928. Large gains were also reported by our heavy machinery manufacturing divisions and members engaged in the manufacture of railroad cars and other railroad equipment.

In describing to you the growth our section has made in reporting accident records, I wish to point out that reports to the Council represented the largest cross-section of accident experience in American industry ever obtained. Reports were received from over 3,600 establishments in comparison with 2,550 for 1928, and hours of exposure rose from 4,200,000,000 to over 5,000,000,000. The Petroleum Section, with an increase of 100 per cent in both reporting companies and hours of exposure, has almost equalled the growth of our steel industry. The Public Utilities, Paper and Pulp, Power Press, Packers and Tanners, and other sections likewise had more members report than ever before.

The accident experience in American industry, as represented by records of about 1,100 plants that have reported in each year since 1927, shows that lost-time accidents per million hours worked have steadily decreased—the total reduction being 11 per cent—but that the severity of accidental injuries has increased 5 per cent during the period. The steady increase in the annual severity rates was due to a sharp rise in the fatality during 1928, and a sharp rise in the rate for permanent partial disability accidents during 1929.

The accident experience of the various groups of the Metals Section has, for the most part, followed the tendency for industry as a whole. The steel industry, represented by 51 plants with an exposure of 200,000,000 man-hours reporting in each of the last three years, has shown a steady decrease in the frequency of lost-time accidents, but rising severity rates. The 1929 frequency rate was 19 per cent less than in 1927; a reduction almost four times that of industry as a whole. The 1929 severity rate for steel plants, however, was 32 per cent above 1927, which is over six times the rise for all industries. This increase is due to a steady rise in the fatality rate during these years. These plants reported 25 killed and totally disabled in 1927, 43 in 1928, and 56 in 1929. The 1928 frequency and severity rates for permanent partial disability accidents rose over 1927; but for 1929, though the frequency rate remained constant, the severity rate for permanent partial disability cases declined. For all three years, however, the frequency and severity rates for temporary disability accidents have steadily dropped.

The 1929 accident experience in the foundry industry was the worst in three years. The experience of 111 identical foundries working about 280,000,000 man-hours annually indicates that the industry had its most favorable accident experience of the period during 1928, for both rates were lower that year than in either 1927 or 1929. The sharp rise in the 1929 frequency rate included increases in fatalities and permanent partial disability accidents.

The 1929 severity rates of plants engaged in the manufacture of railway cars and other railway equipment and those manufacturing machinery were also higher than for either of the previous two years. Their 1929 frequency rates were, however, lower than for 1927, but higher than for 1928. The fatality rates of these industries showed no increase over the previous years, but, in common with other industries, the rate for permanent partial disability accidents was higher.

There is considerable evidence that accidents are more numerous and serious during prosperous years, such as 1929. As I have shown, we have been able to control, and even reduce our temporary disabilities, but not our serious accidents. Are we focusing too much attention on minor hazards and not enough on major ones? More liberal allowances by state compensation boards have undoubtedly been a factor in

higher severity. Then, too, many plants are keeping better accident records and are more willing to report serious cases. Some personnel men claim that their adverse experience was due to inability to hire first-class men during busy periods. A study in a large plant showed that 65 per cent of new employees had an accident during the first three months of their employment. High production must be met with more exact training and supervision of new men and no let-down by old employees.

Individually, numerous plants in all branches of the section showed improvement during 1929 in comparison with 1928. Of the 76 plants in the steel industry that reported for both years, 51 had lower frequency rates in 1929 in comparison with only 25 with higher ones. Improvement in severity, however, was not so general, for only 35 plants reported lower rates against 41 with higher ones.

Individual experience in the foundry industry in 1929 was not quite so favorable, for more plants reported increases than decreases. Less favorable experience was likewise reported by plants manufacturing machinery; but railway car and equipment manufacturers were able to report more reductions than increases in both accident rates.

The Metals Section compares favorably with 23 other industrial groups listed in the Council's publication, "Industrial Accident Statistics," 1930 edition. The average frequency rate for all industries last year was 25.53 and the severity 2.23. The average rates for the Metals Section were slightly lower; we had 25.26 lost-time accidents per million hours worked, and 2.17 days of lost time per 1,000 hours. The steel industry, with an average frequency rate of 18.13, ranked seventh in this list of 27 industrial groups; our foundry group in twenty-first place; railway car and equipment companies ranked eleventh, and our machinery manufacturers, included with a group of companies manufacturing light machinery, ranked eighth. The Metals Section, as a whole, had a lower frequency rate than the Paper and Pulp, Petroleum, and Rubber, but higher than the Chemical, Textile and Cement Sections.

Individual records in each branch of our section vary widely. In the foundry industry, for example, the frequency rates for grey iron foundries ranged from 0 to over 150; the average rate was 52.37. The fact that more than half of the group had rates less than the average shows very good work on the part of medium sized and smaller foundries, and off-setting adverse experience by some large plants. Grey iron foundries ranging in size from 58 to over 600 employees established some excellent records; 2 had no-accident records for the year, and 8 others reported frequency rates less than 16.0.

Though rates among steel foundries ranged from 0 to over 100.0, an excellent record of 3.95 lost-time accidents per million hours worked was established by a large foundry employing over 2,000 men. Further illustrations of effective safety work in this group were demonstrated by six other foundries with rates from 15.0 to 30.0, in comparison with an average of 51.14 for the entire group. A comparison of the experience of foundries, as a whole, shows that accident prevention work in the large foundries is somewhat superior to that in the smaller ones.

Though frequency rates for plants in the steel industry ranged from 0 to over 150 lost-time accidents per million hours worked, many excellent records were reported. A plant engaged in a specialized field, employing almost 400 men, did not have a lost-time accident throughout the entire year. Only seven temporary disability cases occurred in another plant employing over 2,000 men, which gave it a frequency rate of 1.19 in comparison with 3.85 for 1928. Frequency rates less than 10.0 were very common; these low rates were established by 30 per cent of all reporting mills. This is likewise true of severity experience, for 36 per cent had severity rates less than 1.0; the average rate was 2.75. Accident experience in the large mills during 1929 was, on the whole, more favorable than in the smaller organizations.

A compilation of the experience of our steel members in their various departments shows that accidents were most frequent in skelp and strip mills and least frequent

in roll turning departments. Open hearth operations lead in the severity of injuries with roll turning again having the most favorable record. Regardless of the variations in the hazards of different departments, no accident records were frequently made by small organizations, and numerous large departments had frequency rates less than 5.0. A blast furnace department, with an exposure of over 1,000,000 man-hours, reported only two lost-time accidents for the year; eight others had rates less than 9.0, though the average rate was 17.01. The average frequency rate for our open hearth departments was higher than for blast furnaces, 22.1, but 25 per cent of the reports covering this department showed rates less than 10.2. One open hearth department, in which the employees worked over 500,000 man-hours, established a no-accident record for the entire year.

Though accidents were more frequent in sheet and tin plate mills, skelp and strip mills, seamless tube mills, and construction departments than in any others, many records compared favorably with those in less hazardous departments. We find, for example, that nine out of 43 sheet and tin plate mills had frequency rates less than 10.0; the average rate was 27.90. The average frequency rate for skelp and strip mills was 33.82, the highest for any department, but nine out of 16 organizations, working from 194,000 to 900,000 man-hours, had rates less than 18.0. The best frequency rate reported for seamless tube mills was 8.73, and the best severity rate .05, made by a plant that worked 572,000 man-hours. The average frequency rate was 32.20 and the average severity rate 2.06 for seamless tube mills. A much larger plant, working over 2,500,000 man-hours, had a frequency rate of 10.49 and a severity rate of .49. The good records that have been achieved in the various departments of the steel industry are goals for all of us. I have shown you by the number that have made these low records that they are not uncommon even in some of our most hazardous departments, and, in many instances, equal the best that have been made in industries with fewer hazards.

Lost-time accidents among our members manufacturing railway cars and other railway equipment averaged 21.88 per million hours worked and there were 2.2 days lost-time per 1,000 hours worked. Favorable experience predominated in the small shops, most of whom are engaged in repair work; their rates averaging about 10.0 for frequency and under 1.0 for severity. The large shops, building cars, had frequency rates higher than 21.0 on the whole. The manufacturers of signal devices, track specialties, and parts for locomotives and cars, had similar experience. Numerous low rates by members in this branch of the section show that they are keeping pace with other industries.

I have emphasized the good records which were made by many companies in the section during the last year because, in many instances, they reflect continuous attention to safety work over many years. To those who had higher than average rates, the experience of these plants serves to indicate what can be achieved in reducing accidents. There is still plenty of room for improvement in many of our plants, but that we are advancing cannot be doubted. We expect to do better during 1930. Let every member, then, send his 1930 record to the Council early next year.

CHAIRMAN EBB: That is a very splendidly prepared report.

T. H. MCKENNEY (Illinois Steel Co., So. Chicago, Ill.): Mr. Rose, in his statistics on the Metals Section (if I remember correctly) stated that over the last three years there had been a decrease in the frequency of lost-time accidents, but an increase in the severity. I think he quoted figures something like 19 per cent reduction in frequency, but 32 per cent increase in the severity. Then, a little later, he brought up the question of whether or not we had been paying too much attention to our minor accidents and not enough to the severity.

I want to ask, how are we going to tackle that question? I have always thought that we should go after the little ones, and that would keep down the big ones.

F. G. BENNETT (Buckeye Steel Castings Co., Columbus, Ohio): It is rather

difficult to answer Mr. McKenney's inquiry. I think that several years ago Dr. Chaney answered that to a certain extent in one of his reports on structural changes in the steel industry as having to do with the severity.

On your severity problem, I think the Lord has a lot to do with that. You drop a weight from an overhead crane and it can cause simply an abrasion on the shoulder, or it can cause a fractured skull, possibly a fatal accident. You don't know how it is going to turn out. It is rather a difficult question to answer, but not a thing to pass up. It is a thing to be studied and followed up. And the medical men have something to do with it also, on the extent of disability.

E. G. QUASNER (General Steel Castings Co., Granite City, Ill.): I think the reason for some of the increase in severity is due to the improvement of our medical departments. We are finding more things now the matter with the men than we used to do. We are more careful in the examination when a man is injured. I am sure that we are finding more fractures on account of the X-ray being used more frequently.

And naturally if a man has a fracture, he will probably lose time, while if it wasn't thoroughly established that he had a fractured bone, he might have been allowed to go back to work. I think our severity rate has been a reflection of a more efficient medical organization. A definite line has been drawn by that department in the disability of an accident.

CHAIRMAN EBB: Yes, I think that is very true, gentlemen. Dr. Chaney, of the U. S. Department of Labor, is in the room. We all have a very kindly feeling and reverence for Dr. Chaney, and I am going to ask him if he won't come forward and say a few words.

DR. L. W. CHANEY (U. S. Dept. of Labor, Washington, D. C.): The general figures on the iron and steel business agree precisely with those that Mr. Rose has given. That is, they indicate recently a general tendency upward. You take three years and mass them, and it is an upward trend, unfortunately.

The question of why this has occurred, why severity is increasing while frequency is going down, can't be answered yet. It isn't behaving according to theory. The idea has been entertained—I have entertained it myself—that with the effort which is being put upon the matter of accidents, they ought to show a continuous decline. Now they do so far as the frequency of accidents is concerned, but not so far as severity is concerned.

Now some of you will know that for a number of years I have been stressing at one time or another just this idea, that too much attention was being given to the minor accidents, because it gives figures which are satisfactory, and the other doesn't. I believe the stress of attention has got to be still more diverted to the severe accidents. We are not dealing with them adequately. They don't happen so often.

Any day we can pick up accidents of a degree of frequency, but the severe accidents don't happen only once a week, or once a month, or even less frequently; and so these cases which are really very important don't get the attention which they ought to have. The question of how we can safeguard against them has not had the attention which it ought to have.

MR. ROSE: I wouldn't like the thought to go out that the severity rate in the Metals Section is increasing in comparison with the early history of our safety work. This increase is only over the last three-year period. There has been a wonderful reduction made between the present severity rate, that is, the experience of the present, and that of some ten or fifteen years ago. We are going in the right direction, but are just failing to put our fingers on those conditions which make for high severity rates.

Take your classification in the National Safety Council's Accident Report, 1930 edition, and see where you stand in comparison with the others. Maybe your fatal accident rating is high, and maybe the fellow next on the list is low. How does he get away with it? There are some peaks and there are some valleys. If each

one of us will take our individual accident experience, compare it with those in the same group having the best accident rate, go to the trouble to break that severity rate down on every fatality, permanent and minor or temporary, set your own up along side it, you may see why you are not in line.

That is the best suggestion I can offer. Those above the average in the metal section group are the foundries and the structural steel fabricators. They are all hazardous occupations.

CHAIRMAN EIS: Mr. Rose, does 1929 show a marked increase in that record as compared to 1927 and 1928?

MR. ROSE: The average for 1928 was 1.69. That is for the section as a whole. In 1929 it was 2.15. The structural steel fabricating was 3.53 for 1928, and 3.89 for 1929. The ratio is just the same. And that holds true in those groups I have just read.

For instance, steel plants, in 1928, was 2.07; and in 1929, 2.75. And that same relationship seems to hold throughout the whole classification. That is in groups. But again I say, the individual organization can find something interesting in them if they will study them.

B. C. HANSON (John A. Rochlings Sons Co., Trenton, N. J.): Some companies have found it better to keep a man on compensation than to bring him back to work and perhaps have him sit around. Now you can laugh at that if you want to; but that has gone on in practically every plant in this country at some time or another, where we have taken a man back and given him a light job. But today when you take a man to a department, that superintendent wants to know (and you can't blame him) whether that man can do a real day's work. If he can't he isn't going to work. The superintendent isn't going to run up his costs and get called by the powers that be.

So I think, especially due to the fact that your rate has gone up in 1929, that it was due to your bad period there. That is where your depression started, and I feel that a lot of your increase in severity rate has come from that fact—a lot of it.

MR. HANKO (Pittsburgh Steel Co., Pittsburgh, Pa.): I wonder if after this discussion, there would be any way of breaking down the actual experience in the first eight months of 1929, the boom months, and the last four months, or the depression months? Is there any way, Mr. Rose, of breaking down your accident experience like that?

MR. ROSE: No, there is no such breakdown possible. These are simply the total figures that the individual members turn in. Each individual might break it down for his own satisfaction, but all these figures are made up from the reports for the entire 1929 experience that is turned in to the National Council.

MR. HANKO: Well, I find that the first eight months of 1929 were the bad months, and the last four months of 1929 were very good months. And I thought possibly if the accident experience of the entire country could be broken down, that it might show something.

MR. HANSON: A lot of our men, especially among the foreign class, belong to three or four different organizations. You will find that pretty generally true. They all belong to at least two. The man, according to our laws in Pennsylvania, gets \$15 a week compensation. He is also getting at least \$5 a week from each one of those organizations, making a total of \$25 a week, and God knows that the laborer has quite a hard time making that even in periods where there is a lot of business. So he is getting \$25 a week for being off, not doing anything, where if he goes back to work, working four or three or possibly two days a week, he is possibly getting \$12 or \$16 a week, or something in that neighborhood, so you can't blame the man, naturally. But I think there is a lot to think about in that situation.

CHAIRMAN EIS: The next item on the program is an address by Mr. W. Graham Cole, of the Metropolitan Life Insurance Co., New York City.

Analysis of Accident Causes in the Metal Industry

By W. GRAHAM COLE

Director, Safety Service, Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City

I presume it would be quite in order to start by describing, or at least by listing, the numerous things which happen to employees of the metal industry and result in their personal injury. To a group of representatives of the industry engaged personally, as you are, in the prevention of accidents, this would be a repetition of an old story which can far better be told by anyone in the audience, as you are in close daily contact with the situation on the actual firing line. A comparison of the frequency and severity of various types of accidents of the industry as a whole with the records of your individual property would perhaps serve as an aid in measuring the results you are obtaining, or would serve to indicate the types of accidents which you might expect in the future. Would such information, however, be of any direct aid to you in the prevention of accidents among employees of your organization? Unless it would, the mere presentation of this information, although perhaps interesting, would be valueless.

Before attempting, therefore, to present an analysis of accident causes in the metal industry, it would perhaps be advisable to discuss three particular phases of this subject as follows:

First, what is the value of an accident analysis?

Second, what is an accident?

Third, what do we mean by the cause of an accident?

An actual knowledge of facts is efficient to the effective conduct of any business. This is as true with respect to the safety engineer as it is to the production manager, the works accountant or any other executive engaged in industry. Too frequently, however, in the past those engaged in accident prevention work have failed to obtain the factual information necessary for the proper execution of their work; in other words, they have failed to approach their problem from the pure engineering viewpoint. To be sure, a great deal of engineering has been utilized in safety work, in the design of guards and the revision of plant processes. On the other hand, the cases have been rare when a safety engineer has given the same amount of engineering study to the survey of conditions and to technical research which an individual of other fields of work would give to the problems confronting him.

The engineer called upon to design a railroad bridge over a river makes certain tests and studies of the soil both on the banks and in the river bed upon which the bridge foundations are to be constructed. He ascertains the velocity of the river current and the high and low elevation of the stream. He usually finds it necessary to learn something of the maximum wind pressure which will be encountered and the usual stresses which may be expected. He also wishes to determine the maximum weight of locomotives and trains which utilize the bridge and the speed at which this equipment will be operated. With these facts before him, the bridge engineer can proceed to design the bridge, basing the design largely upon formulae and known strength of material determined by those who have had experience in designing similar construction work.

The safety engineer, in approaching the problem of reducing accidents in a given industry, proceeds without this analytical study. He safeguards any apparent unsafe condition in sight and undertakes a broad educational campaign. Although such measures are essential and have produced excellent results, undoubtedly better results would be obtained if the safety engineer knew in advance just what types of accidents were being encountered, what particular machines were in reality accident producers, and then took definite steps to remedy and overcome conditions and hazards which this study indicated actually existed. Furthermore, if the safety engineer made a

careful study of the employees engaged in the work under consideration, he would undoubtedly find that a small percentage of these workers are responsible for a large percentage of the accidents; that this accident proneness was not spasmodic but continued year in and year out with the same employees, unless steps were taken to correct it. He would also find that the employees involved in personal injuries were involved in many more accidents affecting the efficient operation of the property.

With knowledge of this sort the safety engineer would be in a position to develop intensive efforts among the high accident employees in place of wasting efforts upon those employees who can work year in and year out without injury. By studying the characteristics of the high accident employees he would be able to determine very definite measures for aiding these employees to overcome their accident prone habits and characteristics, and he would also be in a position to recognize the signs of such habits developing in other employees.

In making an analysis or study of accident conditions, it is essential that those facts be determined that can be utilized in the further prevention of accidents. A few years ago I visited a larger manufacturer in Pittsburgh. He proudly showed me an analysis which he had had made of accidents on his property. The analysis, as I remember, consisted of a number of typewritten sheets pasted together, forming a plaque as large as his office desk. From it, it was possible to determine just what portions of the body had received the most serious injuries. It was possible, for instance, to ascertain just how many employees in a period of a year had received a scratch on the first joint of their little finger or a bruise on their toe. There was nothing in this elaborate record to permit the preventionist to take proper steps to prevent recurrence. Contrast with this the work undertaken recently by a large steamship company with piers on the water front of New York. This company had experienced an exceedingly high accident record among their 600 longshoremen. An initial study of the problem indicated that very little could be accomplished purely by proper safeguarding. As the longshoremen were engaged in squads of 50 each morning and dismissed in equal squads each evening, an effort to conduct educational work among these workers would, over a period of a year, have necessitated the training of practically all the longshoremen on the entire New York City water front. The problem was approached from an engineering viewpoint and an analytical study of the accident record started. It was found that more than 85 per cent of the accidents resulted from handling material. An analysis was then made indicating the severity resulting from each general classification of freight.

With this information available, the supervisory force was taught how to study proper methods of handling various types of freight, one month being given to each commodity in the order of its severity as an accident producer. The result was an awakening of interest in their work among the supervisory force, a decrease of accidents in each type of freight as it was studied, and a reduction of a few cents at least in the cost per ton of handling the freight was noted. During the period of the first year a 54 per cent decrease of the severity rate was also noted.

A study made of the accident experience of the motormen of one operating division of a large mid-western railroad company offers another example of an analytical approach to the safety problem. In this study property damage as well as personal injury accidents were included and the severity of each was discounted in an effort to determine the underlying reasons. It was found that one-third of the motormen had two-thirds of the accidents and that this one-third, over a period of a year, averaged more than one accident per thousand car miles. The best man on the division could drive his car five thousand miles per accident, the poorest man could only go five hundred miles. All of these operators were driving the same type of car, over the same streets, under the same changing weather conditions, in the same traffic congestion and under the same crew of supervisors. The only apparent difference, which made the best man's record ten times as good as the worst man's record, was in the individuals themselves. With this information on hand it was

possible to analyze the personal habits, characteristics, and physical conditions of the individuals and to take definite steps to apply direct remedies. In six months 47 of the 50 men improved their record, 30 of them showing an average of less than one accident per thousand car miles, with a resulting reduction in the group as a whole of 43 per cent.

Sometimes a failure to analyze the problem correctly causes the accident preventionist to waste considerable effort which could be avoided or placed to useful purposes if a true knowledge of conditions were obtained.

A subway contractor in New York City, who had experienced a high accident record, stated that he was interested in safety and he was sure his foremen were, as they attended a weekly safety meeting. An analysis of accidents by occupations developed the fact that an unusually high percentage of personal injuries occurred in the foremen group and that only a small percentage of all the foremen were involved. A further analysis showed that the employees who were involved in the greater number of accidents were working for the few foremen who themselves sustained the largest portion of accidents in the foremen group. It furthermore developed that these particular foremen were usually absent from safety committee meetings. In other words, the educational work conducted by this contractor had, because of lack of careful analysis, been aimed at the larger portion of this force which needed it least and had entirely failed to reach the smaller portion which needed it most.

The next important phase of the subject concerned is a question of "What is an accident?"

The Travelers Insurance Company, after an intensive study of thousands of accident records, estimated that for one major injury occurring in industry, 29 minor injuries and 300 accidents occurred which do not in anyway involve personal injury.

In industrial safety work we usually confine our efforts to the prevention of personal injuries and frequently only to the prevention of serious personal injuries and fatalities. It has been estimated that the cost of personal injuries to industry are five times the expense incident to carrying compensation insurance or to paying claims and medical expenses. Such an estimate, however, is confined entirely to the incidental cost of personal injuries, but does not include the enormous cost of innumerable accidents which fortunately result in no injury to the human being.

A pair of engine frames weighing seven tons were delivered into a division machine shop of a large western railroad to receive some additional machine work before being sent to the erecting shop. The foreman responsible for the unloading of material instructed two men to unload the frames from a flat car. It happened that these employees had no previous experience in handling material larger than small motors. Their foreman failed either to instruct or supervise their work.

A ten ton crane was available for removing the frames and the cables which were used for swings had recently been tested. Not being acquainted with this type of work the workmen placed the rigging on the engine frame in an improper manner, causing an unusual strain on the sling just as the load had reached its destination. The sharp edge of the engine frame cut through the cable at the point of extreme strain, dropping one end of the frame to the floor, causing additional tension which resulted in the entire cable snapping, uncoiling and falling in a heap on top of the broken frames.

Six hundred men were engaged at work in the shop at the time the incident occurred. Quite naturally all stopped work to see what had happened. Perhaps it is a conservative estimate to say that each man returned to his work in ten minutes. This delay, brief as it was, caused a loss of 100 non-productive working hours, for which, of course, the company had to pay.

Two hundred and fifty men were working on the aisle which was fed by the incapacitated crane. These men were required to remove by hand or hand-truck all the material on which they were working for the balance of the day. This condition seriously decreased the efficiency of the group and delayed production. A foreman

and crew of men spent an entire day repairing the crane, which also required repair parts and a new cable. The engine frames were shipped back to the division shop for recasting. Considerable time was spent by the chief engineer, division superintendent, foreman and others investigating the cause of the incident. The total cost to the railroad company, due to the improper supervision of this particular job, was, as the above figures indicate, enormous. Surprising as it may seem, however, the incident was not an accident, according to the usual interpretation, and in accordance with the reporting requirements of the Interstate Commerce Commission, because, quite surprisingly, no one was injured.

This story describes a rather extreme but true experience. It is presented, however, because it presents in a forceful manner the fact that all accidents in industry are not accompanied by personal injury. Although only a few non-personal injury accidents may entail the cost of the one described above, nevertheless the total of the expenses involved in such accidents during the course of a year seriously affect the cost of production.

To obtain a true picture of the accidents in the metal industry, therefore, would it not be advisable to define accidents in a much broader manner than is customary and to state perhaps that an accident is an incident which causes damage to machinery, spoilage of raw or finished products, injury to tools and equipment, decrease in operating efficiency and/or personal injury to employees. If industry generally would accept such a definition of accidents greater attention would undoubtedly be given to accident prevention not alone as a means of preventing human suffering and decreasing insurance cost, but as an outstanding method of improving the efficiency of the entire organization.

What is meant by "Cause of an accident"? During the study of the street railroad company mentioned before, an accident report which was reviewed gave the cause of the accident as "a street car struck an automobile". This was in reality the result of the accident rather than its cause, but it is typical of the information which is usually encountered on reports whether it be in transportation or industry. On further investigation it was found that the street car struck the automobile because the motorman was not paying attention to what he was doing. It was also found that the motorman had had many other accidents during the year, all of which were traceable to the fact that he was inattentive. To state that inattention, or, as it is too frequently called, carelessness, was the cause of the accidents of this particular motorman would not furnish any definite information for the use of the accident preventionist, as the mere criticism of a man for carelessness frequently fails to produce results. Still further study indicated that the motorman was inattentive because he had something else on his mind. In this particular case under consideration, this something else was mental worry due to a physical ailment which while in itself it did not interfere with the man's operating ability from a physical standpoint did interfere materially from a mental standpoint.

To analyze accidents thoroughly, therefore, it requires a careful study, not alone of the apparent cause or what is usually the apparent result of an accident, but also all the underlying facts and trends of circumstances which actually make the accident possible.

Mr. G. A. Kuechenmeister, of the Dominion Forge Stamping Company, Ontario, speaking before the Mid West Safety Conference last March, gave the following interesting summary of accident causes:

Disorderly Condition	50%
Improper Equipment	21%
Improper Materials	9%
Improper Construction	15%
Lack of Supervision	5%
Total	100%

There is no question but that all of these contributing facts mentioned by Mr. Kuechenmeister have an important influence on accident causation. In some accidents they may be the basic causes. In many more incidents, however, they are in reality the result of conditions which could well be prevented if other facts were taken into consideration.

Such thorough analysis of basic causes which I have indicated are impossible at the present time for the metal industry, or in fact for any industry, and will never be possible until sufficient industrial safety engineers realize the importance of analyzing their own compilations and of comparing results with others. At present, from the standpoint of the industry as a whole, we have to be satisfied with such information as is available. Referring to the latest report entitled "Statistics of Industrial Accidents in the United States," prepared by the Department of Labor, we find a table showing the accident frequency rates of a selected group of iron and steel plants for a fifteen year period given by year and cause. A number of accident causes are listed which although not basic causes present some idea of the typical types of accidents encountered in the metal industry. It is most gratifying to note from this table that in the fifteen years covered the accident frequency rate has reduced 91.2 per cent. The reductions in the various types of accidents were as follows:

Working Machinery	86.8%
Operating Cranes	77.3%
Vehicles	87.1%
Hot Substitutes	92.8%
Falls of Persons	84.6%
Falling Material	99.9%
Handling Material	92.4%
Miscellaneous	95.4%

Such reductions certainly indicate that intensive and aggressive work has been conducted by the industry, but the very size of this percentage of reductions shows that even more intensive and aggressive work is essential if further reductions are to be expected. It is reasonable to predict that this further intensive work will of necessity be developed only if undertaken as a result of an actual knowledge of basic causes of the few remaining personal injuries and of those accidents which have been recorded because no injury resulted.

In such intensive study it will undoubtedly be found that improved equipment, more effective safeguards, better operating processes and housekeeping methods still demand consideration. It will also be found that improved supervision will be required. In addition, however, the need of studying the individual employee and his physical condition, his instruction and training, his mental habits and characteristics, his attitude and environment will be controlling factors in the developing of an operating force which is not only free from practically every personal injury but is also capable of reducing to a minimum that large percentage of non-personal injury accidents which are one of the greatest sources of inefficiency in operation and increase in the cost of production.

CHAIRMAN EIS: From the remarks this morning, commencing with our splendid address by Mr. Morey, followed by the recitation of the statistics by Mr. Rose, and now this valuable talk by Mr. Cole, to my mind it seems that while the Metals Section has accomplished much, individually and collectively, we still have a lot of things to accomplish.

We have the job of understanding, not only in our own plant or plants, but in the entire industry. I wonder just how many of the delegates that are here realize what a tremendous job it is to gather all of the information for the News Letter, for the other letters that go out, for our statistics, and for all of this accident cause knowledge.

It is a tremendous job, and it must be a voluntary job. In view of the fact that this is the largest section, it seems to me that some other means should be pro-

vided. I would like to ask if anybody has any suggestions or opinions as to a means of aiding in the gathering and dissemination of such information.

J. M. WOLTZ (Youngstown Sheet & Tube Co., Youngstown, Ohio): This matter is one that has been given considerable thought by the various Executive Committees for many years. There have been one or two attempts to provide something such as Mr. Eib has mentioned. If we are to continue the essential work that we are here to do, it seems to me we should have some source that can act as an agency to gather and correlate the various activities we are engaged in.

It is utterly impossible to expect volunteers to do all of the work and do it as well as it could be done by a paid secretary. Now that is the idea I have in mind. I believe this section can never be the success that it should unless we have a paid Field Secretary who will be able to gather the material and put it out in the form that it should be put out.

I believe that these various studies, investigations, and what not that come up for discussion from time to time, and that we all think are fine things, will never be accomplished unless we have some one to see that the work is done. The work here is very much like that in any other organization, any corporation. There must be some person to head up the various departments, the various sources from which inspiration issues.

Now it seems to me that something of that sort should be started in this group. I think it is high time that we start it. This may not be an opportune time, perhaps, to broach such a subject, but nevertheless we ought to get the thing started; and even if we don't get the thing successfully going this year, at least we are on the way to accomplish what to my mind is one of the most essential things that we have before us.

Much Research Work is to be Done

F. G. BENNETT (Buckeye Steel Castings Co., Columbus, Ohio): In connection with the foundry research work we have been trying to carry on, there is a lot of work to be done, and I could endorse a paid secretary just for that one branch of the Metal Sections work alone.

There is no doubt that other branches, like the steel fabricators, which was mentioned, should be studied, and maybe some of the good records should be carefully examined. From what Mr. Cole brought out it seems that a more careful analytical study should be made and a person of this type could do that. I certainly endorse the idea.

MR. MOREY: I have listened to Mr. Cole's paper and to the remarks by Mr. Woltz, and I don't see how you are going to keep this alive unless you do something like that; and this analysis study. I don't see how you can do it without such an agency and a paid secretary to give all his time to it. Isn't this the largest section in the Council? I think it is. I surely think we ought to have something of that sort in this section. Of course, I am not in touch with the financial situation, but the need for such an agency is certainly there.

CHAIRMAN EIB: Has any one else any suggestions to offer along that line or any thoughts to put forward?

MR. MCKENNEY: Most of you know that I have been working in this section for a good many years, just as many others have. Voluntary work is all right. We all do the best we can with the time we have to devote to it. You know that there are about 1000 voluntary workers in the National Safety Council.

The Metals Section is the largest in the Council. Therefore it is right to presume that we have had a lot of voluntary workers in the Metals Section. Mr. Woltz has been at the head of a committee on safe practice methods for a long

time. Now, he has to work for a living. He has to serve his company, but he does the best he can to gather this information for the benefit of the rest of us.

Fred Bennett over here, with the foundry research, has devoted a great deal of time to this work, and it has involved a great deal of travel and expense. Now our companies, of course, are willing to have the men do that (some of them) but they don't have the time. And I have felt for a good many years that we should have a man in our section who would devote all of his time to this kind of work.

I don't know just how that thing could be financed; but surely, if we start something, we will get somewhere. Mr. Chairman, I would like to make a motion that it be the sense of this meeting that we go on record as favoring a paid secretary for the section, and that the matter be referred to the Executive Committee of the section to proceed in some manner in which they see fit; perhaps to put it up to the Executive Committee of the National Safety Council and see if some way can't be worked out so we can have a man who will devote all of his time to go out and do this work.

C. E. SANKEY: Second the motion.

CHAIRMAN EIB: Gentlemen, you have heard the motion, and it has been duly seconded. Are there any questions?

(Chairman Eib then put to vote the above motion, which was unanimously passed.)

CHAIRMAN EIB: I thank you very much, gentlemen. It certainly is a needed consideration.

Report of the Committee on Membership

By F. A. LAUERMAN

Interstate Iron and Steel Company, So. Chicago, Ill.

The membership records of our Metals Section since the 1929 Congress show a decrease. At that time we had an enrollment of 809 members. In the period between October 1, 1929, and September 1, 1930, we enrolled 77 new industrial members and lost 84 through cancellations.

New members were obtained by direct solicitation on the part of our members and by mail approach. Our selected list of 2,130 Metals Section prospective members received the following solicitation during the year:

- (1) Letter to special list of metalworking companies enclosing special Safe Practices Pamphlet, "Safety in Structural and Sheet Metal Fabrication", mailed in October.
- (2) General letter enclosing special folder "Large Plants are the Safest", mailed in October, also.
- (3) General letter on Council's Industrial Health Service enclosing health folder mailed in November.
- (4) General letter on safety with descriptive folder outlining service, mailed in December.
- (5) Letter to canceled members of past five years enclosing service folder, also mailed in December.
- (6) General letter enclosing booklet "Protecting Life", describing service, mailed in January.
- (7) Series of letters to metalworking companies offering specific Safe Practices Pamphlet.
- (8) General letter following up January letter, mailed in February.
- (9) Letter to members by President Pettibone, announcing Spring Membership Campaign, sent in March, followed by letter from Mr. John P. Eib, General Chairman, enclosing several prospective members' names on cards and urging their solicitation by members.

(10) General letter enclosing testimonial folder mailed in April.
 (11) Specific letter by Mr. Eib on sectional stationery enclosing poster, mailed in May.

(12) Testimonial letter (general) by Mr. Temple Williams, secretary of the Dodge Manufacturing Corporation, also mailed in May.

(13) Letter by Mr. Lauerman on sectional stationery enclosing new "Gazing into the Future" booklet describing the specific metals service, mailed in June.

A summary shows that each prospect received eight general appeals to affiliate and four specific metals appeals during the year. This mail campaign brought us in a total of 19 new industrial members with aggregate dues of \$601.50.

Many of our members have helped by writing to prospects, usually at the suggestion of Headquarters, and their endorsements were of vital assistance in the obtaining of 10 industrial memberships with dues of \$537.50, and in the total of 77 new industrial memberships with dues aggregating \$3,826.50.

In conclusion, I believe that our cause, its aims and purposes, and our Council service have been presented to the industry. Future solicitation at our present rate of growth will become more and more specialized and result in individual approaches to companies rather than general mail appeals. We will advance, too, proportionate to the help given by members of our Section in soliciting those companies in our industry not yet members of our National Safety Council.

Report of Committee on Publicity

By ROBT. L. SCHMITT

Louisville Car Wheel and Railway Supply Co., Louisville, Ky.

Last February I submitted a detailed report giving the results of the Committee's work up to that time. This report was published by our News Letter editor, Mr. H. G. Hensel, and so reached the entire membership. For the last half of the year, I am able to report the results we were able to secure after our preliminary work was completed.

Your chairman's first effort was to secure articles from the members of the Executive Committee. This committee totals nineteen men and from the nineteen letters, we received nine replies, and from the nine replies, we secured four articles for publication. We had hoped that the Executive Committee membership would make a better showing, but can excuse many of these men on the grounds that they were very busy in their own particular committee work, although this does not fully explain the failure of some of them to answer the letter sent them.

Through the co-operation of our office personnel, we wrote a letter to every member of the Metals Section as shown on the membership list supplied by the National Council offices. We sent out eight hundred and seven of these letters, from which we received one hundred and thirteen replies. From these one hundred and thirteen replies, we furnished Mr. C. T. Fish, editor of the *National Safety News*, thirteen articles, eight of which have been published in the *News*. We know of several other articles published in the *National Safety News* last year which were furnished by members of the Metals Section, but have not attempted to enumerate these since they were not the actual result of the work of the Publicity Committee.

We were able to furnish twenty-six articles to Mr. H. G. Hensel, these particular items being too short for magazine material, but very acceptable for news letter items.

Of the total replies received, four came from Canada, two from Australia, and one each from Belgium, Holland, and Germany. These items showed that accident prevention work was very well established in Canada, Australia and Germany.

The letter from Belgium stated that safety work there was considered a fad and that they were being hard put to overcome the ridicule they had to face in attempt-

ing to do their work. We sent this letter to twenty-three concerns in eight foreign countries, and had nine replies from five of these nations.

Your chairman wishes to thank the members of the Section for their very splendid help and to offer to the new Publicity Chairman any possible assistance.

Report of Committee on Posters

By PAUL J. BRAND

Pullman Car & Manufacturing Corporation, Chicago, Ill.

As the retiring chairman of the Section's Poster Committee I wish to make special mention of the splendid condition in which I found the files of material for Metals Section posters as turned over to me by Mr. Hensel, chairman of last year's committee. Mr. Hensel and his associates did a splendid piece of work in assembling photographs from many different sources and many of these have been used for the preparation of posters produced this year.

During the year, three posters per month have been produced for the members and these have covered as wide a variety of subjects as the available illustrations would permit.

At the March meeting of the sectional executive committee it was agreed that the following procedure should be followed in producing future posters for the section.

Procedure is Systematized

1. To set up a list of subjects based upon the actual needs of the members of the section by reviewing the principal causes of accidents in the industries represented in the membership. In doing this, preference will, of course, be given to subjects of greatest importance.
2. To cross off this list all of the subjects for which posters are now available.
3. To review the files of illustrations now available and to select for use those which will fit in with the new schedule of subjects.
4. To make plans for the obtaining of suitable photographs for those subjects for which illustrations are not now available. This to be done by asking the members to contribute photographs and by arranging for the Council's Staff Photographer to take some of them.

Since that meeting the chairman of your poster committee has conferred with Mr. Hensel his predecessor and Mr. S. H. Kershaw, Director of the Council's Poster Division and steps have been taken to put the plan into effect. As an outcome of this conference a letter was written to 36 members of the Section requesting their cooperation in supplying suitable photographs for posters. This letter was mailed August 7th but up to the present time but one reply has been received. A follow-up letter has since been written and it is earnestly hoped that the members to whom those letters have been addressed will respond generously, in keeping with the co-operative spirit of the section. It is the firm belief that they will.

In addition to the posters already produced for the section during the year, enough illustrations have accumulated from various sources, other than those to whom letters of request have been written as previously stated, with which to produce 18 new posters. However, some of these are only mediocre and it is highly important that additional ones of higher quality from a poster standpoint, be assembled in order to at least maintain the standard already established.

There appears to be no need for disparagement over the outlook for the future production of material for Metals Section posters. The negative results so far met with in the letter appeal for posters is undoubtedly largely due to the fact that the letters were mailed in the midst of the vacation season and that it usually takes some

little time in which to locate suitable photographs or to stage and take new ones. Furthermore, the entire membership has by no means been canvassed and there can be little question about the existence of much suitable material in the files of the members which they would undoubtedly be willing to contribute.

ADJOURNMENT

Wednesday Morning Session

October 1, 1930

JOHN P. EIB, Chairman

Illinois Steel Company, Joliet, Ill.

The second session of the Metals Section convened with Chairman Eib presiding.

CHAIRMAN EIB: The first item on our program is the report of the Nominating Committee and the Election of Officers. Mr. Ed Quesnel is the chairman of that committee.

Report of the Nominating Committee

E. G. QUESNEL (General Steel Castings Corp., Granite City, Ill.): Your Nominating Committee desires to submit the names of the following gentlemen as your officers for the coming year. These recommendations carry with them the approval of your Executive Committee, and also of the National Safety Council. We were very careful to see that the men who were selected would work in the interests of the section, and I hope that you will feel that we have obtained the gentlemen who will best serve us during the coming year.

GENERAL CHAIRMAN: H. G. Hensel, The Youngstown Sheet & Tube Co., Chicago, Ill.

VICE-CHAIRMAN: F. A. Leberman, Republic Steel Corp., So. Chicago, Ill.

SECRETARY AND NEWS LETTER EDITOR: Robert L. Schmitt, Louisville Car Wheel & Railway Supply Co., Louisville, Ky.

CHAIRMAN PROGRAM COMMITTEE: Paul J. Brand, Pullman Car & Manufacturing Corp., Pullman, Chicago, Ill.

CHAIRMAN PUBLICITY COMMITTEE: Benjamin C. Hanson, John A. Roebing's Sons Co., Trenton, N. J.

CHAIRMAN MEMBERSHIP COMMITTEE: S. W. Doran, Pratt & Letchworth Co., Buffalo, N. Y.

CHAIRMAN POSTER COMMITTEE: J. K. Stafford, Mississippi Valley Structural Steel Co., Decatur, Ill.

CHAIRMAN STATISTICS COMMITTEE: D. S. Wechsler, Weirton Steel Co., Weirton, W. Va.

CHAIRMAN ENGINEERING COMMITTEE: J. E. Culliney, Bethlehem Steel Corp., Bethlehem, Pa.

CHAIRMAN COMMITTEE ON SLIDES AND SAFETY KINKS: John A. Oartel, Carnegie Steel Co., Pittsburgh, Pa.

CHAIRMAN HEALTH COMMITTEE: Dr. R. C. Engel, The Corrigan, McKinney Steel Co., Cleveland, Ohio.

CHAIRMAN FOUNDRY RESEARCH COMMITTEE: F. G. Bennett, The Buckeye Steel Castings Co., Columbus, Ohio.

Now the Officers at Large, the men whom we seek counsel from, as follows:

Retiring Chairman, John P. Eib, Illinois Steel Co., Joliet, Ill.

E. G. Quesnel, St. Louis, Mo.

W. E. Watters, National Malleable and Steel Castings Co., Melrose Park, Ill.

T. H. McKenney, Illinois Steel Co., South Chicago, Ill.

Earl F. Blank, Jones & Laughlin Steel Corp., Pittsburgh, Pa.

J. A. Voss, Republic Steel Co., Youngstown, Ohio.

G. A. Davis, Illinois Steel Co., Chicago, Ill.

J. M. Woltz, The Youngstown Sheet & Tube Co., Youngstown, Ohio.

David C. Thomas, Lorain Steel Co., Johnstown, Pa.

A. Bergquist, The Youngstown Sheet & Tube Co., East Chicago, Ind.
 Fred A. Nichols, Granite City Steel Co., Granite City, Ill.
 That, gentlemen, comprises the Executive Committee, together with the officers.
 Submitted by the Nominating Committee of the Metals Section of the National Safety Council. E. G. Quesnel, chairman; Robert L. Schmitt, J. E. Culliney, J. M. Woltz, B. C. Hanson, T. H. McKenney, committee.

CHAIRMAN EIB: Gentlemen, you have heard the report. These are the recommendations of your Nominating Committee for next year. What is your pleasure?

(After a motion made and seconded it was unanimously voted that the secretary cast one ballot for the list of names submitted by the Nominating Committee, and that these men be declared elected.)

CHAIRMAN EIB: The next item on our program is an address entitled "The Foreman as a Safety Factor in Production", by Mr. F. J. O'Connor, Welfare Supt., E. I. du Pont de Nemours and Co., Pennagrove, N. J., and I am very happy to introduce him.

The Foreman as a Safety Factor in Production

By F. J. O'CONNOR

Welfare Superintendent, E. I. du Pont de Nemours and Company,
 Dye Works, Pennagrove, N. J.

In attempting to visualize the position of the foreman to myself in a satisfactory manner, I found it necessary to go back and review the story of American industry, and in that review I found exactly what many others had already discovered; namely, that prior to 1898 there had been little or no change in the method of conducting general business in our country.

Under the older scheme, when a large part of American industry was in the hands of partnerships or of individual owners, the dominant figure about the factory was the owner himself. He did all of the buying, most of the planning, much of the layout work, concerned himself with the hiring and discharging, wrote his own advertisements, was his own paymaster and did not hesitate at any time to give orders direct to his employees. During this time organized employees were considered a menace; welfare was plain charity; safety a new-born baby; and the foreman an undeveloped buffer between the men and the boss.

But as American business grew and expanded through consolidations and combinations and became "Big Business," this great individual personality of the older day was graduated into corporate management, or easily faded from the picture in so far as actual participation in the work was concerned. Clearly defined organization took his place, in which responsibility was unmistakably established, and authority commensurate with that responsibility was given.

In this new scheme of organization there had to be a position, a job, an individual somewhere to whom the plant manager could toss off his orders and know that these orders would be carried out, and also to whom the men could look with some confidence. He could not be of the management. He must be, or at least have been, of the men. Hence the foreman.

This job or this man has continued to grow steadily in importance. He is no longer that man handling a few laborers or mechanics in a yard or shop, lending a hand here or there, sometimes running the time book, sometimes doing part of the routine work, sometimes repairing broken down machinery—continually dwarfed by the driving personality of the Big Boss, and in many instances fearful of him. But he is today that man selected from among his fellows for his knowledge of the job, for his qualities of leadership, for his executive ability, and for possessing those attributes that go to make his selection as foreman easily foreseen.

During the war period when money was plentiful and factories were running day and night, the activities of the foreman were confined almost exclusively to getting out the work. There were on the plants in this time fire chiefs, safety engineers, efficiency experts, employment agents, welfare superintendents, sanitation engineers, and a host of others to look after the service phases of the work. But when business adjusted itself to peace time conditions, retrenchments were necessary and many of these luxurious appendages were swept away. Right here the foreman came into his own. Right here, the foreman became the key man of industry.

Formerly he was responsible for production alone; today he is responsible for every single relationship that exists between employer and employee. He is that point of direct contact between ownership, or plant management, on the one hand, and the operating forces on the other. He is that lever on which the management leans in times of intensive competition for increased production to the end that larger contracts may be secured or new business be gotten from the field.

"To absorb the human shocks attendant upon modern management, to interpret intelligently its purposes, to clarify and enlarge upon its methods to the men working under him, to sense and translate accurately the attitudes of his men and present them faithfully to the management—these are the new responsibilities that have made of foremanship a new and important function of management. Only by the development and constant exercise of this function on the part of the foreman can the objective of complete and continuous co-operation in industry be reached."

However, business corporations are organized, factories are built, men are employed for the distinct purpose of creating greater industrial wealth and of making reasonable financial returns to the persons who have invested their money in the enterprise. Therefore, production is the primary essential of both management and foremanship.

And what is production? Quality and quantity workmanship, accurate layout work with the minimum of wastage of raw material, low costs, merchandise manufactured and finished at a profit, delivery within the promised dates, a common sense regard for the physical upkeep of the plant and its equipment, and the safety and health of all the employees.

Today this safety and health of all the employees is woven into production just as much as low costs, reduction of overhead, accurate timekeeping, layout work, or the estimation of jobs.

One of the vice-presidents, in charge of production, of the du Pont Company has stated that the most forward step taken in the safety movement of our company was when safety was incorporated as a part of managerial responsibility. The foreman is not alone responsible for getting out the required tonnage, but he is responsible for getting it out safely. Here is the crux of our problem—responsible for getting it out, and responsible for getting it out safely.

The foreman himself has been trained in the dangers of his electrical equipment, in state regulations for elevator operation, in plant transportation for getting his raw materials to his buildings and his finished products taken away, in cost analysis, in reading blue prints and making sketches, in establishing contacts with the employment office, so that he may get the best men for his particular work, in making out reports, in the care and operation of sprinkler systems and fire apparatus.

He has learned the value of housekeeping. If he has stored up this reservoir of knowledge of all these phases of his job, so too can he and must he acquire the same knowledge about safety. He has received this education from contact with chemists, engineers, and other technical men, and from the accumulated experience in the years of his working life.

Because his superintendent leans on him for results, so too must he in turn lean upon his men, and the standard of his success will be measured by the amount of training and education that he has transmitted to his men.

I can imagine, for instance, on a plant where there is no police department, a sudden springing up of an epidemic of thievery, where men's lunches were being

stolen, where electric lights were being removed, where finished articles attractive in their nature, like flashlights or toilet articles, were being surreptitiously removed from the plant, that the foreman in whose department these larcenies were occurring would have to convert himself into a detective overnight in order to stop them, because the loss of them eventually finds its way into cost.

Again, supposing a company that had no welfare program whatever, decided to install the group insurance plan, to start a relief association, or a contributing sickness benefit plan. The foreman would, in that instance, immediately have to become an insurance agent. He would have to sell to the men the plan that embodies the contributing phase. He would have to know its various clauses so that he could keep the men informed on how and when to get their doctor's certificates in, so that they would not add to the waiting period.

Just after the A-B-C session the other day some one asked me how far this foremanship should extend in industry. All work is industry, and foremanship extends to any part of it where there are sufficient employees to demand intelligent leadership.

Foremanship might easily extend to: the cashier of a bank; the sergeant of a police station; the principal of a school; the lieutenant of a fire company; the head nurse of a hospital; the buyer of a department store; the manager of a baseball team, and to dozens of other men and women engaged in work of handling employees in fields that we do not ordinarily associate with industry.

Yes the foreman is that small neck of the bottle through which all policies and programs of the plant manager, whether of production itself, or of any of the phases collateral of it, must pass, and where in this narrow passage their full meaning is carefully studied and digested, and then broadly disseminated through the gang.

And as he works among his men he is in a position to more easily detect the unsafe practices of:

Men lacing or putting on belts while the machinery is in motion; not wearing goggles on jobs dangerous to the eyes; climbing between freight cars; using mushroom tools; not flagging crossings; crawling through fences for short cuts; inordinate speed in transportation; using fine appliances for purposes foreign to their intended use; or wearing flowing neckties or ragged clothing.

And he can also observe the unsafe condition of: slippery floors, protruding set screws on revolving shafting, blocked fire escapes, dilapidated ladders, filthy wash rooms, defective railings, inoperative elevator gates, missing toe boards, upturned nails, and so on and on, ad infinitum.

I would go still one step further and say that should any new situation arise in industry in the near or distant future, a situation unfamiliar to us now, the foreman will have to meet that situation and make himself a part of it.

Perhaps I have not made myself entirely clear, but I will give you a concrete example of just what I have been attempting to say. Last week it was necessary for me to go to the home office of my company in Wilmington, Delaware. I don't know whether any of you men have ever seen that building, but it is a massive structure. And today they are rounding it out to completion by putting a still larger addition to it.

When it is finished there will be nine stories and a bank in it, it will have a theater with 1235 capacity, a hotel of 264 rooms, and 1450 offices, besides huge ball rooms and convention halls. And on the addition to that building there are today 27 different contracting firms doing the work. They come from various states and widely scattered cities, and they have 395 men, mechanics or laborers doing that construction work. Among this force of men there is not a single architect, nor a single engineer, nor a single scientifically educated man.

Each one of these contracting firms is represented on the job by a foreman. In other words, twenty-seven foremen are building that big building. And when these foremen left their respective cities they assembled at the railroad stations the nucleus

of their present working gangs. They bought their transportation to Wilmington. On their arrival in that city, they saw that these men were properly housed.

They have provided proper hospitalization in case of sickness. They have seen to it that the men were insured, if advisable; that the men are working in conformity with the building ordinances of that city; and they in all probability have gone bail for the gang if they got arrested. And they are responsible, of course, for getting eight hours' work out of all of those men.

Now, if these foremen are responsible to their employers for the productivity of the men, for their welfare, for their transportation, they most certainly are responsible for the safety and the health of those men.

CHAIRMAN EID: Mr. O'Connor, on behalf of the Metals Section I certainly want to thank you for your inspiring paper.

J. M. WOLTZ (Youngstown Sheet & Tube Co., Youngstown, O.): Do you have a foreman's training course or school, or anything like that in connection with your organization?

MR. O'CONNOR: When I talk about the foreman in this paper, I visualize only the salaried foreman, or the general foreman, not the gang pusher or the little straw boss. In our particular plant, which represents only one plant of the company, we started last year a University Extension Course in foreman training, with 52 men, and 52 men finished the course. This year they are taking second year work, on leadership, which is a course of eight sessions of two hours each. Next year they will complete the course by eight sessions in psychology.

MR. WOLTZ: I would like to find out whether there are other companies here that are having courses in foreman training of any description.

MR. O'CONNOR: In the particular plant that I come from, and one other plant that I know of in New York, the course is conducted by Rutgers University, the Extension Division, with the professor from the college doing the work. He is a very capable man in foreman training.

A MEMBER: (American Cast Iron Pipe Co., Birmingham, Ala.): We have a regular leadership teacher from the University of Alabama. He is a very good man, too.

MR. MCKENNEY: Did you say you were devoting two hours a day in your course, or two hours a week?

MR. O'CONNOR: Two hours a session, every other week.

MR. MCKENNEY: Is that on the company's time, or on the men's time?

MR. O'CONNOR: It is at night, at 6:30, on the men's time. They prefer it that way.

FRANKLIN ZELLSHOEFER (Kochring Co., Milwaukee, Wis.): We have had a training class for foremen for almost a year. It is conducted on the conference plan. The Milwaukee Branch of the National Metals Trades Association conducted a course over a period of a year, prior to our starting a course, in which they trained leaders. We sent a number of our men to get that training; and they have come back to our group, and in turn have trained other leaders, and so our foremen's group is sort of running itself. The men who got the instructions, of course, are guiding it, but each two or three months we try a new leader, so it is being run by the group itself. I want to say further that we have just started a class in psychology for these same foremen, which is under the leadership of the instructor from our local vocational school.

MR. WOLTZ: Jones & Laughlin Co. in Pittsburgh has such a school, and so has the American Rolling Mills Co. at Middletown. And there are other plants. Surely there must be more than just those who have spoken here. It seems to me that this is a very important thing, and I know that when the boys get back home they would like to get in touch with these mills and find out how they are doing this thing, and what were the results.

A. C. GIBSON (Spang Chalfant & Co., Inc., Pittsburgh, Pa.): The Ambridge Plant has had two years of this training course under the Penn State College course.

F. M. ENSIGN (Grand Rapids Malleable Iron Co., Grand Rapids, Mich.): We started a little better than a year ago. We have an instructor from the Davis Voca-

tional School, a local concern, and he comes once every three months. In between times our superintendent, every two weeks, every second Saturday, gives us our instructions. We have our little pamphlets that we can read up on for those two weeks. Then we discuss the different problems.

R. G. FORBES (National Tube Co., Ellwood City, Pa.): Our course in foreman training is in the process of formation at the present time.

Mr. McKENNEY: In the Illinois Steel Company in South Chicago we have a training course in connection with the Y. M. C. A. Various industries in that district are joining hands in conducting the course. It is done under the leadership of men who are brought in there; and this will be our second year. This is the advanced leadership. Our company has 75 to 100 men who attend that course. The company pays half, and the man pays the other half. We feel that where a man contributes a little bit, he might be a little more interested, and that has worked out very fine with us.

D. V. MEDALIE (Interlake Iron Corp., Chicago, Ill.): I have only to add to what Tom has said that Harry Clark conducts the course—perhaps some of you know him—and this is the third year of the course. We started some of our men out the first year, and then other foremen, seeing and hearing what they were doing, applied the second year. The second year we sent another group out, and the third year still another group. We found it very beneficial. The Wisconsin Steel Company, and in fact, about fifteen companies are taking that course at the present time.

J. R. BYRUM (American Rolling Mills Co., Middletown, Ohio): The American Rolling Mills Company is conducting its foremanship instructions along the line of regarding the foreman as a manager. In other words, we boost him up just a little bit. We give him the responsibility of the operation of the plant, how he would handle the plant if he owned it. Now we are going to discuss prime production. That will be our entire program.

The first meeting is held with all the superintendents in the plant with the plant manager. At that meeting all the information that the superintendents have is discussed, and from that meeting they go and hold their foremen's meetings in their various departments. They discuss all the problems of our particular industry pertaining to our plant. Last year we conducted the same sort of a class, and we have noticed wonderful results in reduction of costs. We are looking for a much better result from the plans we are now adopting of placing the foreman in the position of a manager.

Mr. WOLTZ: Do you include everybody in that course; or just your salaried men? Do you get the straw bosses, too? Do you include all who seem ambitious to get to the point of being foreman, or do you draw the line somewhere?

Mr. BYRUM: At present we are prepared to take any man who has a responsibility in directing any part of the operations. We have a step up to that place in our job training. We do very intensive job training work at Middletown. We take the foreman of any division and the men who are just gang leaders in conference, and head that up with the superintendent of that division, and we discuss very thoroughly that particular job; and out of that we graduate right up the line.

ROBERT L. SCHMITT (Louisville Car Wheel and Railway Supply Co., Louisville, Ky.): I believe it would be interesting if we could get something into the minutes of this meeting about the cost of these courses. We are talking about university extension courses, Y. M. C. A. courses, and I think some of the companies have organized the thing themselves. I think the fellows who haven't tried it would probably be interested in the costs of the various courses.

CHAIRMAN EIS: That is a very good point. Would you express an opinion on that, Mr. O'Connor?

Mr. O'CONNOR: Many things are to be taken into consideration in starting a foreman training course. There is the question of whether you want to do it yourselves, or whether you want to have an outside influence come to the men. Then,

the company can pay the whole of it; the men can pay the whole of it; or it can be divided. It is universally believed that having the company pay it all is the worst thing you can do to the foremen.

That is, you tell the foremen, "Here, we are going to give you a course in foreman training; you go to the meetings and we are going to pay the bills"; and they will go because they have been told to go. The policy most frequently followed out is to have the man pay \$15 to the University or the Y. M. C. A., or whatever organization is doing the work—if that is the charge. The man pays it all, and if he attends all the lectures, or rather, if he passes the examinations at the end of the season, he gets a refund of half of it.

The man has got to show sufficient interest in it to hand in all the written work, do all the outside work, pass the examinations, and be regular in his attendance. One concern in New Jersey has established a three-year course, and at the end of the third year, where the men have gone through the three years' work, and passed all the examinations, the firm refunded, at the end of the third year, the three halves that the men had already paid, so it cost the men nothing. That is, if they did three years of conscientious, successful work.

CHAIRMAN EIS: How does the American Rolling Mills Company conduct its classes?

Mr. BYRUM: Our classes are conducted partly on company time, and in many instances on the men's own time. All our job training work is done on the men's time. If the men were coming in to work at 4 o'clock, we would draw them in about 2 o'clock, or 1:30, and give them about an hour or an hour and a half of intensive job training before they go to work. But where the men are so situated that we can't get the entire organization together in the day time, they come back on their own time at night. A number of our superintendents hold their foremen's meetings on the company's time on what we call our foreman-manager's time. And as I say, others are held of an evening.

CHAIRMAN EIS: Who conducts your classes, an outside organization, or some one within your own organization?

Mr. BYRUM: The work is done by our own men.

CHAIRMAN EIS: Tom, would you tell the audience whether or not there is any charge to the men on the courses in the Calumet district?

Mr. McKENNEY: Why, yes. The companies pay half, and the men pay half. And on the matter of the foremen attending, this course is entirely voluntary. We do not compel any foreman to go or insist upon any foreman taking the course. It is up to them to take it if they wish. A certain number take it each year. It is all done on their own time in the evening.

However, we have gone a step further. This course is now being taken up with the subforemen, gang leaders in the plant, at a morning safety meeting, made part of the safety program. The lessons that these men have had a year before are now being given to the men lower down the line without any cost to them or to the company, and on the company's time.

WILLIAM R. YOUNG (Penn State College, State College, Pa.): We have been doing this same type of foreman training since 1921. I think during that period we have tried every possible method. The choice of time, we have found, should depend largely on the type of course that the foremen are going to take. If the course is going to put them through a very high degree of mental gymnastics, then the course should not be given after work.

Take it at a time when men's minds are fertile, like early in the morning or probably two hours after lunch. Now if the course should involve a certain amount of outside study, and in the meetings listening to lectures, then it can well be given during the evening, or at the close of the working hour before the men return to their homes. I found it less successful where we started the program about 4 o'clock, or 4:30 and quit somewhere around 5:30 to 6.

At that time the chief interest is in getting to their home, getting away from their work, and they pay very little attention.

As to the cost, in the Penn State Extension Service, each job that is done is done at a cost figure. The Penn State Extension Service is subsidized 20 per cent by the state legislature. The balance of the cost is paid by the companies or by the men. Now if the foremen are compelled to attend the course, then certainly the company ought to stand the cost at the beginning. If the foreman's attendance is voluntary, then he should have a financial obligation. I believe that it is a good practice to refund a part or all of this money which is paid by the foremen, but certainly if attendance is voluntary on his part, then the man should have some financial obligation.

We pedagogues find that we always have to have a club. In college it is a degree that we hold over the men to make them study. In extension work to a large extent it is financial, and the club is just as necessary in extension work as it is in the regular college work.

MR. SCHMITT: How much do these courses cost? Is it \$15, or more or less than that?

MR. YOUNG: The usual cost for a home study course is about \$15 in Pennsylvania. If that is supplemented by lecture service, we use lecturers coming from the State College, and those lectures run anywhere from \$35 to \$50 apiece, depending on the distance from the college and the amount of money that has to be paid to the particular lecturer.

In our conference method, where we send a very highly trained conference leader out to industry, we have found that for a group of around twelve to sixteen, the cost is about \$25 per man. Now if that conference leader can go to one industry and meet a number of groups in the same day, the cost will come down quite a little bit. We have had it to run as low as \$12 per man on that basis.

CHAIRMAN EID: We will proceed to the next item on our program. The Program Committee and the Executive Committee, in trying to arrive at suitable topics to present to you at this Congress, endeavored to diversify the program as much as possible. We are to have the privilege of listening to Mr. W. A. Hazard, superintendent of erection, Bethlehem Steel Co., Bethlehem, Pa.

Safety in the Erection of Steel

By W. A. HAZARD

Superintendent of Erection, Bethlehem Steel Company, Bethlehem, Pa.

In considering the problems of safety in the methods applied to the erection of structural steelwork, and with the equipment used, I think we should give a little preliminary thought to the conditions governing such operations. I believe that with most of us, our thought and study has largely had to do with promoting of safe conditions and safe appliances for the worker in the manufacturing industries, and it is necessary to make a radical change in our viewpoint, to understand the conditions as applied to the steel erector.

Safety, or safe working conditions, are relative terms, and must be interpreted to fit each condition of employment, rather than to try to fit every line of manufacturing or industry with the same definition. For instance, what would be accepted as safe working conditions in a wood working shop, would not apply in a metal working shop; in other words, the viewpoint must be changed to the extent that the problem can be considered in the light of the experience gained in a particular operation, and the studies made with regard to its relation to associated operations.

Some considerable study has been made, and is consistently being fostered by the Building Trades, to promote safety methods and appliances in construction operations, but the problems confronting the steel erector are quite different from most of those connected with the other trades in the industry.

Safety in the erection of steel structures is very largely a matter of judgment on the part of the superintendent or foreman in charge of the operation. Many, or I might say, all, of the companies engaged in this line of work have formulated sets of rules and instructions for handling their work, with the primary idea of safety to their employees and to the employees of others engaged on the same operation. It has been my experience, however, that such rules are mainly useful in that they are the means of keeping the superintendent's mind tuned up to the necessity of watching his operation constantly, to see that everything is being done to prevent the possibility of accident. This means that the human element is depended upon in each individual operation, with the inevitable result that possibly some very serious and costly accident might not have occurred on certain work had some other man been in charge. Each job has its particular problems to meet, and while some of them may be very similar to those encountered in connection with previous operations, for the most part there are just enough differences to make it impossible for any set of rules to be established which would fit them all.

Next to the responsibility of the foreman in the matter of accident prevention, we must place the responsibility of the individual employee, and I believe there is no line of industry where the individual is depended upon to maintain safe working conditions, more so than he is in steel erection work. A careless dropping of bolts, or tools, leaving tools or equipment where they can be knocked off, or someone fall over them—these are, perhaps, the most common faults among steel workers, and are probably the cause of more accidents on erection work than any one other means.

From these rather general observations, let us turn to the consideration of certain conditions, which, if they could be controlled, I believe some, at least, of the menace to the steel erector would be removed.

The matter of physical fatigue is one which has received marked attention by all of us who are interested in this problem of accident prevention. No one denies that when the body is tired, the mind is correspondingly less active, and a worker is consequently more liable to injury through his own carelessness. There are few lines of industry which call for the expenditure of physical energy to the same extent as that of the steel worker. The equipment he uses, the tools he handles, even the clothes he wears, all are heavier than are employed in almost any other trade, and therefore, an iron worker must, of necessity, be hardened to the tremendous physical strain which such conditions demand. This immediately brings into the discussion the questions having to do with proper precautions for preserving the health of the worker, but this is something which ordinarily is left to the individual's own judgment, for it is a very difficult matter to be controlled by the employer. Where the worker is employed in a plant provided with medical supervision, as most of them are today, it is a comparatively easy matter to require a physical examination of the employee when reporting for work, or even at stated intervals during his employment. This is also true of major erection operations, where a large number of men are employed, but when we have one such operation, we have a great many on which the gang numbers only a few men, and consequently such regulations would be practically impossible. The average worker in the erection gang is apt to be careless as regards his own health, for as he works hard during working hours, he also plays hard when he is off duty, with the consequent result that he often reports for work in the morning in no fit condition for the day's labor. It is not always possible to discover such a condition, except perhaps by very careful observation, and even then only by one trained to such work.

A striking example of this fact was presented in the case of one of our workmen, not many months since.

He was a man who had followed steel erection work for years, and was considered to be well acquainted with all the "kinks" of the trade. He had worked for us some years, and was well thought of by his associates. On this particular occasion, he had returned to work after having laid off for a few days on account

of sickness. The gang of which he was a member was engaged in removing a derrick, located on a tower about 100 feet in height. He joined his gang and, with them, climbed up the ladder leading from the ground to the working platform. As he reached the platform, he straightened up to go about his work, then suddenly toppled over backward, falling to the ground. No one knows what caused the collapse, though undoubtedly it was a case of physical fatigue superimposed by his few days of illness.

That this question is serious, and that it has been recognized as presenting an element of danger, is proven by the fact that a regulation has lately been put into effect to alleviate this condition in the case of the erection of New York "skyscrapers."

The rule is that the iron worker will not be required to climb more than 15 stories to reach his work, but that an elevator will be provided to carry him. If he is obliged to climb more than 15 stories, he shall be allowed one-half hour for rest before starting his work. This is a direct recognition of the fact that not only the safety of the individual is involved, but that his economic value to his employer depends upon having his physical condition in prime order before he undertakes the tasks involved in his day's work.

There is a field in this problem of accident prevention which is strictly within the province of the employer to function, and in which he can be held responsible. This is in the matter of equipment. Both the character of the appliances sent to the job, and the condition of these appliances, are responsibilities which cannot be shifted to the shoulders of the foremen or the men. I am of the opinion, also, that valuable results are often obtained by taking time to instruct the employees with regard to the use of certain equipment, with a particular view of emphasizing the idea of safety in the operation.

As has been the case in most other lines of industry, the work of erection of structural steel for bridges and buildings has undergone certain improvements in the type of equipment used during the past years. This has been due largely to the fact that buildings are built higher and, consequently, heavier members are required, and bridges are of longer spans and support heavier loads, all of which has conspired to develop more mechanical equipment of greater handling capacity and, therefore, requiring more careful attention. For building work, the type of hoisting equipment has not changed materially in a decade, except that derricks have greater load capacity and are equipped with wire lines instead of Manila rope. The hoisting power is only a stronger unit. For bridge work, the wooden traveler has largely been supplanted by the locomotive crane and the derrick car, and where capacities are not sufficient in this equipment some form of steel traveler is used. In the design and application of such equipment, I hold that the employer is entirely responsible to see that the equipment is safe first, and, finally, to know that the foreman who is to handle it understands all the possibilities of the installation. It has been our practice, before starting any operation, to bring the foreman into the office and discuss with him the methods to be used, the equipment assigned for the work, and the routine to be followed in carrying it forward. The idea is to acquaint the foreman with the major problems he will face before he meets them, and to give him an opportunity to study and think about the steps to be pursued. I am convinced that this practice results in more careful preparation for his work, and a much safer operation after the work is under way.

The overhauling, repairing and inspection of equipment is probably the most important function to be performed in the organizing of a job. While the foreman must necessarily be held responsible for handling his work in a safe manner, the responsibility for providing safe equipment and appliances rests entirely with the employer. Too much care cannot be given to the items of repairs and inspection, for carelessness in these matters has been too often the cause of serious accident in the field.

Perhaps no appliances used in this line of work is subject to more severe stress and abuse than the hoisting cables. Practically the safety of the whole operation depends on having safe and dependable lines with which to handle the loads. Our practice has been, so far as possible, to have the cables returned to the main tool house for thorough inspection after every job, and before being sent to another. On arrival at the tool house, the cable is run off the reel and stretched out on the ground. Every foot of it is then gone over by a man who is experienced in this work, and it is examined for broken strands, or wires, or to see if damage has occurred from bending or kinking, or if there has been excessive wear in spots.

If the cable passes this inspection, it is then run through an oil bath to clean out the dirt and grit, and given a coat of preservative before being re-wound on the reel. Record is made of this inspection and attached to the reel. Should a damaged section be discovered, it would be cut out and the cable then becomes two cables of shorter length. We never splice a first grade cable, and when a cable is spliced it becomes a second grade cable.

We have adopted an arbitrary rating for wire cables, which is intended to prevent the possibility of accidents on the work. There are three grades.

No. 1 cable covers new cable which has never been used, and used cable which shows no signs of having been subjected to severe stress, such as would be indicated by distortion or ruptured wires, excessive wear, or indication of kinking.

No. 2 cable may have all of the above faults to a slight degree, but this quality is not again used where heavy loads are to be handled, or where a stress would be developed in the cable which would anywhere near approach the breaking point of the cable.

No. 3 cable is never used for hoisting purposes, but has its uses as lashing, guys and similar functions.

Manila rope is graded in a like manner, except that only new rope is graded as No. 1.

The use of chains in connection with the hoisting and handling of structural steel-work in the erection operation has largely been discontinued in favor of the cable sling. One of the most difficult jobs that a tool house foreman has to perform, and one that calls for the utmost care, is the examination of his chain equipment. If a chain has been subjected to excessive strain, so that the links are distorted, or so that the links show appreciable wear, the evidence is visible, and there is no question in the inspector's mind. The trouble arises from the fact that there are often hidden defects in the chain which cannot be discovered except through use, or by testing the chain. The latter method, however, is not easily available to the tool house inspector. It has been my experience that the danger in the use of chains in the hoisting of steel work does not come from the breaking of the chain so much as from the slipping of the load in the chain. If the man in charge of the operation would always be careful to see that a block of wood was placed between the chain and the steel, so that the links of the chain would not bear directly against the steel, much of this danger could be eliminated, but there again the human element enters into the problem, and the only answer, to my mind, is to find some safer appliance. The cable sling seems to be the solution. It is easier to handle, for ton for ton in capacity the cable is lighter than the chain; it grips the steel more tightly, and its condition is always possible to determine by visual inspection. In this connection, I am strongly of the opinion that the engineering office has a function to perform which is frequently neglected.

When the operation calls for the handling of pieces of unusual size, or excessive weight, I believe the problem should not be delegated to the man in the field alone. The operation should be carefully studied from the engineering angle, and a line of procedure mapped out, the equipment selected, lifting devices designed, and the whole operation diagrammed, so that nothing is left to be guessed at in the field.

Such a procedure not only will go a long way to make the operation safe, but I

believe it tends to speed it up, to the extent that the foreman is not obliged to spend any time in thinking out a schedule of procedure, and he knows that the equipment provided has been considered both with a view to safety and the adaptability to the particular work involved.

There is another function in which the engineering office can assist the field, and that is to advise the shop with regard to loading the material, especially when heavy pieces are involved. If a study is made to determine how the piece is to be handled from the delivery point to the site, as well as to determine how it shall be finally placed in position, much of the delay in securing prompt delivery, as well as the consequent danger incurred by having to turn, or even re-handle it, will be eliminated.

Numerous accidents are on record caused by derrick failures on large building operations. These are mostly of two general characters—either through breaking of the lines, or through the kicking out of the foot block of the derrick. I have also noticed that many such accidents occur on work on which electric hoisting equipment is used. It has long been the practice of the manufacturers of such equipment to provide a solenoid brake as a necessary item. To my mind, any appliance such as this, which acts instantly to stop the machine, is a dangerous one. I do maintain that some form of mechanical brake, which will act automatically to prevent the hoist from dropping its load, is necessary, but such a brake should not act to stop the load instantly; on the contrary, it should work just as the ordinary foot brake operates, and bring the machine to a stop by gradually decreasing acceleration.

The sudden stress put into the lines and the derrick structure, especially the "kick" produced at the foot of the boom, due to instantly stopping the hoist when operating with a heavy load, is something which it is almost impossible to provide for in advance, and it is my opinion that we should give these possibilities severe consideration before applying such equipment to our operations. Personally, I would rather depend on the good judgment of the hoist operator, rather than on any mechanical appliance which carried with it the element of danger, such as does the solenoid brake. It has its uses, but they are not on the hoisting equipment, where derrick operation is involved.

There are two sources of accident which I believe give most of us more cause for anxiety than anything else connected with our operations. This has to do with proper planking for the working floors in building erection, and with hanging scaffolds for riveting, both in building and bridge work. For the riveting operation, especially on bridge work, I am strongly in favor of what is commonly called the ship scaffold. This consists of a platform about four or five feet wide and six or eight feet long, suspended at the four corners by Manila line. On this the riveter works, and it has the advantage of being easily adjusted and moved from point to point, and at the same time is not too heavy that two men cannot handle it easily. This type of scaffold is much preferred to the common type, where needle beams, usually pieces of old pipe or timber, are suspended from the structure, and a few planks laid loosely thereon. Besides the time required to rig up this type of scaffold, it is often built, using old plank, with long span between supports, too long to be entirely safe for supporting the weight of one or more men, and is altogether an unwieldy and careless appliance on a job.

The matter of planking the working floors has received the attention of public officials to the extent that in many of the cities, and some states, laws have been enacted to regulate and control the practice. I refer to the regulation requiring the planking over the entire working floor, and of retaining this planking until the riveting is completed. It is true that these regulations differ with the locality, and regrettably true, that often times they are allowed to be ignored. Here again is one of the points involving the human element—the judgement as to the quality of the lumber used, the length of span over which the plank is laid, and finally, the amount of load it will sustain with safety. All of these conditions are usually left to the judgment of

the man directly in charge of the operation, but I am inclined to the belief that a far better practice would be to have our engineers give the subject some study, to be able to advise the foreman how best to lay his planking, how to distribute his loads, so that the possibility of accident may be avoided entirely, or at least reduced to a minimum.

There is one obligation which we, as employers, owe to our men, and that is, to see that they receive the very best attention possible when they are hurt. Accidents will happen, and sometimes cannot be avoided, but be the injury small or great, the workman is entitled to the best medical attention it is possible to obtain.

Here again is a matter that is too frequently left to the man in the field to take care of, with the result that nothing is done until an injury occurs, and then the patient is rushed to the nearest doctor, regardless of the nature of the injury or the fitness of the doctor to care for it. Many times this procedure produces fatal results, and often serious consequences follow such carelessness. I believe that where an operation is large, and is to extend over a long period, an emergency room should be included with the temporary buildings, this to be in charge of someone who has received training in the handling of emergency accident cases. The least that we can do is to see that the foreman, or some other person on the job, receives some sort of instructions as to what to do in case of injury. It is always possible, before an operation is started, in fact it should be one of the items to be considered when planning the job, to investigate the hospital accommodations in the locality, and to arrange for suitable medical services. Then, when the foreman arrives on the ground, he has his instructions all prepared for him, and need have no anxiety as to whom to call upon or what to do when injury occurs.

In closing, I want to make one observation, which I feel confident we can use to good advantage in connection with our studies for the promotion of safe methods in this line of work. Indeed, I am not sure but that the same thing will apply equally well in every line of industry. The human mind is quick to acknowledge suggestion, and to imitate what appeals to it as good. Written rules, pictures, lectures, conferences, even individual instruction and training along the lines of accident prevention, are admirable, and not by any means to be overlooked, but I am convinced, from my own experience, that the workman who finds the tools and equipment which he uses in perfect condition, who sees that those in charge of an operation are constantly alert to prevent carelessness on his part, or on the part of his fellows, who knows that careful planning and study has been given to the job in advance, and that the procedure has been all mapped out beforehand, cannot help but be impressed, so that almost instinctively he uses the suggestion to the end that he is more careful of himself, and more thoughtful of how he goes about his tasks, as they affect the safety of himself and his fellow workers.

CHAIRMAN EIS: Thank you very much, Mr. Hazard, for your splendid paper. I would like to ask you what is the method of inspection of that Manila rope that you have used for riveting scaffold? What do you do with that after you get it down?

MR. HAZARD: I should have amplified that, perhaps. We never use second-hand rope on the riveting scaffold. These are always new ropes at the start of a job. Now they may last through the job if it isn't too long. When they are taken off the scaffold, they are never used again after the completion of the job. That is, they are not supposed to be used again. We can't always control those things. But they are short pieces, only about twenty-five feet in length.

J. A. NORTHWOOD (Bethlehem Steel Co., Sparrows Point, Md.): I would like to ask why you use that Manila rope for a scaffolding of that kind?

MR. HAZARD: You can't use wire rope very well. You have got to have something that is pliable and that is easily attached to your iron frame work.

MR. NORTHWOOD: There is the question of the rope burning from hot rivets, and becoming weakened.

MR. HAZARD: That is true. There are dangers in connection with that, but all

riveting scaffolding is more or less temporary, and I consider that the type I have mentioned there is probably the safer.

MR. NORTHWOOD: What I had in mind was the question of whether the cable wasn't practical to use on that type of work.

MR. HAZARD: No, I don't consider it so.

J. W. BENNER (Carnegie Steel Co., Homestead, Pa.): Are your erectors subject to any age limit?

MR. HAZARD: That is a delicate question. If you refer to 40 years old, or anything of that kind, I would say "No" right away, because some of the best erectors in the game today are men who are from forty to sixty years old. It is a strange thing about the steel erector. He is a pretty hard proposition physically, and the rule is that he lasts a long time. Most of our men are from thirty to forty, as a rule, and I don't think of a single exception in our particular instance, where the foreman is not over forty years of age. We have one foreman on the pay roll now who is nearly sixty.

G. H. JOHNSON (Minnesota Steel Co., Duluth, Minn.): Mr. Hazard brought up the matter that where a man has to climb up a certain distance, there is danger of collapse. I was wondering whether, in the case of a man climbing up about 100 feet from the ground to tend a blast furnace, you would regard it as a sufficient distance to warrant the installation of an elevator?

MR. HAZARD: I am strongly of the belief that any man's job which requires an excess of expenditure of physical energy—and a blast furnace man would be included in that category—ought to be taken care of to some extent. Your individual operations have got to determine that. If a man climbs fifteen stories, you know you are not ready to go to work right away. I should imagine the same thing would be true in a blast furnace; if a man climbs 100 feet, he isn't ready to go to work. He ought to have a chance to get his breath. We, in the steel erection game, are probably less thoughtful of our employees in that respect than most of the other industries. If a man has to go up to the top of a tower to do a job, we send him up to do it and come down again. But it is a mistake.

CHAS. W. HANKO (Pittsburgh Steel Co., Monessen, Pa.): I would like to ask if the Steel Workers' Union does any safety educational work, or co-operates with the contractors?

MR. HAZARD: Well, we are open shop people, you know. The Steel Workers' Union has made some attempts along the lines of safety education, but it hasn't gone very far. All the work that has been done, so far as the steel erection game is concerned, has largely been by the individual companies. Now I have been very much interested to see that the American Iron & Steel Institute has appointed a committee, of which the Chief Engineer of the Hamilton Bridge Company is the chairman, to try to develop specifications, if you want to call them that, or rules, governing our line of work. I don't know how far they are going to get, but at least the movement is started to get us all together. But so far the work has been largely handled by individual companies by some one in the particular organization, who follows along the lines that he has developed himself.

WILLIAM J. DENNISTON (Hyatt Division, General Motors Corp., Newark, N. J.): Have you had any experience with safety belts with regard to riveters?

MR. HAZARD: Personally I am not in favor of the safety belts as now used. A man who has to move around at all, and most of them do, even in riveting, with a line attached to him, is not a safe proposition, in my opinion. I have in mind a very large piece of work that was under way several years ago in which there was a rather abnormal loss of life, and safety belts were provided by the company, and every man was required to wear that safety belt. The belt consisted of a heavy leather belt, about four or five inches wide, with twenty-five feet of line fastened to the man. No man could go on the job without one. But I was on the job several times, and I never saw a line uncoiled.

My own observation, giving a personal opinion again, is that a man—and this is a sort of psychological conclusion—when he feels that he is tied up to something, loses his nerve.

MR. HAZARD: Didn't you find among your men a sort of feeling that they felt stifled, and felt that all the other fellows were laughing at them?

MR. HAZARD: I never put the safety belts on our men, so I can't quite answer that question.

J. E. BUSKO (Jones & Langhlin, Aliquippa, Pa.): I would like to ask the speaker what his ideas are on the ship scaffold.

MR. HAZARD: The ship scaffold is built about six feet long and four feet wide. We try to use chestnut as the lumber for the floor. It is just a square platform suspended from the four corners with $\frac{3}{4}$ Manila line. That is hung down below the point where the riveter is working.

J. A. ROHLFING (Elcoa Ore Co., E. St. Louis, Ill.): Do you have any railing around that?

MR. HAZARD: No, nothing.

MR. BUSKO: Do you ever have your men tied up with dolly bars?

MR. HAZARD: No, I don't. We try, so far as possible, not to have more than one set of dolly bars with each gang. If he has got to change his dolly bars, he puts the dolly bar that he has been using back on the scaffolding with the rivet heater. In other words, we try, as far as possible, to keep any excess tools off the riveter's scaffold.

MR. NORTHWOOD: Mr. Hazard, in that scaffold are the boards of the flooring close together, or a little apart?

MR. HAZARD: They are about an inch apart. Now I know what you are thinking of there. You are thinking of rivets rolling off and going down through. Well, they do.

CHAIRMAN ER: I am now privileged to present to you Dr. R. H. Lansburgh of the First National Bank of Detroit.

The Machine Age and Its Relation to Accident Prevention

By R. H. LANSBURGH

First National Bank, Detroit, Mich.

I come to you with an apology this morning. That apology is that I am going to give you an opinion, and not facts, because the more you look for the facts, the more you find that they have been screwed down into the concrete floors underneath the machines that have been put there.

We all know—we have been told for many years—that we have the problem of accidents from machinery in our industries licked, that it is the human element that we should look after. Compilations of statistics as handed out from Massachusetts to California—I can't say Maine, because I never saw any accident statistics come out of Maine as a whole—indicate to us that there is a definite trend downward from accidents due to mechanical defects or to the operation of machinery itself.

We have not been able to see the same trend in accidents due to the personal factor, the human factor, due to the type of things which is often referred to by a number of names, but which we generally have included under the human equation.

Now during this same time it is perfectly clear to all of us that the machinery introduction has not only not stopped in our industries, but that we are doing every year many more things by machine than we did the year before, and it is also clear to us that the types of machines which we are utilizing are not simpler machines, but are more intricate machines.

Those of you who are in the steel industry are familiar with the mechanical developments in the steel industry, over the last ten years. Once upon a time, about five

years ago, a gentleman who is well known to all of you as the safety director of the Carnegie Steel Co., took me by the buttonhole and led me down to see what in his opinion was the safest steel mill that had yet been erected down at Homestead; and when I went into that mill I agreed with him that it was the safest thing that I had seen in the steel industry. It couldn't help but be safe as far as the worker went. It might be dangerous to the visitors, but not to the workers—because you couldn't find any workers around the mill.

That tendency, which is well known to you in the steel industry, of having electrical and mechanical fingers and arms and legs work instead of human fingers and arms and legs, is also to be found in other branches of the metal trades that you are familiar with. The foundry industry has become mechanized, and I think that the safest foundry I have ever seen is a foundry not far removed from Detroit, Michigan, where the company spent \$500,000 to put in automatic foundry equipment. This equipment is like no other equipment ever made before, and no other equipment that has ever been made since, and it is so expensive to operate that they can't get any orders, and therefore, they have very few accidents.

You are confused very frequently as you come into a highly mechanized work-place because what is order to the man who is working there, day after day, seems to you to be a clashing of gears, and a lot of moving machinery, and you wonder, if you are interested in matters pertaining to safety, whether that machinery is properly guarded. And you see something that may not be guarded to the nth degree, either in the original design or in the final set-up, and you may feel that it is dangerous.

But the fundamental fact is that that machine has probably supplanted the type of labor which is prone to accident, namely, the unintelligent labor around the works. And I think that the supplanting of unintelligent labor by machinery, which not only has arms, and legs, but seems to have brains as you see it operate, is the factor which is causing the accidents due to machinery in this country to have a downward trend.

Now we are accustomed, I think, in talking about accident prevention, and have been for years, to talk about such companies as the Carnegie Steel Co., American Rolling Mills Co., and others that have been referred to here today. Those are the companies that have the resources to enable them to put in the most modern equipment, to devise the most modern equipment, and to purchase it. We still have in this country thousands upon thousands of small shops without safety engineers, without representatives in these meetings, companies which have no officers who read the *National Safety News*, or are in any way affiliated with the National Safety Council.

Those companies are the ones that are leading a hand-to-mouth existence, and never a more hand-to-mouth existence than on October 1, 1930. Those are the companies which statistics show to us are having accidents in total, although when you take any one particular plant, it is the same old story of the small shop—they don't have enough to get anybody interested in them.

Now you gentlemen are probably interested in metals or you wouldn't be in this room this morning, and therefore you are not interested in a plant which produces malt which I happened to visit during this past week. But I find that malt is still being manufactured.

And according to the president of the company involved, the process has not changed since the Egyptians. As far as his particular plant goes, it has been there ever since the Egyptians first started making malt. These are the conditions that you find in plants where the executives are not mechanically minded and do not live in the machine age.

This gentleman in question was trying to secure a loan from the bank I was connected with. He was, therefore, very nice to me when I visited him. He wanted to show me how fine his plant was, how magnificent it was, and he led me from his

office down two steps to an alley, and across the alley, and up what purported to be a ladder. This ladder was only about four feet high, but in that four feet it had two missing rungs, and I wasn't sure that the others wouldn't be missing before I got to the top, and therefore the job of climbing the ladder was quite a job.

When we got to the ladder he said, "Follow me. I guess you are not used to this", and then he led me down a tunnel—I can't describe it any better than a tunnel—which I suppose was only about 60 feet long, but it seemed about 600. The tunnel didn't have a single bit of illumination of any kind. I could see a dim light at the other end, and I knew he was ahead of me, so I supposed if I wasn't hitting him, he was still moving.

We went from that tunnel down to the platform where he unloads his grain, and we went down one of those contraptions called a circular stairway, a metal stairway. I don't know what brand of sledge hammer they use, but half of the steps slanted downwards and the other half slanted upwards.

There we saw his grain unloading devices, and then we started climbing through his plant composed of about six floors and all kinds of vats, storage bins, drying apparatus, etc., I learned a lot about malt, but not much about safety. There were the worst possible types of contraptions around that place, that were called stairs, that I ever saw. Some of the treads were a good foot wide, and others were four inches wide, on the same stairway. As you were trying to find your way up, you had to lower your head because a pulley came down, just where your head ought to be.

I climbed around that place for about half an hour, and I came to one definite conclusion, that the only safe place to be in that plant was to be tending a machine, that if you had a job which caused you to walk from one place to another you ought to take out an additional amount of life insurance.

There is an industry as old as the Egyptians, with machinery that hasn't been changed much. There isn't any thought given to the mechanical side of the operation of that plant, because the operation now is just the same as it was 27 years ago when the plant was built, although it looks like 270 when you are in it.

The attention of the executives of that plant is centered in what the grain market is doing today, whether it is off a cent, or up a cent. It is centered on the business of making future sales of malt to be delivered next May, and there is nobody around who is giving a single thought to processes.

You can contrast that right up through the industries with which you and I are familiar, that have engineers who devise machinery, engineers who buy machinery, men who think, and when they are thinking in terms of how something is to be made, they think in terms not only of the purchase of a machine to make it in the cheapest and best way, but naturally tend to think about the making of that in a safe way.

The safety engineers of this country are not composed only of those men who have the title of safety engineers. Although I know that you are going to tell me that one of the worst trials and tribulations that you have is with the mechanical engineers in your plants who won't design machinery so that it is safe, nevertheless, by and large, that isn't true. The machinery which is being developed today is safer than the machinery which was being developed five years ago, and that in turn was safer than the machinery of ten years ago.

I am willing to make the rash statement that if every steel mill had equipment which had been put in in the last five years, and if every machine shop had motor driven tools of the design of the last five years, that we would have gone a long way toward the entire elimination of accidents, due to mechanical causes.

So that to me the machine age is a very definite challenge to the safety engineer to see that his machines are designed right, and are safe to start with, and then practically forget them and pay his entire attention to the human causes of accidents.

That discussion which Mr. O'Connor led this morning concerning the training of foremen and supervisors indicates to me one of the most important outgrowths

of the machine age, because management at the top, though it can inspire, cannot direct the elimination of accidents from human causes and it is the foreman who has the job squarely on his shoulders.

The very top today is thinking in terms of financial statements, and whether or not the next dividend can be paid, and they are going to continue to think of that, because if they don't, the safety engineer or no one else is going to have a job next year, and it is up to the foreman, the man on the firing line to put across the human side of safety, which is of ever increasing importance.

ADJOURNMENT

Wednesday Afternoon Session

October 1, 1930

F. G. BENNETT, Chairman

The Buckeye Steel Castings Company, Columbus, O.

The third session of the Metals Section convened with Mr. F. G. Bennett, The Buckeye Steel Castings Co., Columbus, Ohio, presiding.

CHAIRMAN BENNETT: It is my privilege, gentlemen, as chairman of the Foundry Research Committee, to preside at this Foundry Session. The first item on the program is remarks by your chairman.

This gathering represents those members of the Metals Section who are interested in foundries. Shortly after the Congress last year your Executive Committee decided to hold such a session. The attendance and discussion at this meeting, and the interest displayed in it, will be factors in determining the continuance of a similar session next year.

The statistics for 1929 as published by the National Safety Council reflect a rather backward trend. Frequency increased 16 per cent and severity 46 per cent over 1928. These figures are reports from 111 foundries that have reported during the past three years. All members have received a copy of the 1929 statistics, and can further study and analyze the figures.

The general result is a rather poor showing, and no particular analysis has been made by your committee. In the United States and Canada there are more than 6000 foundries. A small fraction of that number are members of this organization. I wonder sometimes if we have the worst part of the industry, or is it simply that the interest is lagging amongst our own members? At any event, we are vitally concerned with these figures.

Your committee has arranged this session as an avenue of finding out what is wrong, and attempting to overcome some of our problems by permitting discussion on the subjects to be treated here this afternoon.

Prior to this year I met with two representatives of the National Safety Council, and we attempted conferences with the American Foundrymen's Association, and the National Foundry Association. We did not meet with any success in attacking this problem in a nation-wide manner by means of a general committee. What we will try to do will be through members of the National Safety Council, with some co-operation from the members of these other organizations, because since that time I have been selected as a member of the National Standards Committee to revise and arrange for the redrafting of the National Foundry Code.

I have asked Dr. Chaney of the U. S. Department of Labor to speak to us on the labor statistics. We will now hear from Dr. Chaney.

DR. L. W. CHANEY: The question of what to do about foundries has interested me now for a number of years. Unfortunately, the figures which would tell you with some exactness what happened during 1929 are not at hand.

There are several reasons for that. We are trying to broaden our survey on the accident conditions, getting outside of the iron and steel group, to which we have for some twenty years given attention. We are now in the fourth year of an effort to get at a broader view of the accident situation.

We are obliged, in order to get what we want, to go to the industrial concerns, and so we are obliged to find out what the experience of the different concerns may be. Several of you will undoubtedly remember that I have at different times rather taken the foundry industry to task for not securing results quite comparable with what is being accomplished elsewhere.

It isn't reasonable that the foundry industry should have a record in the matter of

accident occurrence less satisfactory than open hearths and blast furnaces. I think you will all probably agree that what may be called the normal hazards of open hearths and blast furnaces are higher than the normal hazards of the foundries.

The foundries have not had as good a record. Last year they improved quite materially; that is, the last casting up of the records. The casting up for this present year, as I have said, is not complete, and so I can't guarantee the accuracy of the figures, as I hope to be able to do when experience is brought together.

In the figures which I have presented to you from year to year there is a group of plants which serve as an illustration of what can be accomplished. They are the plants which have, for the longest time and most successfully, struggled with the problem of accident reduction. That group of plants has consistently for ten years, perhaps for more than ten years, shown a decline in its accident figures.

This past year—when I say past year, I mean 1929, because we have not yet done anything with 1930—that steady, continuous, downward trend of accident experience has slightly turned in the other direction, and I am wondering why. I must confess that I have no satisfactory explanation.

Quite a good while ago, I came to the conclusion that a period of depression would be a period of accident decreases, for the reason that the men let out would be, on the whole, the less desirable employees, whereas the more skillful ones would be retained, but my explanation now falls down on that, and if any of you will explain to me why there is this marked definite turn in the other direction, I will be very grateful, because, so far, I can't explain it at all.

Well, to speak a little more definitely toward the problem which you are facing as foundrymen, it is evident that if you are to keep up with the procession, and better the situation, you have got to put on a little more strenuous effort than you have been doing.

That the accident rate of the foundry industry can be brought down is clearly demonstrated by the facts. That it can be brought down more rapidly than it has been, I believe is demonstrated by the experience of the other departments of iron and steel.

I don't wonder at all that, under the circumstances of this past year, things haven't gone quite as we would like to have them, but there is no occasion in those facts as I have suggested them to you, why the foundry industry shouldn't go on to accomplish the desired result.

CHAIRMAN BENNETT: The next item on the program is a paper by Mr. J. W. Beall, Insurance Commissioner, The Ohio Steel Foundry Co., Lima, Ohio. It gives me pleasure to introduce Mr. Jack Beall, of Ohio.

Foundry Engineering and Safety

By J. W. BEALL

Compensation Insurance and Safety and Welfare Director, The Ohio Steel Foundry Company, Lima, Ohio

I believe the greater portion of American industry has already made its way through the first two stages of the war against accidents, namely: the machinery guarding stage, and the safety-education stage. I am sure of that statement insofar as the larger units of industry obtain. We are sure, also, that there are hundreds and thousands of the smaller plants and groups of workers throughout the country that have yet to take up the sword. This being true, possibly these smaller groups may be led to profit by the earlier experiences of the larger industries, such as are represented in this Congress. It is possible that if we, in our councils here, can devise more effective means and methods of combat, we can then best serve these tardy groups by leading the way into quicker action and greater results. With this

end in view, I am going to submit for your consideration and discussion these two plans of strategy for development and employment. They are:

First:—Purposeful elimination of misleading sentimentalism from accident prevention—safety promotion work.

Second:—(a) Charging accident costs, along with production and overhead costs, against the department in which the accidents are permitted to occur.

(b) Discipline.

Let me hasten to assure you that I do not claim to be the only pioneer safety thinker to originate or adopt the pair of strategic plans just proposed. If I did so claim, I would be guilty of gross plagiarism. Neither do I expect or hope that all of you will agree with me. If you do, there will be no field for future discussion, argument and analysis; without which our barrages here would mess up our No Man's Land with a lot of duds.

As to my proposal number one, I am proud to say I had the support of one of America's foremost, outstanding generals in safety's army, supplying food for the thought before this paper was typed. The suggestion itself came from his pen. I refer to that eminent thinker and exponent of safety, R. G. Adair, staff supervisor of safety and training, of the American Rolling Mill Company, Middletown, O. Let me quote from an article by Mr. Adair which recently appeared in an issue of *Factory and Industrial Management*:

"For too long has safety been tangled up with sentimentalism. It is, of course, a human tendency, well-intended but ultimately misleading, to become hysterical over an injury. Straight-line thinking should make the safety worker worry only about the accident and dig in determinedly to correct the underlying fault which will prevent a recurrence. Not until then can he turn loose his sympathies. Following the stretcher, leaving the scene to break the news to the wife and family, has caused many a safety man to lose the scent of an accident, for while he was away the wreckage has been cleared up, and the evidence is gone forever. Similar accidents can never be prevented without factual information."

Probably some of the sob sisters and blubbering brothers will denounce me as a hard-boiled top sergeant when the soaking-in process brings to mind the fact that I have advocated divorcing sentimentalism from safety work. Well, let them, but I ask them to be charitable enough to quote me literally. My proposal is "Purposeful elimination of misleading sentimentalism." A safety man, like the top sergeant, must be as hard as his job. That's why I say purposeful-elimination; we have an end to attain and attain it we must. I'll venture the statement that there is not a safety man in the Congress who has not at some time or another felt inclined to become hard-boiled when some poor, unfortunate, misguided worker has confronted him in the swelled-chest attitude of a hero, a self-anointed martyr, demanding monetary compensation, future special privileges, tolerance of malingering and a lifetime job on Easy Street. Why? Because he pulled a boner, violated a safety rule, took a chance when the foreman's back was turned, knew this "safety stuff was the bunk" and got hurt in the shop.

I am proposing that we leave the misleading sentimentalism of this brand to the social service organizations, to the uplifters who know little of and care less about our problems and whose usual comment is: "Well, if they can't protect their men, they can pay, so that's that." But, while this goes on we can "stay in and pitch" and with patience and devotion to a clearly defined duty, dig in for the truth, eliminate the cause and save some other hero from a similar or a worse fate.

I will give you a concrete example:

A man of family—wife and three children—obtained employment at one of the plants of an Ohio foundry company through misrepresentation, claiming to be an experienced chipper—we learned afterward he had never used a chipping hammer

before. On the second day, after he had worked only thirteen hours for this employer, he stood in the way of a crew of men who were shifting a set of chipping rails, not knowing what it was all about, and sustained a broken ankle. An X-ray disclosed there were no bone displacements and the man should have been on the job within a few weeks. But no; he was one of those self-styled martyrs to industry. He ignored and disobeyed all the doctor told him to do in an effort to help to get the ankle to resume normal functioning; sat at home for months, nursing the lame foot, refusing to use it or the leg to which it was attached. Atrophy of the leg and ankylosis of the ankle were the inevitable results. He continued on maximum compensation for nearly two years. Finally his case was referred by the employer—a self insuring corporation under the compensation law of Ohio—to the Industrial Commission, where an award of compensation for sixty-six and two-thirds per cent loss of function of the foot was granted. That was fair. He had and still has the impairment. The rehabilitation uplifters were, however, not satisfied. The employer paid a lump sum to the man and set him up in the restaurant business. Two of the uplifters visited him, ate one of his wife's dinners, and then sent a recommendation to the Industrial Commission, urging that the case be re-opened and that the man be given compensation equal to that for total loss of a leg. That, I claim, is misguiding sentimentalism.

You will say that with proper supervision in the cleaning room, that man would not have been injured. Agreed; we do sometimes find it necessary to discipline a foreman for negligence, but in this case the misapplied sentimentalism was brought to bear after the man was beyond the supervision of a foreman.

It has long been the opinion that the enforcement of strict adherence to safe practices and safety rules in any shop or factory is up to the foreman. You would not hesitate to discipline or remove a foreman who repeatedly permitted bad castings to come through. That means higher costs for what good production comes through. The broken ankle also meant higher costs—a dead, non-productive loss of probably two thousand to twenty-five hundred dollars. Why not discipline men for high accident costs as well as for any other high cost that is controllable? It must be remembered that accidents are caused; they don't just happen!

Then, if we are right in holding a foreman responsible for department of his men in production and accidents, why shouldn't we also discipline the man? We should and we can, if we get away from misguiding sentimentalism. Here is another concrete example:

A man with a large family was employed in the welding department of an Ohio industry—a foundry. Week after week and month after month, this man was losing days and weeks as a result of disabling flashes from welding and cutting torches. He had been through all the stages of mechanical safety, the helmet and the eye shields, and the educational stage of safety meetings, safety bulletins and booklets. But all to no avail. Then we tried discipline. Two years ago, when he returned to work after several days absence on an eye injury, he was told that he had been transferred to a labor gang in the yard, where, for the sake of his family and himself, he would not encounter the hazard of eye flashes. He was told the transfer had been made at the request of the safety and welfare chief. A few days later he called on the safety man and declared he could not earn enough money on the yard gang to properly care for his big family. He wanted another chance in the welding department. That was just what we had hoped for. He was sent back to his old job and for two years his name has not appeared on an accident report. He has been promoted and he sees to it that the men under his supervision in the welding-cutting department do not have occasion to go to an eye specialist for treatments for eye flashes. He had learned that a man who carelessly allowed himself to become a chronic repeater in the accident records was not a hero—not a valuable man in industry. And he had profited by his lesson. Misguiding sentimentalism is no longer

a part of his curriculum. He now believes in the slogan of Ohio's Division of Safety and Hygiene that "Safety Is Better Than Compensation."

The safety man can make speeches at mass meetings of employees, give motion picture shows that impress wives and children, load the plant bulletin boards with educational posters and hold weekly safety committee meetings to his heart's content and the accident reports will continue to land on his desk with painful regularity. The speeches, the meetings and the posters are all well and good. They are a necessary part of the great undertaking, but discipline always clinches your argument and brings home the kind of bacon you are striving for. The man in the shop thinks the safety-welfare man is a good fellow; he listens to his troubles, gets him a wage advance, squares him with the building and loan company, sends flowers to the saddened home and sees that compensation is paid. But it is the whole-hearted co-operation of the foreman that the safety man must have if he is going to stop accidents.

The man in the shop does not feel that he owes anything to the safety man. Sentimentalism tells him the safety man will do the patting and the petting when he gets hurt; get him a lump sum award to pay off the mortgage on his home or the automobile if he loses some part of his anatomy while being a martyr to industry. But with his foreman, well, that is different. He is responsible to the foreman for the kind of work he turns out. The foreman tells him how to turn out a job and he knows he is responsible to that foreman. His place on the payroll depends on his standing with that foreman. Let the foreman also tell him in the same brotherly way that he cannot afford to have his costs running wild with compensation claims. Call it hard-boiled if you want to, but the results will count and the costs will fall. Soon the spirit of co-operation will infiltrate throughout the plant and no man will want to take a chance; he knows he will hang his head in shame when he meets the foreman or his fellow workers if they see him on crutches. That's the kind of sentiment we want. The kind that will cause a man to protect himself and his fellows and be loyal to his foreman and to his company. He should know that lower costs mean profit for the employer. Wages are paid out of profits; sans profits, sans wages.

At one of the plants of the company by which I am employed, there is much handling of a somewhat bulky article of our product that, when first it began going through foundry, cleaning room, machine shop and shipping department, caused many broken toes. We insisted on safety shoes and we furnished them to the men at factory costs. Soon the injuries to feet were almost wholly eliminated. Then one day a colored laborer came in from the cleaning room with a badly mashed toe. The hospital attendant said: "I thought I sold you a pair of safety shoes a couple of weeks ago."

"Sure, yessa, yessa, you did," replied the laborer.

"Then how does it come you are handling those return bends, wearing those old worn-outs," queried the attendant.

"Oh, yes," said the colored man, "them safety shoes is too nice to wear in the shop. I keeps them in mah locker and wears them back and forth." More misguiding sentimentalism. A good place to apply rational discipline. We might even give safety shoes to such a man at company expense, but what good would be accomplished if we didn't make him wear them in the shop?

Now, Mr. Safety Man and Mr. Foreman, that's my story and I'm going to stick to it, so long as my position is tenable, at least. As the Irishman would say: "You can take it or leave it." I could read or talk through the remainder of this session about foundry hazards, the need of goggles, helmets and safety shoes, and how we get men to wear them, but you have all been through all that. Each shop and each safety man has its and his own problems. You have probably studied out your own way of attaining the objective. I have told you mine. Now you may fix bayonets and attack my plan of strategy and cut it to pieces. But you'll find us tough, for,

while I am not here to advertise, I warn you that my company manufactures, among other things, a high temperature, high pressure resisting alloy.

Some of you may have begun to wonder why I am taking up all of this valuable time without having said one word about the first half of the two-headed subject assigned to me—Foundry Engineering. Well, the kind of foundry engineering I believe we are most interested in is the kind I have been talking about; the kind that stops accidents. However, with reference to mechanical engineering and plant construction engineering, as relates to the modern foundry and the last word in engineering as it provides a safe place in which to work, I will call your attention to a little booklet, which will presently be passed around for your inspection. This booklet describes a new unit added to the plant of The Ohio Steel Foundry Company at Springfield, O. I want you to note the wonderful lighting of this plant; nothing like the foundry of the old days, where you'd have to use a torch to see when it was time to blow the noon-day whistle. Note the orderliness inside and outside the building, for you all know that orderliness, cleanliness and good housekeeping are among the first requisites to safety. You will note, also, that the molders, helpers, ladlemen and all in this foundry wear white uniforms for overalls. They stay white, too, and they are not laundered every day either. Can you imagine such a thing as white uniforms in the foundry of fifteen or twenty years ago?

CHAIRMAN BENNETT: Thank you very much, Mr. Beall. The discussion will take place after the next paper.

The next subject will continue the discussion on foundry safety along helpful lines. We have asked Mr. S. W. Doran, Personnel Superintendent of Pratt and Letchworth Co., Buffalo, N. Y., to address us, dealing especially with hand, foot and head protection.

Personal Protective Devices for the Foundry Worker

By SEYMOUR W. DORAN

Personnel Superintendent, Pratt and Letchworth Co., Buffalo, N. Y.

I have been in attendance at a great many safety Congresses and have heard a large number of very wonderful talks on the various phases of accident prevention work. Most of these plainly indicated that the speakers had spent a lot of time in research in order to obtain the voluminous quantities of statistical figures which they submitted; figures which show the upward and downward trend of accidents and near accidents in the various departments of this work. I have often wondered how they succeeded so well in finding out the facts which they finally submitted. I have a great admiration for men of this type. They are conscientious in their work. We find them at their desks working when most of us are out playing golf, or baseball, or whatever may be our particular weakness. These men are the guiding lights of all accident prevention work. It is they who tell us whether or not we are getting anywhere. I question, however, if it is statistics we want at a gathering of this character. I wonder if we should not confine ourselves to a practical discussion of the best procedure in actual preventive work.

The gentlemen who arranged this program assigned to me discussion of the hands, the feet, and the head. After getting into the actual work involved in such a discussion, it occurs to me that they have handed me almost everything that pertains to accident prevention work, and were each subject handled in detail as its relative importance deserves, I am afraid the time available would be entirely inadequate.

After this assignment, it seemed to me this subject of foot and hand and head protection is so fundamentally simple and obvious that I felt at a loss to talk about it, feeling that everyone by this time should know the most acceptable practices for preventing accidents to either one of these members. This knowledge is so general

that I do not believe anything can be added that has not already been said and printed. I am therefore, afraid you will hear nothing new and what I am going to say is probably a reiteration of all things which you are now doing in your own plants. The subjects, in a great measure, are interwoven one with another, although I will attempt to discuss them under their separate heads and will take them in the order given.

Let us start with a clear understanding of what we mean by foundry worker. As I understand the term, it includes all of those workmen who have any part in the manufacture of castings, from the time the materials for the heats are brought in from the scrap yard until the castings are ready for the machine shop or the shipping platform. The operations will vary somewhat, depending on the class of work your particular foundry is doing and whether you manufacture steel, malleable, gray iron, or brass castings. My experience has been wholly confined to the manufacture of steel and malleable iron.

Let us take the foundry first, in which we will include the core rooms and the melting departments. In many foundry operations it is impractical, owing to the nature of the operation, or the workers to protect the hands with gloves. Most of the operations are such that the work could not be satisfactorily done were gloves worn. I have particular reference to core makers, molders, and core setters. In every operation where possible, the workman should wear gloves. Flask handlers and chainmen or hookers should always wear gloves. These are the two foundry operations in which hand injuries most frequently occur. This is particularly true of the chainmen or hookers. All small flasks should be made with provision for the insertion of pins which can be readily inserted in either side for easy lifting. All heavy flasks should be constructed with proper handles for use of chain hooks.

The proper installation of a simple effective system of signals should be in use. In order to be effective there must be a clear understanding of the responsibility of both the chainmen and the crane operator with reference to these signals. No movement of the crane must be allowed without a signal from below. In addition, the crane operator must be given authority to refuse to move his crane if, in his opinion, to do so would endanger the chainman or others. Such signals should be uniform thruout the plant. These signals in different plants do not vary to any large extent and you can secure pamphlets from the National Safety Council giving clear explanations of the different movements, together with cuts showing just how the signals should be made.

All heat pourers and helpers should wear gloves to prevent burns from splashing metal.

Hand and sledge hammer handles should be promptly replaced when cracked or broken.

Our experience shows a greater number of hand injuries in the finishing department than in the foundry. In that department we have the same hazards which exist in the foundry and in addition, hazards from chipping, grinding, and handling. Chippers cut their hands against sharp sprues and frequently jam fingers or hands between two castings when turning them over. Grinders often get bad burns from getting their hands in contact with wheels. In all of these operations the wearing of gloves is the only practical protection available.

Consider the foot hazard in the foundry. Let there be no misunderstanding concerning the position of the Pratt & Letchworth Company on that question. For the past four years they have not allowed anyone to start to work unless he is equipped with a pair of standard safety shoes in good condition. Our company is self-insured and we make a careful physical examination of all men before employment. The employment manager then takes the prospective employee in hand and among the other customary questions, asks "Do you object to wearing safety shoes? If not do you agree, so long as you remain in our employ, to keep them in condition to afford proper foot protection?"

It may be that other things which I have stated are so ordinary and fundamental as to be of little practical value to this gathering. I therefore wish to talk to you in greater detail concerning this compulsory wearing of safety shoes.

A large percentage of our product is the manufacture of steel castings ranging in weight from 12 to 180 pounds. They are made on a production basis and require considerable handling by hand. Up to four years ago the largest single cause of lost time accidents was due to castings falling on workmen's feet. It became no serious in fact, as to call for very special consideration; we decided to make an effort to have our men wear safety shoes. We put in a large stock of shoes and by the use of group talks, bulletins, through safety committees, etc., we tried to induce the men to purchase and wear these shoes. Our efforts met with very little success and accidents kept piling up. We were convinced, if the use of these shoes were made general, there would be a decided reduction in accidents caused from falling objects; we then considered the compulsory use of safety shoes as a matter of policy and as part of the contract of employment. We talked to many executives in similar work and could find no one who had up to that time, taken this rather drastic step and some of our own executives were somewhat dubious of the success of such a movement. Every conceivable argument was advanced as to why we would fail to put it across; "That our men would quit", "new men needed would refuse to be told what they would or would not wear", that "it would cause more ill feelings than it was worth", "that the men would walk out with shoes partly or wholly unpaid for", etc.

However, we finally came to the conclusion that this was the only remedy and we posted bulletins to the effect that on or before a certain date we expected every man, including the general manager, to be equipped with safety shoes. The foremen were called into conference and they were instructed to see that our wishes were carried out. We set no special time for payment or any special sum per week, accepting as low as twenty-five cents per week in some cases. Not a man quit and not a man refused to comply. That was four years ago. Since then we have employed a good many new workmen and but four refused to start when informed of this rule and we have lost but five pairs of shoes by men not working long enough after employment to pay for them. Occasionally we get complaints that the shoes hurt the feet; that they don't stand up, etc. In every case the workman is given the benefit of any doubt and we fix him up in some manner, having gone so far as to get shoes made of special size for special purposes at added expense. These shoes are sold at cost and as we buy them in fairly large quantities, the cost to the men is very low when the quality and the wear is considered.

At first we kept track of those cases where it was obvious a shoe had prevented an accident or had been the means of reducing what would otherwise have been a serious accident. These cases were so numerous as to prove not only to the company, but to the men as well, that the wearing of safety shoes was a practise which worked out to the mutual advantage of both. As a result of our action, two other companies in this district have made the same ruling, and, I am informed, with gratifying results.

While it is true a shoe with a good stiff toe-cap will to a large extent protect the instep by breaking the fall of the object, the object does not always strike that part of the shoe, and therefore safety shoes are just a good start in the campaign to eliminate foot injuries. A majority of injuries to the feet are caused by falling objects. What then, causes objects to fall? Investigations of accidents showed a large percentage were from faulty hooking. We started an intensive educational campaign, designed to teach our chainmen or hookers the proper method of hooking a casting or a load, so it would not slip and fall. Frequently, while the load would not fall, it would shift sufficiently to cause one or two castings to slip off the load. All departmental foremen are a part of these campaigns. This is important for several reasons, the principal one of which is, to reasonably insure a continuance of

proper practises, for after all, unless there is a constant follow up, no matter how good your plans may be or how well your men are instructed, in most cases they forget very quickly and lapse into careless and unsafe practises.

Many other accidents were caused through careless piling, both on lift trucks, and stock piles. A similar campaign was inaugurated to overcome this practise, with excellent results.

The most frequent foot accidents were caused by smaller castings falling off benches, particularly during inspection, and we cured this by building up the edges of inspection benches, adding a strip four to six inches wide, two inches high at outside and tapering to nothing on top of bench. We also found that the use of gloves on both hands tended to cause castings to slip, therefore the use of but one glove and that on left hand is recommended.

Good housekeeping is a most essential part of accident prevention. Floors and passageways must be kept free of materials and obstructions. This is particularly true where it is necessary for workmen to handle large castings. When a man is carrying a heavy load and trips, he invariably drops what he is holding and it generally falls on his feet. While we rarely have a grinder suffer foot injuries, possibly due to position assumed while grinding, it is possible other plants have a different experience; however, it seems to me safety shoes with good stiff toe caps are the most effective preventive.

Now consider eye hazards. I believe we all are agreed as far as the individual is concerned, the only adequate eye protection is through the wearing of one of the standard grades of goggles, spectacles, colored or white, or what, according to experience, has been demonstrated to be the most acceptable for the particular operation on which the workman is engaged. Heat pourers and those helpers who attend the ladle when heats are poured, should wear spectacles with a No. 2 shade green lens. The lenses should be extra large. Our experience is that it is impractical to use side screens because on this operation moisture generates on the lenses and interferes with the wearer's vision. The wearing of spectacles on this job is not only to protect the men's eyes from the glare of the metal but also to protect the eyes in the event of a mold blowing up due to wet cores, plugged vent holes or any one of the causes which results in pouring off explosions.

Aside from these two operations there is little need for the use of goggles in the foundry proper. The cleaning room however, presents an entirely different situation. Up to approximately nine years ago, most companies encountered considerable difficulty in having the chippers and others in the finishing departments use eye protection. I believe, however, that these days are past. The principal danger at present is in too lax enforcement of the wearing of goggles. While the practise is generally accepted, you will always find a few workmen who, not realizing the chances they are taking, will work for short periods, with their goggles hanging on their caps or pushed up on their foreheads. In my opinion this is the point which must now be carefully watched and this can only be done after your foremen and underforemen are completely sold on the value of this protection. They should be mentally adjusted to the point where they are consciously or sub-consciously looking for infractions of this rule at all times. No one, regardless of rank or title, should be permitted under any circumstances, to step within the confines of a cleaning department unless his eyes are protected with goggles. There should be no exception to this rule. Experience has proven it is most often the bystander who suffers eye injuries and not the operator. Goggles should be worn in every grinding operation, from grinding large castings to the smallest tool. No exception to this rule should be permitted.

In grinding operations of late years the causes of eye injuries have been to a large extent eliminated due to improved guarding. This is evidenced by the fact replacement of lenses for grinders' goggles has been reduced at least 50 per cent.

In acetylene welding operations there was great danger of eye injuries due to

the old practice of preparing holes and cracks without first replacing the welder's goggles with a toughened chipper's goggle. The old practice was to shove the welder's goggles up on the forehead or the cap and go ahead with an air hammer and clean the castings preparatory to welding. We have overcome this by having our welders prepare two or three hours' work before doing any welding. They put on their chipper's goggles and clean out enough work to keep them welding for three or four hours. In this way we have overcome the practice of chipping these holes without protection. Since this practice was inaugurated in this department we have not had a single eye injury.

I have heard safety directors state the wearing of screened goggles is itself constitutes a hazard, and to a certain extent I agree. Some malleable foundries for years have insisted upon all pourers wearing goggles. This is something we have never been able to do nor were we very insistent upon the use of side screen goggles in this class of work; observation convinced us that the hazard set up by loss of vision due to dirt and steam was as great, if not greater, than the danger to the eyes from wild metal. However, we have now overcome this to a very large extent by the use of large clear glass lenses without side screens. These do not steam up and while perhaps they do not afford the protection the goggle with side screens gives, they do take care of any metal coming directly toward the eye of the worker. Our position on this point may have been wrong in the past. In view of the fact that we have had only one serious eye accident in that department in ten years however, we believe that in a measure at least, we were right.

Now, just a final word about eye injuries in other departments. My conclusion, after visiting a number of other plants, is that goggles are necessary in the maintenance department, particularly in the machine shop proper. In dismantling and repairing machinery where it is necessary to remove rivet heads and also in working with carburized pins or tools, there is a very definite eye hazard. Men chipping concrete, seldom if ever, are furnished a pair of goggles. Yet, only cursory observation will show the very great need for protecting the eyes of these men.

The National Society for the Prevention of Blindness has recently published a booklet entitled "Eyes Saved in Industry", which is the experience of 583 companies. This is a rather small booklet containing but 23 pages but is chock full of valuable information for all safety men. I strongly recommend that every one send to this society for a copy of the publication, No. 62.

I have devoted my time here to a discussion of mechanical correction of the accident problem only because I was requested to. Yet I cannot sit down without reiterating a fact with which I know you will all agree. That is, that mechanical guarding, whether of machines or men, is only a minor part of our problem. Our big problem is now, more than ever, one of education of men; not only the men on the job but the men charged with supervision of those workers. In the first place the management must be absolutely sold on accident prevention. Your foremen must work with you hand in hand. You must be careful in the selection of your departmental safety committees. We have found them a most important factor in our safety work. We must never allow our efforts to become stale or half-hearted. We must never lose an opportunity of pointing out unsafe practices when observed. Our plant inspections must be made thoroughly and religiously. In no sense should any inspection be made unless it be made thoroughly and conscientiously.

CHAIRMAN BENNETT: We received the following telegram today in care of Mr. John P. Eib, Chairman Metals Section: "Sickness prevents my attending the Congress. I am sorry. Better luck next time. Best wishes and success to the Metals Section. W. E. Watters."

We regret very much that Mr. Watters can't be with us. I have asked Mr. Robert L. Schmitt, the newly-elected Secretary of the Metals Section, to take charge of the Round Table Discussion of foundry hazards. Mr. Schmitt will come forward and proceed to take charge of the meeting.

Round Table Discussion

ROBERT L. SCHMITT (Louisville Car Wheel & Railway Supply Co., Louisville, Ky.): In entering this Round Table discussion I want to say at the beginning that some of you may be new in the safety game, and you may be hesitant about getting up and asking questions, or offering comments, either on the papers we have heard read this afternoon, or on some new subject which is close to your mind. But I want to ask that you do not hesitate. Get up and ask your question or make your comment as may please you, because the new fellows in the game can only learn by hearing what the old heads have to say. If you ask questions, I am pretty sure there are enough of the more experienced safety men in foundry work here this afternoon to give you some answer to your problem.

Before we go ahead with that, though, I want to make a comment that I think ought to get before this meeting. Last year I attempted to do some publicity work for the Metals Section, and I received quite a few replies from member firms. One of the things that struck me was that in a majority of instances the men who answered and who had good safety records, either in their mills or in their foundries, were those fellows who were able to say that they had followed a standard program.

There is such a program laid out by the National Safety Council, and if any of you are having safety troubles, I would suggest that you write to the Council and get a copy of the standard program and study it over and see what you are lacking. I am not trying to keep you from learning anything here this afternoon, but I suggest that you do this in addition to what you learn here today.

JAMES CORRY (Wheeling Mold & Foundry Co., Wheeling, W. Va.): I would like to ask Mr. Doran what kind of goggles his chippers wear. Are they cup goggles, or are they similar to what you have on there?

MR. DORAN: The chippers wear goggles with metal side screens, without exception.

A MEMBER (Atlas Steel Co., Buffalo, N. Y.): I would like to ask Mr. Doran what type of leggings his men wear.

MR. DORAN: Well, I think that would better be answered in this way, that it depends greatly upon the nature of the operation. We use the knee length leggings. We don't have to use the hip length leggings.

MR. ENSIGN: Did I understand you correctly to say you hadn't had much success with the side protection goggles for pouring the iron?

MR. DORAN: When I said that we didn't use the side screen goggles I meant for the heat pourers and the helpers on the ladles, the hand ladle pourers. We came to the conclusion that the wearing of side screen goggles set up a greater hazard than was offset by the protection afforded against splashing metal, because the goggles steamed up, you know, with perspiration running down a man's forehead, and became almost impossible to see through.

MR. ENSIGN: Well, we have found just the opposite result. We had the open goggles at first, and I wasn't perfectly satisfied, so I called up the wholesale house and had them send their samples over with a salesman. He had a large lens goggle with side screens. He gave me one pair of those for a trial. They looked good, and I gave them to different men throughout the shop and let them decide whether they wanted them or not, and quite a few men wanted them. I got a dozen pairs and gave them out to the men in the shop. The other men saw them, and they tried them out, and now they all want that same kind of goggle. But we have the extra large lens.

MR. CORRY: I have tried those goggles with the side screens myself, and I could see just as well as if I had used the open goggle. Now another thing, on the matter of gloves. My experience is that the sparks hit those gloves and they burn. The men sometimes can't get their gloves off in time. What kind of glove do you wear there?

MR. DORAN: I think I had better explain that I was referring to the pouring of metal in the steel foundry. We just use the ordinary leather gauntlet.

MR. CORY: Well, the sparks could go down the gauntlet.

MR. DORAN: Yes, they could, but we haven't had that experience. Of course, we may occasionally have had it—we probably have, but you will find in the majority of cases the sparks fall back of the hand.

H. C. O'BRIEN (Ohio Brass Foundry, Mansfield, Ohio): In our malleable iron foundry, we haven't had any success in wearing goggles of any kind, side lenses or large open lenses. It may be because of the nature of our work. We have about twenty tons of metal poured out in a half hour, and with the different temperatures in the air coming at this time of year, and working that fast, the men sweat up and the glasses get steamed up. My own glasses steam up just standing around there. We have been looking for a glass that wouldn't steam up, and we haven't been able to find one.

MR. ENSIGN: I think that our line of work is the same as that gentleman's. We use the same process that he does, and we use an anti-sweat compound that you just rub on the glasses, and rub it off again, and it will last at least three days. Now that will not steam up. I have tried it at all seasons of the year, winter and summer. We don't have any trouble at all. I give half a cake to each man, and when he gets out of that, I give him more.

MR. CORY: I have used some compound, too, and it is good.

M. A. GIMBEL (General Electric Co., Philadelphia): What is done in cases where, under ordinary conditions, a man wears a lens prescribed by an oculist, and in addition to that, under conditions of his work, should wear goggles to do his regular work. Do you have your goggle glass ground to his prescription, and do you pay the expense? Or do you fit him with a pair of goggles to wear over his regular spectacles?

There is another question that I would like to hear some discussion on, and that is why in the world are the accidents in foundries increasing? That question has been raised before, and the answer to it is very important.

Now before I sit down I want to make a statement. We found that in our shipping department where men were driving nails, crating cases, etc., the nail is sometimes struck on the side, and it rebounds, striking the man in the eye. Last year we lost one eye that way. This year we have every one of our men, who drive nails in boxes, wearing goggles. We have had several cases where the lenses were struck, but the men did not suffer. In starting these goggles in the shipping department we found all kinds of objections. One complaint was that the men would get a reflection in their lens. On others I found a lot of waste wrapped around the bridge. Still others would try to fit the goggles to a sort of arrangement that didn't have the side fasteners on them. We arranged with an optician to correct this fault by adjusting them properly, and since then we haven't had any trouble.

C. E. SANKEY (National Tube Co., McKeesport, Pa.): While driving those nails in you need to start the nail in a hole. Then turn your hammer over and drive that nail in. You can get a hammer from the American Tin Plate Co., of Cadiz, Ohio, with a driving head on one side, and pointed on the other. They cost about a dollar and a half. Then you can do the job in three strokes, one to set the nail, and two to drive it in. This will enable you to drive the nail in straight without danger of flying, and it protects property inside the box, and eliminates the scratching hazard from nails projecting out of the box or crate.

On your goggle question, you are right. Get 2 1/4-inch lenses, for instance, and put a leather side on them, and then if you have any sweating trouble, use this compound that the gentleman spoke about, or use some glycerine. That will take care of the sweating; we have seen that work under the same conditions. Our men have to wear them when they do that pouring.

D. E. WALL (U. S. Pipe Co., Scottdale, Pa.): Speaking for our company, and

also for the company at Chattanooga, they pour 300 tons of iron a day, and they use a screen goggle. They have no trouble whatsoever. They have been using them for the last four or five months, and they have had no eye cases whatsoever. At our own place we had a man who used to complain about the sweat, and would come into the hospital for treatment almost every day. We put a sweat band around his forehead about six months ago, and he hasn't been in since. In over two years we haven't had any eye cases from burns or anything like that. The men pour tons and tons of iron a day, and have no trouble at all.

JAMES RAEDIN (State Factory Inspector, Indianapolis, Indiana): It has been my duty to visit many foundries, and the eye problem is one of the hardest to handle. I think it would be unfair to say that the same pair of goggles would work in every building, because your ventilation isn't the same. In some of the low-ceiling buildings which are poorly ventilated, some of the goggles would steam up pretty much. I have seen them use soap on them, and these compounds that you speak of. I don't think it fair to say that the man in the building with the low ceiling, the old type foundry, can get the results that you can in a modern, up-to-date building.

V. A. ROUSH (American Radiator Co., Buffalo, N. Y.): We have been asked how to eliminate these accidents. Now I am not telling this young man that he should do this, or do that. Of course not. But I don't think there is a firm represented in the room here that hasn't had a lost-time accident again and again. Now I am talking gray iron. The company wants to relieve itself of the responsibility by putting it on to the man, by purchasing safety devices. All right. I have possibly fifteen or twenty reasons in the twelve months of a year why the devices should be worn, and the reasons are that the accidents have happened, to the goggles, and not to the man. I keep a list of them. You can't tell how many accidents you are preventing except by that list.

I say without any hesitation that as far as the American Radiator Company is concerned, side screen goggles for the pourer are the only thing.

DAVID SCOTT (Edgar Thompson Works, Homestead, Pa.): The actual foundry accidents are on the decrease. I don't agree that the accidents are on the increase. Of course, I only know our own foundry. We have over 400 employees. This year, so far, we have only had one lost-time accident. Ten years ago we were having four, five, six, and as high as eight lost-time accidents in one month. We have done that by holding shop meetings. We started holding shop meetings ten years ago, and we talked to the men for twenty minutes at a time. We are at a place now where we do not have any trouble in getting any of our men to wear goggles. And they wear goggles with sideguards, too. I don't see what is the use of wearing a goggle with just a lens, without a sideguard, because I am sure we would have had lots of accidents if we didn't have sideguards on our goggles. Our men wear the knee-length leggings, too. No trouble at all.

Now somebody might think that our men don't cast very long. Well, we have one shop where we cast from six to seven or eight hundred tons every day. Those men are casting for five hours, and they are wearing their goggles all the time they are casting. We have a little brass foundry where our hazards are not great, and we haven't had a lost-time accident in our brass foundry for five years. We haven't been having accidents because we haven't got the hazards. The work in this place is all done by hand, and the castings are small. In our 800-ton shop we have had accidents, for which we are very sorry, but they are on the decrease, we are thankful to say, for which we will go through the whole year without a single lost time accident. We have gone through nine months now.

MR. SCHMITT: There is one question on the floor now. This gentleman wants to know what we do about prescription goggles. Who will say something on that?

MR. ENSIGN: I think I can answer that partly. We have one man we thought needed a special goggle. We tried it out, and he didn't need it. He could see just as well by putting this other large goggle that we have over his other glasses. But

any time that we do need special goggles, we have the firm right there that has these goggles, and we can get them in half an hour. They will fit right over the other glasses, and will not impair the vision at all.

Mr. GIMBEL: That is a coverall for his regular spectacles?

Mr. ENSIGN: Yes, they cover them right up.

Mr. GIMBEL: What about the cost of them? Does the company pay the cost?

Mr. ENSIGN: Yes, the company pays the cost. They give the goggles to the man who needs them, and any time that he leaves the company, or is let out, if he does not return them, he is charged up with them. The company replaces all lenses free of charge. I am so enthusiastic about goggles because when I came with the company almost two years ago there was a change of management, and this new management is a safety man. Last year I went to Chicago—it was my first Congress—and when I got back to the plant we started in this work, and in our first month we reduced our accidents 94 per cent. That is why I am enthusiastic about safety.

Mr. SCHMITT: The coverall goggle is a fairly new development. I think most of us have tried it and found it satisfactory.

Mr. DORAN: I think I mentioned in my paper the fact that the wearing of goggles was such an accepted proposition that they were more or less a part of the employment contract. I am surprised to hear that any one is still having any trouble with them. For eight years I was general foreman of the cleaning department, and during that period the wearing of goggles was at issue. And it was up to me to put across the wearing of goggles, and it was done in this way. It was done with the big stick, I will acknowledge.

I personally went around to every man—135 chippers—and I told him what the company wanted, and what they should have. I warned them that unless they agreed to wear these goggles, their term of employment was all caught up with the Pratt & Litchworth Co. I told them that the first time I caught a man without a pair of goggles, I was going to check it personally, and that man was going to get a three-day layoff. The second time it was going to be a week's layoff. And the third time I was going to fire him. And I did just that. I fired eighteen of the best chippers we had in the shop. And we never have had any trouble since in wearing goggles at our plant.

Mr. SCHMITT: Our time is almost up now, so I will turn the meeting back to Mr. Bennett.

CHAIRMAN BENNETT: Dr. Chaney raised the question as to why it is that the foundry industry is having more accidents than the iron and steel and blast furnaces, and I don't know that we have particularly answered the question. We will try during the next year to find some solution, some answer. There is one thing about the collecting of statistics, and Dr. Chaney will bear us out in this. Of our 6,000 foundries in the United States, and Canada, I don't know of one that is anywhere near comparison in size and position to your iron and steel concerns that furnish their statistics. For instance, the U. S. Steel Corp., Jones & Laughlin, American Rolling Mills Co., National Tube Co., with their highly-trained safety organizations are all huge affairs. But I am wondering if some of the larger foundries haven't done very excellent work in our own division. Is there anything to that, Dr. Chaney?

Dr. CHANEY: There is a good deal to it. There is this difficulty still. The foundries which have the high rates are in many cases parts of the steel works plants, and there, in the steel working, foundry seems to be the sore spot.

CHAIRMAN BENNETT: I was talking to a gentleman this morning connected with a large steel plant, who said that they had been having trouble with their foundry. It was an old building that had been used for something else, but they were now using it for a foundry.

Dr. CHANEY: I think there is a great deal in that—the conditions under which the work is done. That is more or less responsible for what happens in some of

these plants. And it isn't all confined to the steel works, either. A lot of foundry work is done under physical conditions which make accidents almost inevitable.

CHAIRMAN BENNETT: In Ohio, in our foundry code work, we found foundries in cellars, with no light at all, dirt floors, where men couldn't walk safely, and yet they were carrying molten metal. This was years ago when we first started in our work, you know, and we have abolished that now. That was when we adopted our first code. I was in one foundry when an accident occurred, and there wasn't the slightest trace of first aid equipment in the place. In the new code there is a required first aid provision in every foundry. That is what caused a lot of the increase in severity in our accidents—having no first aid treatment handy. I happen to know that this fellow was disabled for two years. I followed up that case. I don't think the poor fellow ever did get back to work.

Now I want to ask the question, do we want this separate foundry session next year at the meeting? This matter will come up at the next Executive Committee meeting, which will be fairly soon, because we must begin working on a program for the Congress next year. Do you want the separate foundry session next year? (Cries of "Yes", "Certainly", "Sure", "Of course", etc.)

Will Repeat the "Foundry Session" Next Year

CHAIRMAN BENNETT: Well, I would say that we did from what I hear. And there also might be some attention given to this in our regional conferences. We might take that up with the Executive Committee.

C. W. HANKO (Pittsburgh Steel Co., Moonessen, Pa.): I have been listening with a great deal of interest to the discussions, and I was extremely interested in the same question put by Mr. Gimbel and by Dr. Chaney, as to what was the reason for the increase in accidents in the foundries.

Well, I think the answer is here. I think if you will carefully scrutinize the remarks made here today, you will see why. Here comes one fellow along and tells what he has done. Then Mr. Doran here gives us a solution for some problems, and he has done good work. And Mr. Beall gives us good advice, too. And here comes another man along who is not willing to accept that doctrine. He is not willing to accept it and try it as the man who has tried it and is succeeding with it has done. These fellows say: "It can't be done." Well, if one man can do it, surely another can. If it can be done in one line of industry, it can be done in another.

When a man gives us a point, we ought to go to our plants and work it out, if possible, and if that man has worked it out, you surely can work it out if you have any backbone at all. I think the answer is right here within this room. We are trying to find excuses for the things that we haven't got backbone enough to put over. Now that is using strong language, I realize, but I am sincere in that remark.

We know that all plants aren't as modern as others. The steel mills aren't; neither are the textile mills, or any other line of industry. But we have got to accept conditions as they are and make the best of them, and try to get to the point where the other plant has gotten to, and try to accept their doctrine, and do the thing the right way and get the good results they are getting.

Dr. CHANEY: I want to be sure that you gentlemen understood me correctly. What I did say was that, beginning in 1926, foundry rates were going down. In 1929 they were apparently going up. Now that is quite different from saying that the foundry accidents are on the increase. As a matter of fact in 1929 I took on a considerable number of new plants. Now unquestionably before that I had the biggest fellows, the large plants, all of them, nearly. These that I took on in 1929 were for the most part the smaller plants. And I think that is why we can see a change there in the wrong direction, because it is rather conclusively demonstrated by the studies of the National Safety Council that at the present time the small plant is

more hazardous than the large one. Now what I have done, undoubtedly (and I shall have to explain that when we come to publish these figures) is to inject into my figures a considerable number of these small plants, and I think I may say that the question of the small plant is going to be a matter of serious concern, not only in your industry, but in a whole lot of other lines. It is the small plant, so far, that hasn't caught the idea.

ADJOURNMENT

Thursday Afternoon Session

October 2, 1930

JOHN P. EIB, Chairman
Illinois Steel Company, Joliet, Ill.

The fourth session of the Metals Section convened with Mr. John P. Eib, general chairman, presiding.

CHAIRMAN EIB: We will immediately go to the first item on our program, that of the award of the Metals Section trophies. We will have the privilege of listening to and seeing the awards distributed by President C. E. Pettibone.

Award of Metals Section Trophies

By C. E. PETTIBONE

President, National Safety Council; and Vice-President and Manager,
Engineering Department, American Mutual Liability Insurance
Company, Boston, Mass.

I am not going to take your time to make a speech today. But I might say that 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 a great thing. We believe they help you very materially in your work in the plants.

It seems to me that there are two rather fundamental facts that help to contribute to the desirability of these contests. I think the American people today are more and more realizing that there are a lot 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. In the last ten years American people have followed sports more than any people.

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 their love of contest. We know that of course in the plants we should enforce a certain amount of discipline, but in addition to that you can get enthusiasm and cooperation from them if you lead them. All these contests do is to appeal to their love of sport and help lead people to things that you can't drive them to, and they like it a good deal better.

I am going to take a minute to present to you a few facts about this contest.

June 30, 1929, marked the close of the second-no-accident contest conducted among members of the Metals Section of the National Safety Council. The first contest started January 1, 1929, and like the second, was of six months' duration.

In the first contest, 34 plants were entered. However, in 1930, the entries jumped to 152, or an increase of 347 per cent. This remarkable change can be attributed to a complete revision and expansion of the rules, authorized and approved by the Executive Committee of the Metals Section.

While the conditions under which various units competed were changed in the 1930 rules, the basis for award remained the same. That is, the rules specified that the winner of each group "shall be the unit having the lowest frequency rating (lost-time accidents per one million hours worked) at the conclusion of the contest."

In the 1929 contest, entries were limited to plants actually engaged in the manufacture of steel. In the 1930 contest, however, five divisions were included and each division was divided into two groups, namely: Group A—plants employing 500 or more workers; and Group B—plants employing from thirty, or more, to less than 500 workers.

The divisions specified were as follows:

1. Steel mills
2. Rolling, finishing and fabricating
3. Iron foundries
4. Steel foundries
5. Heavy machine shops

In the final report of the contest, copies of which are available, many interesting facts are disclosed. Summarizing them briefly, they are as follows:

High Spots of the Contest

In 1930, approximately 174,000 employees worked more than 218,000,000 man-hours for an average of close to 1,300 hours per person. This is a slight decrease in hours employed per person since the 1929 average was approximately 1,500.

The 1930 average frequency rate is 15.604. This represents an increase of five per cent over the 1929 average rate of 14.813 but it is not entirely out of line, particularly in view of the great many more plants entered this year than last. While the frequency rate is slightly higher, it is gratifying to note that the ratio of persons employed to lost time injuries increased from 46 to 1 in 1929 to 51 to 1 in 1930.

Last year the final report listed the names of all contestants. However, this year the rules will not permit the identity of contestants to be disclosed and consequently the final report can only be identified by key number.

Based on verified reports, submitted in accordance with the rules of the contest and on behalf of the Executive Committee, National Safety Council, the following listed contestants are to be presented with trophies.

The Following Trophies Are Presented

Steel Mill Division

- Group A—The American Rolling Mill Company—East Works—Middletown, Ohio.
- Group B—The Youngstown Sheet and Tube Company—Hubbard Furnaces, Hubbard, O.

Rolling, Finishing and Fabricating Division

- Group A—Weirton Steel Company, Clarksburg Plant—Weirton, W. Va.
- Group B—Pittsburgh Steel Company, National Steel Fabric, Monaca, Pa.

Iron Foundries Division

- Group A—United States Pipe and Foundry Company—Scottsdale, Pa.
- Group B—United States Radiator Corporation—Edwardsville Plant—Edwardsville, Ill.

Steel Foundries Division

- Group A—Pratt and Letchworth Company, Buffalo, N. Y.
- Group B—The American Rolling Mill Company—Central Works, Middletown, Ohio.

Heavy Machine Shops Division

- Group A—General Electric Company, Philadelphia, Pa.
- Group B—The Bryant Heater and Manufacturing Company, Cleveland, Ohio.

Although not specified in the rules, the Executive Committee of the National Safety Council has presented to all plants completing the contest without a lost time accident, or ranking in second and third positions, a certificate of merit.

Steel Mill Division

- Group A—The Corrigan McKinney Steel Co., Cleveland, Ohio
- The American Rolling Mill Co., Butler Works, Middletown, Ohio
- Group B—Hamilton Coke and Iron Co., Hamilton, Ohio
- E & G Brooke Iron Co., Birdsboro, Pa.

Rolling, Finishing and Fabricating Division

- Group A—Weirton Steel Co., Weirton Plant, Tin Mill, Weirton, W. Va.
- Central Tube Co., Ambridge Plant, Pittsburgh, Pa.
- Group B—Union Drawn Steel Co., Gary Plant, Gary, Ind.
- Union Drawn Steel Co., Hartford Plant, Hartford, Ind.
- Camel Co., Hammond, Ind.

Iron Foundries Division

- Group A—United States Pipe & Foundry Co., Chattanooga, Tenn.
- Stockham Pipe & Fittings Co., Birmingham, Ala.
- Group B—United States Radiator Corp., W. Newton Plant, W. Newton, Pa.
- National Radiator Corp., Johnstown Union Plant, Johnstown, Pa.
- Louisville Car Wheel & Railway Supply Co., Louisville, Ky.

Steel Foundries Division

- Group A—National Erie Co., Erie, Pa.
- General Electric Co., Everett, Mass.
- Group B—Michiana Products Corp., Michigan City, Ind.
- Duquesne Steel Foundry Co., Coraopolis, Pa.

Heavy Machine Shops Division

- Group A—General Electric Co., Bridgeport, Conn.
- General Electric Co., West Lynn, Mass.
- Group B—The Advance Rumley Co., Battle Creek Plant, LaPorte, Ind.
- The Advance Rumley Co., The Thresher Works, LaPorte, Ind.

Report of the Safe Practices Committee

CHAIRMAN EIS: Before the presentation of our playlet, there is just one brief report of the Safe Practices Committee, to be presented by Mr. J. M. Woltz, of the Youngstown Sheet and Tube Company.

J. M. WOLTZ: Those of you who were present at our first session recall that there was some discussion relative to the need of a paid secretary for our Section. I do not know of any way that this could be demonstrated more effectively than the lack of work that my Committee has been able to do, practically for that very reason.

Everyone who has been asked to work on these codes or safe practices pamphlets has been very glad to accept the work, but when it comes to accomplishing things, it has been a most difficult thing to get these safe practices completed. We outlined about five years' work two years ago, and I want to say that there is only one person who had a subcommittee who has completed the work that has been assigned to him, and that is Mr. Homer Weeks of the American Steel and Wire Company.

I am not going to be hard on those fellows who were unable to present a report that we could give to you at this session of the Congress, because I know that they were all busy. I know that they all had made attempts to do some work on this, but it has been physically impossible for them to complete the work.

CHAIRMAN EIS: Now, friends, we feel that we have had very nice programs, that we have had wonderful attendance, and we have had fine cooperation in preparing and presenting them.

We have in the Metals Section an enviable record for service, particularly at Congress time in presenting our programs. You will recall last year that there was presented a playlet by the boys in Chicago which was written by Mr. M. D. Conroy. Mr. Conroy has again written a playlet for our sectional program, and it will

now be presented by the School of Drama, Carnegie Institute of Technology, Pittsburgh.

(The playlet, entitled "The Quitter", which was presented at this point before a very appreciative and interested audience, has been mimeographed for the use of those who may be interested in producing it, and copies may be had by request of the National Safety Council, Civic Opera Building, Chicago, Ill.)

CHAIRMAN EIB: I don't know that any humble words I might say could add to the impressive drama we have just witnessed. I do feel that we should honor Mr. Wallace by introducing him to this audience, and I can truthfully and heartily say that I consider it an honor to present Mr. Chester Wallace, head of the Department of Drama of the Carnegie Institute of Technology, who in turn will present the people who played the parts.

CHESTER WALLACE: We thank you very much for the splendid response you have given to our work. In addition to our business of training young people for the stage we are from time to time called upon to do certain community propaganda plays. We are usually very glad to do this because it gives us experience in various fields, but perhaps you don't realize how difficult it is to write an entertaining propaganda play that is to get over some sort of teaching or some sort of message, and still keep the play in the terms of the theater. So we have been especially delighted at the opportunity of working on this little play. I think perhaps it is the most excellently written propaganda play that has ever come into our hands. We have used it and worked on it with our acting group; we have had it in the play-writing class as a model of what a propaganda play should be, that is to put over a message and still be essentially theatrical and dramatic. This play has living people, has humor, it has rhythm, it has fine speed and it has ideas, so we feel that we are grateful to you, all of us, for this opportunity of doing this play, and that if you have enjoyed it, both you and we are very deeply indebted to Mr. Conroy for this excellent piece of work.

The New General Chairman is Introduced

CHAIRMAN EIB: I think the finest tribute we can give to Mr. Wallace and these young people is to give them a rising vote of thanks.

At this point in the program it has been customary for the retiring chairman to introduce to you your new chairman. At this point in the picture I fade out. I trust that the programs that we have presented to you during this Congress have been of interest and inspiration. I want to assure you what a pleasant year it has been for me to work with the other members of this committee and with you folks.

I thank you for the honor you have conferred upon me for that privilege during the past year, and I have greater honor in presenting to you at this time your new chairman, Harvey Hensel, Safety Director, Youngstown Sheet & Tube Co., Chicago, Ill., who will carry on from this point.

CHAIRMAN HENSEL: Members of the Metals Section: All I want to ask is that I have your hearty cooperation, as I know I will, to carry on during the coming year, the same as you have done with our good chairman this past year, and my good friend, John Eib.

This is your Section. It will be just what you make it. Your officers are always looking for suggestions. We very often get into a rut, and we certainly need you fellows to help pull us out. Don't be afraid to take your pen in hand or dictate a letter any time during the year and give us your ideas. Constructive criticism is what we want. Let me remind you that your News Letter editor, Mr. Robert Schmitt of the Louisville Car Wheel and Railway Supply Company, Louisville, Kentucky, will also need your help and will need articles for the News Letter.

I don't know just how many News Letters we would have issued last year if it had not been for his help and for the help of many members of this Section.

I want to take this opportunity to thank those members who contributed to that News Letter and helped along in that work.

The next number on our program is a number that has always been on from year to year and has created considerable interest and has given us many new ideas. It is entitled, "Safety Kinks in the Metals Industry." It is a film strip and has been prepared under the direction of our good friend John Oartel, Chief of the Safety Bureau, Carnegie Steel Company, Pittsburgh.

(The film strip was then shown.)

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Mining Section

Officers 1930-31

General Chairman—R. N. HOSLER, Pennsylvania Rating Bureau, Harrisburg, Pa.
First Vice-Chairman—W. H. COMINS, National Lead Co., St. Francois, Mo.
Second Vice-Chairman—THOMAS E. LIGHTFOOT, Koppers Coal Co., Pittsburgh, Pa.
Third Vice-Chairman—A. H. MENDELSON, Copper Range Co., Painesdale, Mich.
Fourth Vice-Chairman—FRANK DUNBAR, Mather Colliers 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, "Explosion Engineer," Wilmington, Del.
R. DAWSON HALL, "Coal Age," New York City.
Chairman Poster and Slide Committee—J. J. FORBES, United States Bureau of Mines, Pittsburgh, Pa.
Executive Committee—THE OFFICERS AND
H. C. HENRIE, Phelps Dodge Corporation, Bisbee, Ariz.
FRED H. NESBITT, Tri-State Zinc and Lead Ore Producers Association, Miami, Okla.
CLYDE A. McDOWELL, Pittsburgh Coal Co., Pittsburgh, Pa.

Retiring Officers

General Chairman—H. C. HENRIE, Phelps Dodge Corporation, Bisbee, Ariz. *Vice-Chairman*—R. N. HOSLER, Pennsylvania Rating Bureau, Harrisburg, Pa. *Vice-Chairman*—H. G. HENSEL, Youngstown Sheet and Tube Company, Chicago, Ill. *Vice-Chairman*—B. D. SHOVE, Oliver Iron Mining Company, Ironwood, Mich. *Vice-Chairman*—THOMAS E. LIGHTFOOT, Koppers Coal Company, Pittsburgh, Pa. *Secretary, Chairman Program Committee and News-Letter Editor*—DANIEL HARRINGTON, United States Bureau of Mines, Washington, D. C. *Chairman Membership Committee*—M. R. BUDD, "The Explosives Engineer," Wilmington, Del. *Chairman Sta-*

Statistics Committee—W. W. ADAMS, United States Bureau of Mines, Washington, D. C. *Chairman Entertainment Committee*—J. T. RYAN, Mine Safety Appliances Company, Pittsburgh, Pa. *Publicity Committee*—SYDNEY A. HALE, "Coal Age," New York City. A. W. ALLEN, "Engineering and Mining Journal," New York City. C. F. WILLIS, "Arizona Mining Journal," Phoenix, Ariz. *Chairman Poster and Slide Committee*—J. J. FORBES, United States Bureau of Mines, Pittsburgh, Pa. *Executive Committee*: OFFICERS AND W. H. COMINS, National Lead Company, St. Francois, Mo. FRANK DUNBAR, Pickands, Mather and Company, Mather, Pa. JOHN L. BOARDMAN, Anaconda Copper Mining Company, Butte, Mont.

**Tuesday Morning Session
September 30, 1930**

**H. C. HENRIE, Chairman
Phelps Dodge Corporation, Bisbee, Ariz.**

The first session of the Mining Section of the Nineteenth Annual Safety Congress convened with H. C. Henrie, Phelps Dodge Corporation, Bisbee, Arizona, presiding.

CHAIRMAN HENRIE: As chairman of the Mining Section of the National Safety Council it is my pleasure to extend to all of you a most cordial welcome to this Mining Section Safety Conference. It is indeed gratifying to see such a large and representative assembly of those who have an interest and a part in the Industrial Safety Movement. This Mining Section of the National Safety Council was organized on October 20, 1915, just fifteen years ago. The increasingly larger attendance from year to year at these annual conferences is sufficient evidence of the real worth of the cause to which you have devoted yourselves and the democratic character of the institution which we represent.

I am more and more impressed with the constantly increasing interest which is being manifested in the Safety movement and with the results which are being obtained, especially in the mining industry. It was only a few years ago that we had difficulty in convincing people that accidents could be prevented and were not a necessary by-product of industry. Mining has always been regarded as, and is, a hazardous occupation, yet I believe it is evident from the results which have been obtained by different mining companies in various sections of the country that Accident Prevention work, when properly organized and administered, will result in making mining operations and the occupation of mining as safe as the great majority of our other industrial activities and occupations.

We are beginning to realize that Accident Prevention work is not a thing apart in itself but rather is an essential and integral part of economical production. It is a matter of record that those companies which have made a real test of the value of organized accident prevention work have benefited in increased efficiency, economy in operations, improved employee relations and a decrease in their accident rate to a degree never before deemed possible.

While definite progress has been made in reducing the accident rate in the mining industry, there is still much to be done before we can feel satisfied.

Your Program Committee, of which Mr. Harrington is chairman, has prepared what I consider to be an exceptionally worth-while and well balanced program.

I hope that this Conference will bring to you many new ideas and prove to be a source of inspiration and renewed enthusiasm, and I also hope that you will contribute your share in making these meetings a success by participating in the discussions.

The first order of business is reports of the various standing committees; first, the Membership Committee, Mr. Budd.

Report of the Membership Committee

**By M. R. BUDD
Chairman**

The membership records of our Mining Section since the Congress show a decrease. At that time, we had an enrollment of 231 members. In the period between October 1, 1929, and September 1, 1930, we enrolled 18 new industrial members and lost 26 through cancellations.

The first mailing made was a compilation of names and addresses of all members. This list was sent out by your chairman and served our section by giving every member a list of all our members and at the same time correcting the mailing list.

New members were obtained by direct solicitation on the part of our members and by mail approach. Our selected list of 1683 Mining Section prospective members received the following solicitation during the year:

1. General letter enclosing special folder, mailed in October.
 2. General letter on Council's Industrial Health Service enclosing health folder, mailed in November.
 3. General letter on safety with descriptive folder outlining service, mailed in December.
 4. Letter to cancelled members of past five years enclosing service folder, also mailed in December.
 5. Letter to entire list (general) enclosing booklet "Protecting Life" describing service, mailed in January.
 6. General letter following up January letter, mailed in February.
 7. Letter to members by President Pettibone, announcing Spring Membership Campaign, sent in March, followed by letter from Mr. H. C. Henrie, general chairman, enclosing several prospective members' names on cards and urging their solicitation by members.
 8. General letter enclosing testimonial folder mailed in April.
 9. Specific letter by Mr. Henrie on sectional stationery enclosing poster, mailed in May.
 10. Testimonial letter (general) by Mr. Temple Williams, secretary of the Dodge Manufacturing Corporation, also mailed in May.
 11. Letter by Mr. Budd on sectional stationery enclosing new "Gazing into the Future" booklet describing the specific mining service, mailed in June.
- A summary shows that each prospect received eight general appeals to affiliate and two specific mining appeals during the year. This mail campaign brought us in a total of five new industrial members with dues aggregating \$212.50.
- Many of our members have helped by writing to prospects, usually at the suggestion of Headquarters, and their endorsements were of vital assistance in the obtaining of 4 industrial memberships with dues of \$1.50 and in the total of 18 industrial memberships with annual dues aggregating \$712.50. (A list of new members, and by whom they were obtained, is attached in the event you care to name those who helped.) A list of Mining Section members who helped in the solicitation of members is also attached.

In conclusion, I believe that our cause, its aims and purposes, and our Council service have been presented to the industry. Future solicitation at our present rate of growth will become more and more specialized and result in individual approaches to companies rather than general mail appeals. We will advance, too, proportionate to the help given by members of our Section in soliciting those companies in our industry not yet members of our National Safety Council.

Report of the Statistics Committee

Figures submitted by the 162 mines covered approximately 28,000 employees and more than 82 million man hours of exposure to mining hazards. Detailed figures for the record are given below.

Type of Mining	Average Rates		1929		1928	
	Frequency	Severity	Frequency	Severity	Frequency	Severity
Entire Industry	81.65	10.23	74.43	9.99	77.07	11.11
Coal—Anthracite	96.62	9.84	99.68	10.87	88.12	10.92
Coal—Bituminous	78.70	12.47	69.25	11.69	84.96	12.47
Metal	69.79	7.81	52.16	5.99	52.12	9.51
Non-Metal	50.53	6.82	31.10	8.15	52.69	7.94
			1927		1926	
Entire Industry			87.60	11.27	89.25	8.65
Coal—Anthracite			99.55	9.93	97.95	7.46
Coal—Bituminous			97.33	15.74	67.63	10.71
Metal			63.90		115.44	7.52
Non-Metal			33.38	4.41	78.94	6.40

Type of Mining	Number of Mines	Average Number of Employees	Hours of Exposure	Number of Lost Time Accidents					Total	
				Deaths	Disability		Temporary			
					Perma- Total	Perma- Partial				
Entire Industry ..	162	28,300	82,095,942	94	3	114	5,899		6,110	
Coal—Anthracite ..	24	9,890	28,691,541	40	0	19	2,801		2,860	
Coal—Bituminous ..	66	10,910	31,654,651	40	3	59	2,090		2,192	
Metal	54	6,250	18,116,618	10	0	31	904		945	
Non-Metal	18	1,250	3,633,132	4	0	5	104		113	

Type of Mining	Deaths	Number of Days Lost Time			Rates		
		Disability		Temporary			
		Perma- nent	Perma- nent		Total	Freq- uency	Severity
		Total	Partial				
Entire Industry ..	564,000	18,000	103,857	133,964	819,821	74.43	9.99
Coal-Anthracite ..	240,000	0	19,950	51,847	311,797	99.68	10.87
Coal-Bituminous ..	240,000	18,000	50,330	61,583	369,913	69.25	11.69
Metal	60,000	0	29,627	18,885	108,512	52.16	5.99
Non-Metal	24,000	0	3,950	1,649	29,599	31.10	8.75

Report of Publicity Committee

Sydney A. Hale, *Chairman.*

Report of the Poster and Slides Committee

A. Appointed the following committee to assist me with the collection of suitable pictures for possible use as posters:
Mr. H. T. Bannister, General Safety Inspector,
Madison Coal Corporation,
Glen Carbon, Illinois.

Mr. C. H. Dodge, Safety Engineer,
 Buckeye Coal Company,
 Nemacolin, Pennsylvania.

Mr. Roy V. Hersey, Safety Engineer,
Nevada Consolidated Copper Company,
Ray, Arizona.

Mr. S. J. Sicotte, Safety Inspector,
Pickands, Mather & Company,
Hibbing, Minnesota.

Messrs. Bannister and Dodge are men of considerable coal mining safety experience while Messrs. Hersey and Sicotte are safety engineers at representative metal mining operations with considerable metal mining safety experience.

I am glad to report that this committee assisted me in a very admirable manner in Poster Committee work during the past year.

B. Work Accomplished:

The Chairman of your committee conferred with Mr. Stanley Kershaw, Director, Poster Division, on two occasions during the year; one of these conferences was held in the office of the National Safety Council at Chicago and the other in my office at the Bureau of Mines, Pittsburgh, Pa.

At the Chicago conference selections were made from the best posters available in the existing poster library. At the conference in Pittsburgh a number of good coal mining pictures were selected for possible poster use.

I am glad to report that there is a good supply of pictures of coal mining operations that can be used for posters but I regret to advise that there is a very limited number of good metal mining pictures for possible poster use.

Through the cooperation of the Safety Division, Bureau of Mines, a number of good coal mining pictures were taken during the year. These pictures are now being prepared for transmittal to Mr. Kershaw.

Mr. Hersey sent a number of pictures depicting metal mine safety work in the mines of the Nevada Consolidated Copper Company.

A careful study was made of these pictures and a number of them sent to Mr. Kershaw for his approval for possible poster use.

Mr. D. Harrington, Secretary, Mining Section, sent your chairman some very good material for possible poster use.

In addition to the coal and metal mining pictures indicated above we have received several good quarry pictures depicting quarry safety work which were taken by a bureau representative and a representative of the Connecticut Quarry Company in Connecticut and which were sent to Mr. Kershaw for possible poster use.

During this year tentative classification for coal mining occupations was prepared and sent to Mr. Kershaw for use in classifying coal mining posters. A tentative classification for metal mining occupations was prepared and forwarded to Mr. Kershaw for possible use in classifying metal mining posters.

Your chairman has kept in close touch with Mr. Kershaw during the past year and I am glad to report exceptionally good progress on coal mining posters, and not very good progress on metal mining posters.

Your Poster Committee needs the cooperation of the membership of the Mining Section in helping it to obtain good pictures depicting metal and coal mine safety work for possible use in preparing such posters. It would be appreciated if any of the members of the Mining Section having good pictures in their possession or if they could take pictures on either metal or coal mine safety work, would send them to your chairman addressed in care of the U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa., after which they will be carefully analyzed and forwarded to Mr. Stanley Kershaw for possible poster use.

CHAIRMAN HENRIE: We would now like to have a report from Mr. Harrington, Secretary and Editor of the Section.

SECRETARY HARRINGTON: The secretary has, as you know, sent out during the year, the twelve monthly news letters. If you like them, please say so; and if not, tell us why.

The program speaks for itself. We have tried to make it a balanced one. It is not as balanced as we desired; we intended to have about 50 per cent coal and 50 per cent metal mining topics. The coal mining men came through more readily than the metal mining men on this program. However, I think you will get a considerable

value from this program, for the coal mining portion will be largely applicable to metal mining, because it is of a general rather than a specific nature.

While the results may not show very definitely, the work as secretary of this Section has taken almost a full month of my time during the year.

CHAIRMAN HENRIE: We are extremely fortunate in having with us Mr. T. G. Fear, General Manager of The Consolidation Coal Co., who will give us a short talk.

Safety Responsibility of Management

By T. G. FEAR

General Manager, The Consolidation Coal Co., Fairmont, W. Va.

Personal injuries in industry are almost invariably the result of neglect or carelessness on the part of management, fellow employee, or the injured employee. For years personal injuries (erroneously) have been styled accidents, management has in many instances accepted the dictionary definition of the word "accident" as something which happens and cannot be foreseen.

This type of management merely shrugs its shoulders and asks what can be done when its employees are injured. It may even go to the extreme and blame an unfortunate occurrence on act of Providence, as was the case in an explosion some years ago in a mine which was known to have accumulations of both gas and coal dust.

Early in this year, I received a letter from an executive of a large coal mining company, relative to the institution of more rigid safety measures for his mines. He stated that, although he knew about what he wanted in the way of a safety organization, yet he was not confident that he could sell the idea to his Board of Directors. My reply was summed up in what I now term the Ten Commandments of Safety, which are:

I—Sell the officials of the company, from the chairman of the board to the section foreman, the idea that safety is simply the proper method of operating and is not a separate and distinct function; that the entire responsibility for operating safely rests entirely upon management; that they cannot escape this responsibility either from a humane or cost basis.

II—The company must purchase safety, by providing the proper safeguards such as hand-rails, gear guards, shelter holes, proper clearances underground, ventilation, rock dusting, etc. Rate all plants for safety semi-annually to determine if further purchases are required.

III—Draw up and have printed a safety code covering all operations in and about the company's plants.

IV—Have every supervisory official carry a copy and be fully acquainted with every detail of the safety code, insuring this by providing schools of instruction and frequent examinations. These officials are responsible for the instruction of the day men and loaders in the safety code.

V—Institute absolute discipline to enforce this safety code which must apply to day men, tonnage men, and salaried officials without exception, fear or favor.

VI—Institute responsibility ratings of all personal injury cases to determine unsafe employees or officials. One plan for determining such responsibility ratings is outlined below:

Classification Committee:

- Division Manager
- Division Superintendent of Mining
- Division Superintendent of Maintenance
- Division Engineer
- Division Mine Inspectors
- Chief Gas Inspector

Classifications are:—

- 1—Sub-Standard conditions
- 2—Violation of Rules and Instructions
- 3—Poor Supervision
- 4—Carelessness
- 5—Unavoidable

No. 1—Sub-Standard Conditions:—Under this classification shall be placed all injuries which have been caused by natural or mechanical conditions existing in violation of the mining law or the company standards. As an example, injuries caused by scant clearance, poor timbering, defective track, cars, motors, trolley wire, frogs, switches, unguarded equipment, etc.

No. 2—Violation of Rules and Instructions:—Under this classification shall be placed all injuries which have resulted from a disobedience of the mining law, company rules or the orders of the foreman in charge or responsible for the work.

As an example, men falling from end of motor pushed trips, on loaded cars, between cars, demolition and explosives improperly stored and handled, flying switches, failure to re-rail cars and motion with jacks and re-railers, etc. Under this classification shall be placed injuries resulting from the failure of the workmen to immediately obey the orders of the official such as failure to take down loose coal or slate, failure to place timbers or any other order given for the workmen's protection, or the protection of others.

No. 3—Lack of (or poor) Supervision:—Under this classification shall be placed all injuries resulting from insufficient attention on the part of the official responsible for the work being done.

This classification shall include injuries resulting from hazards known to the official in charge but who has failed to have the hazards removed. Also under this classification shall be placed injuries resulting from hazard conditions which the foreman has failed to observe or, if observed, failed to correct.

Under this classification shall be placed all injuries resulting from improper instructions from the official in charge of the work, also injuries resulting from the failure of the official to see that sufficient and proper materials are provided to safely conduct the work.

As examples, men injured in the working places where the foreman has failed to properly inspect and test the roof, injuries from failure to see that dangerous roof is taken down or timbered. Failure to see that tracks are properly placed and failure to inspect tools, explosives and other standard requirements.

No. 4—Carelessness:—Under this classification shall be placed all injuries resulting from thoughtlessness, lack of intelligence or education.

As examples, men injured while handling coal, slate or other material and catching hand between material and car, timber or rib, injuries caused when men hit their hands, feet, etc. with hammer or axes.

No. 5—Unavoidable:—Unavoidable accidents are accidents which no precautions can or would have prevented. As an example, a man handling slate or coal and the lump of coal or slate breaks in his hand and falls, injuring his foot. Such an accident might properly be classified as unavoidable.

VII—Institute safety courts, at each and every mine, in order to have your employees become more interested in safety rules. This works as follows:

"Any employee of the company, seeing a fellow employee violating a mining law or company safety rule, is supposed to call the man's attention to the violation for immediate correction and then report to the sheriff. This procedure makes it necessary for all employees to have a working knowledge of the mining laws and safety rules which has added all our employees to our mine safety inspection force. As human nature is just as evident in coal mining men as any other class, the coal miner, including everyone from the trapper-boy to the highest official, will refrain from committing safety violations if he knows he will be caught. To most employees the

stigma of being convicted in a safety court means more in a disciplinary way than the payment of a nominal fine.

"When supervisory men discover infractions of safety rules, they are not permitted to have warrants issued for such violators as it is their duty to see that the proper discipline is meted out immediately. The primary purpose of the safety court is to enlist the aid of the entire personnel on personal injury prevention, to aid the supervisory force in eliminating hazards and hazardous practices, and to make every employee an inspector who will seek to cause everyone to conform to the rules and regulations prescribed by our safety department.

"Since January 1, 1928, there have been about 500 sessions of safety courts in our thirty operating mines and about 1,000 cases were tried with 95 per cent convictions.

"During the first months of the court's operation, safety violations of various characters were reported which had never been detected by our regular mine inspection force.

"An employee tried and convicted may also be disciplined by suspension or discharged by the mine supervisory force in case the violation is of a serious nature."

Purpose of the Safety Court:

The safety court is an employee organization whose purpose is to stimulate interest in safety; to promote observance of the state mining laws and the safety rules and standards of the company.

It serves to draw the attention of fellow employees to the unsafe and careless practices which are the cause of most injuries and to instruct them in safe ways of working.

Organization of Safety Court:

At each mine or group of mines a committee of employees shall be appointed for the purpose of arranging for a safety court organization meeting, and for securing the attendance of the mine employees at this meeting.

At this meeting the organization committee shall outline the purpose of the safety court and shall describe the organization proposed for its administration.

The organization committee shall then call upon the mine employees in attendance for nominations for the various offices of the safety court.

Nominations for the offices having been made the mine employees in attendance at the meeting shall then be called upon to vote for the nominees for the various offices.

The officers so elected thereupon take office and, during their term in office, administer the affairs of the safety court as herein provided.

Jurisdiction of the Safety Court:

Each safety court shall have jurisdiction in and about the mine or mines which it serves.

The safety court may summon, try, judge, and pronounce sentence, if found guilty, any employee of the company who fails to (while within the jurisdiction of the court) obey the state mining laws, or the safety rules and standards of the company.

Visitors or those in the employ of other companies may be warned by the safety police as to violations of the laws and rules, but they are not to be summoned before the safety court.

Officers of the Safety Court:

A safety court shall consist of the following elected officers:—

- One Judge
- One Clerk of the Court
- One Sheriff
- One Prosecuting Attorney
- One Attorney for the Defense

Qualifications for Safety Court Officers:

Judge—A person to be eligible for the office of judge shall be acquainted with correct underground practices, and shall have been an employee at the mine for a period of at least one year.

Clerk—A person to be eligible for the office of clerk shall be able to take notes quickly and accurately, and able to properly keep the minutes of the safety court sessions.

Prosecuting Attorney and Attorney for the Defense—A person to be eligible for either of these offices shall have been an employee at the mine for a period of at least six months.

Sheriff—A person to be eligible for the office of sheriff shall have been an employee at the mine for a period of at least one year.

Term of Office of Safety Court Elected Officers—The term of office of the safety court judge, clerk, sheriff, prosecuting attorney, and attorney for the defense shall be for a period of three months.

Appointment and Term of Office of Safety Police—The safety police are to be appointed by the sheriff for a period of one month.

The names of the safety police shall be kept secret and shall not be made known by the sheriff or the safety police until they appear at a session of the safety court to make charges of safety violations.

Re-appointment to the office of safety police may be made at the discretion of the sheriff.

The sheriff shall appoint such a number of safety police as are necessary to properly cover the territory within the jurisdiction of the safety court.

Duties of Safety Court Officers:

Judge—Shall preside at and be responsible for the proper conduct and procedure at all sessions of the safety court. Shall pass judgment on all cases brought before him.

Shall call all meetings of the safety court. Shall call juries when same are demanded.

Clerk—Shall keep the minutes of all court sessions, the recording of all cases tried, judgments rendered, and fines imposed. Shall keep an accurate accounting of all moneys collected and disbursed.

Prosecuting Attorney—Shall vigorously prosecute in accordance with the state mining laws and safety rules and standards of the company, all defendants brought before the court for trial.

Attorney for the Defense—Shall defend all accused persons brought before the court, except where the accused prefers to make his own defense, or elects to choose his own attorney for defense.

Sheriff—Shall appoint the safety police and see that they function properly. Shall turn in to the prosecuting attorney at least three days before any meeting date written charges against any violation of the safety standards.

Duties of Safety Police—It shall be the duty of the safety police to keep a watch for and to report to the sheriff all violations of the state mining laws and the safety rules and standards of the company, irrespective of the status of the persons violating them.

It shall be also the duty of the safety police to report to the sheriff all practices which have a bearing on general safety conditions.

Sessions of Safety Court—Sessions of the safety court shall be held monthly. At each session, the date, time and place of the next session shall be determined and announced.

Safety Police Reports of Violations of Laws and Rules—The safety police shall report to the sheriff each violation of the state mining laws and of the safety rules and standards of the company. These reports or charges must each state the name of the violator, the nature of the violation, the names of the witnesses thereto, and the place and the time at which it occurred.

Bringing Safety Violators to Trial—The reports or charges of the safety police shall all be turned over to the prosecuting attorney by the sheriff not later than three days before the date of the session of the safety court.

The prosecuting attorney will thereupon immediately have the clerk of the court issue and the sheriff serve, summons in writing to the safety violators and the witnesses mentioned in the reports or charges.

The failure of any safety violator to appear when summoned shall serve automatically to judge him guilty of the violation as charged.

Conduct of Safety Court Trials—

The clerk of the court shall announce each case.

The prosecuting attorney shall make the charge, present the evidence, and take such steps as are necessary to put the charge and evidence before the judge and jury.

The attorney for the defense, or the defendant himself, or his attorney, at the defendant's option, shall present the defendant's side of the case, and shall take such steps as are necessary in that connection.

The defendant shall have the privilege of calling witnesses in his behalf, and shall have the right to demand a trial by jury, or to select an attorney for his defense.

When the defendant demands a trial by jury, the judge shall designate the three men to serve, subject to right of challenge for cause by the attorneys for the prosecution and defense, each side having the right to challenge two. A majority vote of the jury shall decide.

After hearing the charge, the evidence and pleas of the prosecution and the defense, the judge shall announce the verdict, and, in case of conviction, the penalty imposed.

The judgment and penalty shall thereupon be made a matter of record by the clerk of the court, and the sheriff shall proceed to collect the fines imposed.

Fines and the Handling of Safety Court Funds—The funds collected by the employees safety courts are committed to the control of the safety court officers, and are to be distributed by them only for charitable purposes among the employees of the company and their families in and about the mine or mines which the safety court serves.

The safety court officers of each division shall meet and designate a custodian of the safety court funds; the custodian shall be the local auditor or other properly bonded employee.

The safety courts shall, when and as they decide, issue orders upon the custodian of the safety fund, for distribution from the fund.

Any person judged guilty of being a safety violator shall be fined. The minimum fine to be 25 cents and the maximum fine \$1.00. Any witness refusing to appear before the court shall be judged in contempt of court and shall be fined. The minimum fine to be 25 cents and the maximum fine \$1.00.

The fines shall be collected by the sheriff when imposed and shall be turned over by him to the custodian of the safety court fund.

The clerk of the court shall keep an accurate record of all fines imposed by the court, collected by the sheriff, and turned over to the custodian of the safety fund.

The clerk of the court shall also keep accurate record of all authorizations of the court for disbursements from the safety court fund and shall keep continuous check to insure proper handling, use and conservation of this fund.

Vacancies—If a vacancy occurs among the officers of the safety court then the remaining officers shall immediately meet and select, by majority vote, a man qualified to fill the vacant office for the unexpired term.

VIII—Establish 100 per cent first aid training at each plant, so that every man from the superintendent to the trapper boy is proficient enough to receive a first aid certificate. Trained men taking care of injuries to their fellow-employees are impressed by the suffering and prevention of injuries is brought more clearly to their attention.

IX—Keep the mining plants clean on the surface and underground, and hire safe men by giving them physical and oral examinations before employing them.

X—Remember that "eternal vigilance" is the price of safety.

In each of these ten rules, you will note that management is entirely responsible for all employees from the time they are employed and go to work until they turn in their time checks at the end of the shift.

Management must, from a humane standpoint, provide safe working places and tools to its employees, in order that they and their loved ones may be spared the sufferings which personal injuries in industry have been exacting.

Management must, from a cost standpoint, reduce the personal injuries to a minimum, which will include only purely accidental injuries.

Reducing costs by preventing human suffering is a most pleasant and noble work and, to the management which honestly and sincerely carries on to the limit, personal injury prevention, there must come a satisfaction such as came to Abou Ben Adhem in Leigh Hunt's poem.

CHAIRMAN HENRIE: Our next speaker is Mr. W. H. Comins, Manager of the St. Louis Smelting and Refining Works, National Lead Co., St. Francois, Mo.

Safety Responsibility of Management

By W. H. COMINS

Local Manager, St. Louis Smelting and Refining Works, National Lead Company, St. Francois, Mo.

The following remarks will be based on actual experience in the lead belt of southeast Missouri, also known as the Flat River District. Flat River is a town 70 miles south of St. Louis on U. S. Highway No. 61 and should not be confused with the Joplin and Tri-State districts which are in the southwestern corner of Missouri.

Twenty thousand tons of lead (Galena, Pb₃) ore are hoisted each working day of 24 hours. Pillars are left in place to support the roof. Natural ventilation gives excellent air conditions underground, as the long period of operation in the district has made it possible to connect nearly all of the extensive mine workings. Very few people of foreign birth now work in the mines, as no "foreigners" have been employed since 1917. Home loving, substantial Americans make up the population, the largest units of which live in unincorporated areas and are thus governed by the county form of government. The St. Joseph Lead Company and National Lead Company are the two operating companies.

What is the attitude of the executives of St. Joseph Lead Company and National Lead Company?

Let me refer to an address by Clinton H. Crane, president of St. Joseph Lead Company, before the Mining and Metallurgical Society of America on January 10, 1930. His subject was: "The Human Problems Involved in the Operation of a Long-lived Mine."

"We have had a safety first department for a long time. A real safety first department means a school for your foremen, a school which will teach them that accidents are not necessary, that they are not a part of the mining business. But I think that there is no more important job in any one of our companies than the right man at the head of the safety first department. The man who can sell the idea of taking care and keeping it sold; and I think safety first is one of the principle things that need selling all the time."

And here is the attitude of President Edward J. Cornish of National Lead Company:—

Edward P. Durfee, representing the Insurance Department of National Lead Com-

pany was talking some time ago, to a group of underground employees at St. Francois.

He admitted the fact that a reduction in frequency and severity rates naturally saves the company money. It was also admitted that such a reduction also saves the employee suffering and wages. And then Mr. Durfee said this:—

"Let me make this statement. If any man in this gathering, or any other man, can develop and guarantee a practical plan whereby all accidents can be prevented at this plant, or any plant, he need only present his idea to President Cornish and his Board of Directors for their immediate approval and authorization of necessary funds. The funds will be forthcoming notwithstanding the fact that the necessary appropriation would greatly exceed present cost of compensation and accident prevention work. Gentlemen, that is the attitude of National Lead Company toward injuries to its personnel."

The "Safety Responsibility of Management" is large. It exceeds the responsibility of any other division in the safety movement.

Management must inaugurate the safety campaign.

Management must furnish the inspiration to keep the safety movement a live and going concern.

Management must take the lead and see that injuries receive proper medical and surgical treatment and that they are followed by occupational therapy when desirable that the injured party may regain, to fullest extent, use of injured members.

In short, the success of a safety movement in any organization rests squarely on the shoulders of the management, and, furthermore, management, if sincerely interested in the work, suffers heartaches when employees are seriously injured and also experiences "the thrill of a life time" when a successful record is established.

As we review the past, we note following accomplishments of management toward accident prevention:—

- (1) Management has provided suitable guards for all machines.
- (2) Management has eliminated or protected all hazardous working conditions.
- (3) Management has introduced and is making compulsory the use of protective clothing, wherever the situation so demands.

However, "History is not resource" and management must always keep looking forward. I have in mind three fields of endeavor in which management can find a large sphere of activity:—

- (1) Discipline before the accident.
- (2) Develop and maintain a favorable mental attitude on part of injured employee during healing period.
- (3) Occupational therapy during the healing period.

Let us first consider the matter of discipline. We all know that the promulgation of severe safety rules is not new and we also must admit that, in the past, the strict enforcement of them has been new and rare. Let me illustrate what can be done along this line. How many of you are familiar with the safety record of the Union Pacific System, a system of 9,800 miles of track; 1,700 locomotives and 55,000 revenue freight cars? This Class I railroad won the Harriman medal for the "most outstanding accomplishments in railroad safety" in 1924-25-27 and 28 and honorable mention in 1926. This record was accomplished by strict enforcement of safety rules. The Union Pacific has a rule that members of train crews shall not step on a moving locomotive and this rule is enforced. A foreman who overlooks violation of safety rules by men in his care is severely punished. In short, strict enforcement of severe safety rules has been very instrumental toward success of the Union Pacific Safety record.

Now let us consider the responsibility of management after the accident. Management has as great, if not a greater responsibility after the patient has been discharged from the hospital.

First, we have to consider the mental attitude of the injured employee, which we know varies with each individual. In some cases the employee will become depressed and morose, possibly over the fact of the injury itself, or, perhaps, out of remorse resulting from a belief that he could have avoided the accident had he observed ordinary precaution. In other cases, the employee may develop a hatred for his employer or for the equipment by which he was injured. We know that the tendency of an adverse mental attitude on the part of the injured employee is to retard progress in the healing process and that the best results can be obtained only under conditions of a favorable mental attitude. It is, therefore, the duty of the management to study the mental reaction of each individual injured employee and to devise ways and means of changing the mental attitude, where adverse, from negative to positive and to maintain a positive mental attitude during the healing process. This phase of the responsibility of management in safety work may properly be termed practical or applied psychology.

Now, regarding the application of occupational therapy during the healing period. Management should now aid the injured employee by means of occupational therapy where needed and this is no small task when we consider the many varied mental reactions of numerous employees.

I have in mind one man who suffered a Potts fracture of ankle. Expert surgical care saved the foot but employee had a stiff ankle upon discharge from hospital. The surgeon had done his part and could do no more without the co-operation of the injured employee. Exercise and still more exercise alone would obtain a useful ankle. At this point responsibility of management becomes apparent. Management must give the injured employee proper work. The mental reaction of the employee towards the efforts of the management to restore the injured member to normal was favorable and inspiring. Today that employee has an ankle that is nearly normal and the surgeon states that recovery of use of this particular ankle was most remarkable and unusual.

I know of another case where reaction of injured employee was unfavorable and in fact resistive of the efforts of the management to help him. Complete paralysis of arm and possible amputation at shoulder was first diagnosis. Employee was discharged from hospital with arm intact but with a 100 per cent loss of use. The company believed that it was their duty to help this injured employee regain such use of arm as would be possible notwithstanding fact that a prompt settlement would be the easiest and cheapest procedure. The man was paid the standard wage and daily received occupational therapy, massage and also did light work around the job. Notwithstanding an unsatisfactory mental reaction, the patient gradually progressed from exercises with a one pound ball to five, twelve and sixteen pound balls and finally graduated to a job of loading, wheeling and dumping a wheel-barrow. The almost certain 100 per cent loss of motion was reduced to a 15 per cent loss of motion for the reason that the management assumed their full responsibility.

As we all know, safety is very largely a matter of education. Safety cannot be instilled into a group of workmen in a practical way by the promulgation of rules and the imposition of penalties for the infraction of such rules. Any safety campaign, to be successful, must be founded upon a systematic and persistent program of education and personal contacts, in which management must sincerely and wholeheartedly participate. In the first place, the management must convince the employees that the safety campaign is founded on a humanitarian consideration and designed to preserve the life and limb of the employees unimpaired, insofar as it is possible to do so, and to preserve the economic status of their families, and that it is not merely a scheme designed to save money to the employer. Safety education is not a matter of a day or a year, but must be carried on continuously and forever. In many cases, it takes years to educate workmen to a wholehearted belief in the safety movement. I recall when the safety movement was launched in a practical way more than twenty years ago. Many men who were in responsible charge of

operations at that time were skeptical and inclined to look upon the movement as a hobby of the so-called social workers, or, as a sort of fad that would quickly fall by the weight of its impracticability. Now it is practically impossible to find management that is not highly enthusiastic over the safety movement. I mention this merely to illustrate my statement that safety is largely a matter of education. Management had to be educated to a belief in the safety movement and now that education must be carried on down to the workmen. Responsibility for and leadership in safety education rests with the management. Whenever management defaults in its responsible functions in any safety campaign, such default is certain to follow down through the organization to and including the workmen and will very probably bring failure upon a campaign that should have been successful had management not shirked its duty and responsibility.

In my opinion management is the "drive-wheel" in any safety campaign and without its active cooperation and participation a full success cannot be hoped for.

I, of course, have not intended in any way to minimize the importance of other factors; i. e., the safety director, the foreman, the doctor, the nurse, and last but not least, the workman himself, in safety work as I fully appreciate that each and every one of them have their very important place and responsibility in any successful safety campaign.

Gentlemen, I submit that the responsibility of management in safety is profound and, as I have indicated above, its importance to success in safety work is second to no other single factor in any safety campaign.

CHAIRMAN HENRIE: Mr. Warriner of the Lehigh Navigation Coal Co. was to be the next speaker on this subject. Mr. Warriner, however, found it impossible to be here, and so he has sent Mr. Gilbertson, Director of Personnel of the Lehigh Navigation Coal Company.

Safety Responsibility of Management

By J. G. GILBERTSON

Director of Personnel, Lehigh Navigation Coal Company, Lansford, Pa.

In dealing with this whole question of safety responsibility of management it occurs to me that in the mining industry we might give some attention to the peculiar background of the employee as distinguished from the background of the employee in other industries.

Perhaps the most distinguishing feature from the safety standpoint is the multiple hazard of the individual. In most manufacturing industries there are single characteristic hazards. In the clothing industry perhaps is one; in the electrical manufacturing industry there may be one or two. But to the miner and all the men who work inside the mine, there is a multiple of constant hazards. There is that constant hazard of a roof fall; the hazard of flying materials; the hazards from gas, from fresh and old workings; the hazards of transportation; the hazards associated with explosives; and in these days, the hazards associated with the introduction of electricity in transportation and elsewhere in the mines.

Put yourself in the place of the miner going to work in the morning, and facing this battery of hazards which are with him throughout the entire day. What is the attitude of that man going to be? The miner takes a more or less fatalistic attitude toward his occupation and toward the conditions which he meets. He goes into the mines, and says to himself, either consciously or unconsciously, "It's up to the management and to God." We have in that multiplicity of hazards an explanation for some of the mental attitudes of the miner—the underground man, at least, which makes safety so difficult.

Because of these conditions, those of us who are connected with the management of the mines should have a more sympathetic attitude, perhaps toward the miner. We

would not for a minute minimize the importance of eliminating carelessness; and yet it is imperative to understand that background. Hence, and because of the complex hazards, we should place the greater responsibility upon management.

What are the duties and responsibilities of management in safety? It is all "old stuff," and yet it needs to be reiterated and perhaps analyzed over and over again when we meet at safety conferences, and plan our safety campaigns.

First, it certainly is the responsibility of management to inform its employees of the dangers and the methods of avoiding them. In our own company we discharge this responsibility in a formal way, through the Miners' Handbook of safety rules.

Secondly, we create a positive sentiment for safety—not a very easy thing to measure—in the hope that in combination with the other measures that it will finally bring certain results.

Third, there is a responsibility to investigate accidents and fix responsibility. There is a great deal to be done, in accident investigation, judging from our own experience. I believe that supervisory men, if left to their own devices, will be very deficient in the technique of investigation. We have found a tendency on the part of supervisory men, like some prosecuting attorneys—to find a goat.

Unconsciously, supervisory men in their investigation are more or less satisfied, unless they are carefully trained, to get a good explanation of the accident or the personal injury. It is absolutely necessary, if we are to get anywhere in safety work, to get the whole explanation and fix the entire responsibility, for I believe that every accident is due to a combination of circumstances. The miner was careless. Well, why was he careless? If you check up, you will often find a laxity of discipline; and yet how often will you find that explanation on the safety report?

The accident may be traced to certain physical characteristics in the mine, or to the management. In investigation work, which perhaps is the most important thing we can do to prevent accidents, it is essential to cultivate better analytical faculties in the men who are responsible for results.

The responsibility for the measures which may be taken to remove the purely physical causes rests on management. We have spent vast sums on ventilation, improving explosive and other equipment. A great deal of credit is due the powder companies for the great and intelligent cooperation that they have given management in this particular field.

Along with the investigation of accidents, discipline is perhaps the most fruitful line of endeavor that we can follow in safety work.

Finally, the education of supervisors, particularly in accident analysis is important, as I said before, for cultivating a judicial mind and for taking accident investigations out of routine duties.

This constitutes the program of our company. We recognize safety as a many-sided affair. We are never able to tell what one activity has accomplished results, but yet over a period of years, we have made progress.

Our mines are in the lower part of the anthracite region, where the veins are thick and stand on a steep pitch, resulting in a very gaseous condition at times. We also have a great many old workings which are hazardous. In 1918 we had 63 explosions from gas, but by constantly dinning away at the safety program we reduced this number to 43 in 1920, and in 1923 to 36; and the average for the years 1926 to 1929 has been brought down to 8. The general fatality rates have almost decreased in proportion.

Here is the sad part of our whole safety program. I have mentioned the good results of 1918 to 1929. There has been no relaxing of efforts, no lessening of interest in the program, and yet the year 1930 has been worse than any of the recent years. I suppose every man in safety work has that experience. All of the good work of previous years appears in vain but the point is a safety program must

be for the long pull. In spite of the bad results we seem to be getting in 1930, we have faith. A few years hence when we look back to 1930, we expect to see some safety results which are the joys of every safety man's heart.

CHAIRMAN HENRIE: For the next few minutes we would like to have some discussion on the papers you have heard thus far on the "Safety Responsibility of Management." Who is the first?

Discussion

E. A. STOCK (National Lead Co., St. Francois, Mo.): We have heard of Safety Courts. Is the fine imposed on the men left to the court's judgment?

MR. FEAR: The Safety Court prescribes a fine, minimum of 25 cents and maximum of one dollar, for each offense. The violators of the Safety Rule may ask for a jury trial, a jury of three men, if they so desire it.

CHAIRMAN HENRIE: Who is next?

A. H. TARBET (Pickands, Mather & Co., Caspian, Mich.): Do you have other men testify against the violator?

MR. FEAR: No, we do not. To show how efficient these safety courts have become, I can't go around any mine now without having a dozen or more men watch every move I make. Our president and vice-president of operations visited some of the mines in the Fairmont district with me. We went up to Mononga mine. The chauffeur stopped the car alongside the stairway over an interurban track on which cars run 60 miles an hour. The president and vice-president walked across the track and opened the gate. A big sign on it said, "Danger; do not use this; use stairway."

The manager was standing there. One of the workmen was coming down the steps, he turned around, and said to the manager, "Say, are you going to stand for that?" He didn't know who these men were. They got their summons in safety court, and appeared on December twentieth.

We find the men are all taking an interest in these courts, and I believe they are one of the best activities for the promotion of safety around mines.

LEE LONG (Clinchfield Coal Corporation, Dante, Va.): Do you have your safety engineer work with your Safety Committee in getting the facts of an accident?

MR. FEAR: We rate all personal injury cases according to responsibility. The Safety Engineer and committees rate them independently. If these two ratings don't agree, the safety engineer asks the division to review the case. If they don't change their position, the case is sent to the supreme court, the chief engineer and myself, to be settled.

MR. LONG: Isn't your information in a more detailed form when it goes to this Court?

MR. FEAR: Those cases don't go to the court. The safety courts handle only violations without injury.

WM. G. METZGER (Hudson Coal Co., Trenton, N. J.): What men compose these safety courts?

MR. FEAR: All officials of safety courts are men in a supervisory capacity because we had to have some mine or section foreman start the courts; the men beld back. We had the superintendent of mines institute the courts and have coal men elected to fill the position of judge, prosecuting attorney, clerk of Court, sheriff, and so forth; so it is entirely a workman's outlet, though we are always behind it. You have to be behind everything in safety.

CHAIRMAN HENRIE: Our next subject is "Safety Responsibility of the Foreman, Shift or Face Bosses." Mr. A. R. Pollock, General Manager of Mines, Ford Collieries Co., is to speak to us on this subject.

Safety Responsibility of the Foreman, Shift or Face Bosses

By A. R. POLLOCK

General Manager of Mines, Ford Collieries Company, Curtisville, Pa.

The man who holds the position of foreman has given evidence that he possesses the qualifications necessary for a foreman. For a man to be a foreman implies leadership. Leadership is an opportunity to any man; and opportunity carries its responsibility.

In all states where mining is done, there are mining laws that are primarily a Safety Code. The preamble of our Pennsylvania mining Act says "An Act to provide for the health and safety of persons employed in and around the bituminous coal mines of Pennsylvania, and for the protection and preservation of the property in connection therewith," and then the law continues to outline the responsibilities of the persons in management.

A foreman in our state must qualify before an Examining Board; he must give evidence of sufficient experience in mining, knowledge of mining methods, and knowledge of mining law before they will pass him as competent. If he has been certified as a competent man to fill the position of foreman his certificate is evidence to you and evidence to me that a legal responsibility rests upon this man, and that he has indicated that he assumes that responsibility.

Then, he also has a responsibility to his employer. I am assuming that I am his employer; he has come to me for a job; he has presented his certificate; I have taken it at face value. He goes to work. If he doesn't mean to fulfill the responsibility of that position, for which I am going to pay him good money, he is sailing under false colors. He shouldn't be allowed to occupy the position of foreman, because he has misrepresented himself—not his knowledge—but he has shown that he isn't a man of right character. He must have the right character for to the men he is the company.

How many of them think beyond him when he is giving them instructions, or working with them, think of the man who is sitting back of the mahogany desk hundreds of miles away? No; the foreman is the company to the majority of men; and when he represents the company, he represents me; I have passed the "buck" to him. Therefore, his responsibility is great to his employer.

Furthermore, he has a responsibility to the men who are placed under his charge, for their health and safety. The very fact that he has a certificate of competency, says, "I am going to have men in my charge and care. I am going to look after them; I am going to preserve their health, and I am going to look out for their safety. I am going to preserve their lives; if it is humanly possible."

He owes a responsibility to their wives and their families. His responsibility to his own family—what might become of them were his life suddenly to be snuffed out—should make him realize his responsibility to the families of his men.

Nearly forty years ago, when I was a restless laborer in the mines, I didn't know when I went to work in the morning whether I would be driving a mule, pulling timbers, or haling water. As I worked in these different capacities, I wondered about my young wife and little baby; I knew that hour after hour my wife sat with the babe in her lap—I have seen her do it—with her eyes on the child, thinking of its future.

How often I have thought of the foreman who was over me at that time! He gave no thought to safety or the prevention of accidents for he didn't consider that a man's life was worth as much as a mule's, but he was one of the best foremen I ever knew. If that man only had the interest that today's foremen have in accident prevention, what a wonderful man he would have been! He was a hero to me then, and as I look back over these forty years, he is still to a certain extent a hero, but he needed present day lessons of safety.

The present day foreman not only has legal responsibility, responsibility to his employer, responsibility to the man under him and to his family, but he has a responsibility to society. Who wants to see, around their mining camps, men on crutches? Who wants to look into a home and see children without food to eat because the father has been injured in the mine and never will be able to work again? It would have been better for his family had his life been snuffed out at the time of the accident.

Responsibility exists all along the line. When a report comes to my desk, saying, "Cause of the accident—carelessness," the first question I want to ask the man who made up that report is, "Whose carelessness?" Was it your carelessness? Prove to me that it was the carelessness of the employee. I am assuming it is your carelessness first because you haven't properly instructed; haven't set the right example; safety hasn't been practiced under your management.

There is a fascination about the safety movement. It was said that twenty years ago we thought it was the child of the brain of some reformer—the Lord deliver us from professional reformers. This movement has grown and grown, and everybody who becomes interested enough to study it has become enthused. Safety is one of the biggest steps we can take in our industry.

CHAIRMAN HENRIE: Our next speaker was to be Mr. DeCamp, of the United Verde Copper Company, but he is among the absent; I have asked Mr. Harrington to read his paper.

Safety Responsibility of Management

By W. V. DECAMP

General Manager, United Verde Copper Company, Jerome, Arizona

Management is solely responsible for safety in your organization. This does not necessarily imply the manager alone, but those directing operations and controlling the policies of your organization.

I can appreciate your reaction to this rather radical remark, but having been engaged for many years in an effort to establish a safety consciousness in the minds of employees and directors of operations, I have reached the conclusion that my opening statement is true in every particular. Your immediate reaction might be to state that the employee should share equally with management in devices and methods designed for his own well-being, and I will concur with you in this objection only to the extent of stating that the employee should and does share in this responsibility, provided management first shows the way.

Has it ever occurred to you that there is nothing new in safety? Probably not. But there is decidedly something new in the viewpoint regarding safety, which you men directing operations have acquired as a result of study and education along safety lines. Admittedly there is nothing new in safety when we must concur in the belief that a lack of safety precautions was solely responsible for Adam's downfall. We will admit that he took a chance, and did so because he did not accept the admonition of his master. Further, the infant, from the time it learns to creep, is deluged with safety rules and regulations, which we recognize as essential if we wish to bring the child to maturity. His education begins at an early age and progresses until such time as he is considered competent to care for himself. Immediately thereafter education of the child along safety lines ceases, and he is required to shift for himself and obtain by bitter experience the knowledge of safety so essential to his future welfare. When he passes school age and enters industry of any kind he is immediately confronted with a need for education in safety work and safety procedure. Whether or not he obtains this education the management of the industry concerned is largely responsible.

Should he be sufficiently quick and intelligent, and should his experiences not

remove him from active participation in industry, he may eventually survive; and having done so it is probably due either to good fortune or to that endurance which has been so characteristic of the American people. We Americans, as is commonly recognized, are born gamblers, and that instinct has been one of the characteristics around which this nation has progressed, as we have been led by chance-taking enthusiasts who have repeatedly risked health, time, money and future in order that some idea be born and developed.

Management is largely in the position of an educational department in all safety work, and logically the educator himself must be educated before he can consistently and intelligently convey his knowledge to others. When management ceases to look on safety work as a fad and seriously considers it as essentially a part of their operation as any other detail of operation or administration, then will they be approaching a point where they can begin to expect results from programs designed to develop the idea of safe practice in their employees.

Management requires this education to a great degree, since the experiences and training of many of you antedate the days when the safety movement came to be considered a part of any industrial program. Frankly, this infers that management to a large extent may be traveling in the rut of former practice in their chosen field, and in many cases may be so bull-headed and opposed to anything new that they themselves must have a knowledge of safe practice forced on them by bitter experience, just as the child who could not believe the fire was hot without experimenting. More particularly than anything else, therefore, you are in need of education along safety lines. Contemporaneous with this, in order that too much time may not be wasted, you should undertake the education of the men in your employ. The installation and protection of equipment requires an education in itself, and necessitates in many cases increased costs which you will not be willing to accept until you realize that the lack of such equipment enforces even greater costs.

No matter how far you may go in the installation of protective mechanical devices, you can never become successful in a safety program unless with this knowledge of safety equipment you acquire a belief in and put into effect an educational system which will make of your employee an active, thinking individual rather than an automaton.

The man who is interested in retaining his position with you is the one who can be taught anything, and is the one who will respond to educational work on costs, efficiency of operation, safety, or anything else. This is the type of man in whom you are most interested, since this class probably constitutes the major portion of your employees and in general probably desires only a place to work, a place to live, and a sufficient income to meet their needs and possibly educate their children.

I have been wondering just how you go about interesting this man in the performance of his duties; particularly am I interested in this question, in view of the many demands you make on him. For the sake of this argument, let us list your demands, and following that, list those things which you supply in the way of exchange for the demands you make on him.

First, you insist that he do a fair or even a good day's work for the compensation he receives, and if this fair day's work is not performed you exercise your prerogative as an employer, which permits you as a penalty to replace him with someone else.

Second, you demand that he work steadily without complaint and that any advancement he may receive is a direct result of the continuity of his employ and the ability he demonstrates. Should he become impatient with his progress you would no doubt object and consider him in too much of a hurry to get ahead.

Third, you insist on his temperate use of intoxicants, regardless of your attitude toward the Eighteenth Amendment or regardless of your own degree of

indulgence. Again, you hold up the specter of the discharge slip as a penalty for non-observance of your rules and regulations.

Fourth, you demand his absolute loyalty at all times.

Fifth, you expect him, if his position is one of any importance, to give you advance notice of absence or any temporary lay off he may require, and insist on this to the extent that you maintain careful records of service and look with disfavor on that man whose term of employment is broken.

Next, you ask him to cooperate with you one hundred per cent in the case of any labor misunderstanding that may occur, and demand that in such cases he follow your banner rather than that of his friends and associates, without your holding out as an inducement any promise of continued employment or future benefits.

These and many other demands we make of our employees, and on top of that we demand further of each that he be a safe employee, and we even exercise in this case rigid penalty systems for non-observance of rules. You may, in demanding that he be a safe worker, hold up before him your concern as to his personal welfare, but no matter what a safe employee means to you, the inference is obvious that a safe personnel reduces costs, whether general or for injury and damage. Say what you may regarding the value of safe practice to the employee, the final answer rests in the unit costs of your product.

In my opinion, you will never be competent to be the director of your safety operation or program until you are willing to combine and give equal weight to the question of costs and the more humanitarian attitude of regard for your employee's welfare.

If you want or demand so much of this employee, just what do you give in return for all of the virtues we have previously outlined, and which you consider so essential in the employee?

I have been wondering if you are far-sighted enough to realize that proper housing and living conditions are conducive to the development of many virtues in this employee, and are you particularly interested in the degree of hospitalization you render him, in which he no doubt participates to some extent by deductions from his income?

Have you inaugurated in your community or state injury and damage insurance, established on a sound basis and permitting payments comparable to the cost of living in your community, or are the cost of injuries and damages low in your particular community, due to unfair laws that do not permit reasonable compensation in cases of disability?

How about insurance, either health or accident off the job, or life insurance of a similar character? Have you made the effort to ascertain whether or not your employees would join you in group insurance in which you and the employee participate on equal basis?

Have you concerned yourself about pensions for the old-time, faithful employee, either on a participating basis wherein he provides the major portion of the fund, or whether on a joint basis between you two?

Have you recognized the value of cooperative buying or the establishment of cooperative stores that will permit your employee the benefit of wholesale discount?

What have you done in the way of recreational facilities in your community in order that it become a better place in which to live and thereby attract and hold higher grade men?

To what extent is the educational system in your community on a par with the educational systems in other districts, and do you take an active part in seeing that a reasonable degree of educational work is supplied your employee?

To what extent have you favored your more capable employees by bonus or contract methods, which permit them higher earnings than the average run of workmen?

To what extent have you improved the sanitation in your particular district, in order that the danger of epidemics is minimized?

Are you concerned as to the promotion of men from within your own organization?

Are you willing to accept floating labor at a time when there are ample men available, and take your chances when labor is scarce? Has it ever occurred to you that savings programs might be devices which would enable your employees to accumulate a reasonable fund for their protection and care in time of need or to tide them over periods of unemployment; and to what extent do you guarantee this man that he will be given steady employment? Are you satisfied to engage him during good times and permit him to shift for himself during periods of depression, with the excuse that peaks and depressions are common to your own, as well as all other industries, and therefore beyond your control? Or have you, like some of the more progressive organizations in this country, endeavored by careful investigation and by expansion of your markets, to eliminate at least to some degree the extent of peaks and depressions which are so destructive to the morale of your organization?

No doubt some of these thoughts may appear radical to you, but the answer to each one of them will give you the answer to the demands that you have already made on this paragon of all the virtues, the safe employee. If you are right on all of these questions, in my estimation you have in your plant a good safety record. But if you are not right on the major portion of those listed, then I would suggest that your education is necessary, not only along the line of recent safety practice, but along humanitarian lines as well. If you are still critical, I can assure you that these things and many more have been done by numerous organizations in this country, and that in almost every case the result has been that they have the ability to put over an educational campaign along any line quickly and successfully, at a minimum cost and with maximum results.

In closing I wish to reiterate that management alone is responsible for safety in your organization, and that safety consciousness can only be instilled into your men following your own education. But sound educational methods should be conducted continuously, and they should be started among the school children in the institutions of your community and carried to every employee in your plant, since even though we may not attain the maximum success with the present generation, we can hope for a better response from the coming generation. Do not forget for one moment that as an employer you are your brother's keeper; that the responsibility is yours; that you are going to get from your organization that loyalty and consideration that you are prepared to give them.

Discussion

CHAIRMAN HENRIE: We would like to have some discussion on any of the papers.

ROY V. HERSEY (Nevada Consolidated Copper Co., Ray, Arizona): Two or three years ago I made the statement, and it was criticized, that an accidental death was almost an impossibility. Big head lines in the paper, state that so and so was killed accidentally in an automobile wreck. As a matter of fact, the wreck was probably not accidental, but due to recklessness or carelessness. I believe we could all help the safety game if we did away with that word "accidental."

L. FERN PATT (Utah Copper Co., Bingham Canyon, Utah): What is meant by discipline and to what extent should it be exercised for different offenses?

W. H. COMINS (National Lead Co., St. Francois, Mo.): In Missouri we have not emphasized discipline until recently, and we are really feeling our way. I wondered, in looking over records in the central safety contest how so many companies go

without a lost-time accident for the entire year. I am beginning to think morale is responsible for these good records. How can morale be accomplished?

F. C. DUNBAR (Mather Collieries Co., Mather, Pa.): Morale has a lot to do with the prevention of accidents. I don't believe morale can be developed on an empty dinner pail. Accidents happen in mines operating one day and two days a week. A man is not apt to be in good physical condition when working part time. He has family worries because his income is small which is not conducive to good morale. This deserves the attention of management—whether to operate an entire mine two days a week, inefficiently as far as morale is concerned, or whether to operate only one section of a mine continually and safely.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): Several years ago I thought seriously of trying the system developed by the Consolidation Coal Company, but I rather feared the reaction of our men to snooping and spying, reporting little infractions of rules, and the like. When a man is reported by a fellow employee, is it resented?

Systematized Courts Have Proved Successful

T. G. FEAR (The Consolidation Coal Co., Fairmont, W. Va.): We have been holding safety courts in every mine for the last four years, and have had no trouble. If you try this method, you will not have any complaints.

To build up morale, we had to mete out the same punishment for the same offenses. We made rules stating that the first offense would mean a warning; second offense, penalty of three days lay-off; third offense, ten days; and the fourth offense, discharged. Of course, if the first offense is very serious, a man is immediately discharged without warning or suspension. By uniform punishment, all the men knew they were treated alike, which has helped to build up the morale.

To insure fair treatment, the safety department receives, from each foreman and each superintendent, a copy of the warning or discipline meted out. The report shows the number of warnings and the number of offenses. We have standardized the system.

CHAIRMAN HENRIE: We would like to hear from a foreman.

S. M. HOFFMAN (Maritime Coal Co., Amherst, Nova Scotia): Should serious accidents which result in no injuries be investigated?

H. D. HARTFORD (Tennessee Copper Co., Copper Hill, Tenn.): We investigate all near accidents. It is one of the best means to prevent accidents.

O. F. McSHANE (Utah Industrial Accident Commission, Salt Lake City, Utah): I concur wholeheartedly in what has been said regarding the responsibility of foremen. I believe that he is the key man in any safety program. The desire for increased production should not interfere with a foreman's safety program. Managers will get better safety results without constantly nagging foremen for more and more production.

MR. COMINS: I believe you can speed up production and still have an excellent safety record, for speeded up production is like driving an automobile. The lad who drives at 25 miles an hour is dozy and sleepy, and apt to get hurt a whole lot quicker than the fellow who is hitting 45 and 50 and alert.

Give your safety men ample support. Tell the whole gang to snap into it; and your accidents drop; for they are wide awake.

C. W. GUSS (Harwick Coal Co., Harwick, Pa.): The necessity for education in accident prevention work was recently forcibly impressed on me.

We issued a book of rules, containing the general rules of the company, and extracts from the State Mine Law of Pennsylvania for the benefit of miners particularly. The mine officials were expected to examine the men after they had time to study the contents, and turn in a report to the office. The report form is the last page in the book.

The mine foremen examined the fire bosses; and very much to our surprise our fire bosses could not answer satisfactorily the statements and the paragraphs on the State Mine Law, and some of the fundamental rules of the company.

Believe me, the situation was rectified in a hurry. We need to find out what our foremen know and train them to handle their jobs efficiently.

ADJOURNMENT

Tuesday Afternoon Session

September 30, 1930

H. C. HENRIE, Chairman

Phelps Dodge Corporation, Bisbee, Ariz.

The second session of the Mining Section convened with Mr. H. C. Henrie presiding.

CHAIRMAN HENRIE: Gentlemen, the first order of business is the report of the Nominating Committee.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): Mr. Chairman, the Nominating Committee, consisting of Clyde MacDowell, Jack Ryan and myself, offer the following recommendations for section officers for the next year:

General Chairman, R. N. Hosler, of the Pennsylvania Rating Bureau of Harrisburg, Pa.

First Vice-Chairman, W. H. Comins, National Lead Co., St. Francois, Mo.

Second Vice-Chairman, Thomas E. Lightfoot, Koppers Coal Co., Pittsburgh.

Third Vice-Chairman, A. W. Mendelson, The Koppers Range Co., Painesdale, Mich.

Fourth Vice-Chairman, Frank Dunbar, Mather Collieries Co., Mather, Pa.

Secretary, Dan Harrington, of the Bureau of Mines at Washington.

Chairman of the Program Committee, Henry Bannister, of the Madison Coal Corporation, Glenn Carbon, Ill.

Chairman of Statistics Committee, W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

Chairman of the Engineering Committee, John L. Boardman, Anaconda Copper Co., Butte, Montana.

Executive Committee, H. C. Henrie, Phelps Dodge Corporation, Bisbee, Ariz.; Fred H. Nesbit, Tristate Zinc and Lead Association, Miami, Okla.; Clyde A. MacDowell, Pittsburgh Coal Co., Pittsburgh, Pa.

Chairman of the Entertainment Committee, J. T. Ryan.

Mr. Chairman, I move that the report be adopted.

(The motion was seconded, put to a vote, and carried.)

CHAIRMAN HENRIE: Our first paper this afternoon is by Mr. P. G. Beckett, Vice-President and General Manager, Phelps Dodge Corporation.

Some Fundamental Requirements in Successful Accident Prevention Work

By P. G. BECKETT

Vice-President and General Manager, Phelps Dodge Corporation, Douglas, Ariz.

In 1925 it was decided to reorganize the plan of administering safety and accident prevention work of Phelps Dodge Corporation and Old Dominion Company. This decision followed many years of safety work that had met with a certain lack of cooperation on the part of the organization and with general indifferent success. The safety system then in vogue largely had been one of appointing a safety engineer or inspector whose duties were to see that no accident happened in the mine or in the plant. So far as the average safety inspector was concerned, the spirit was willing, but notwithstanding the fact that a day has twenty-four hours the flesh was not equal to the task imposed upon it.

An analysis of the situation made it clear that accident prevention work was not a one-man job, but a job for every man in the organization, and that if satisfactory progress were to be made, it would be necessary to reorganize the plan of administering the work. This reorganization was effected in the early part of 1925 and since then a committee system, modeled after the plan adopted many years ago by the United States Steel Corporation, has been used. It may be said at this point that we have proven to our own satisfaction that the committee system is basically sound and is the system which brings everybody in the organization—management, supervisory force, and workmen—into coordinated action in the effort to reduce accidents. It is the basis for team work which is so essential to the success of any undertaking.

The flow sheet and general functioning of the Phelps Dodge Corporation and Old Dominion Company committee system has recently been described in detail* and there is no need for repetition on this phase of the work. The principal purpose of this paper is to outline some of the fundamentals which we have stressed since we launched our reorganized safety campaign and which appear to have brought results. With five years of experience in intensive safety work behind us we are now better able to judge of the relative importance of these fundamentals.

We started off on the theory (which was not original with us) that safety work may properly be divided into three classes: (1) organization, (2) education, (3) protective measures, or methods designed to remove or reduce known hazards.

We recognized early in the game that in addition to these three main divisions of safety work it was necessary to have a background which might be termed the safety spirit or safety atmosphere of the organization. This spirit consists in having every employee feel, right from the start, that the desire for improved safety work and the elimination of accidents comes from the head of the company and that there is no four-flushing nor camouflage in connection with the safety movement on the part of the management or higher executive officers of the company. The workman can very readily sense insincerity and will not cooperate if he feels that the management is not really sincere. I am confident that the average workman is willing to do what he believes his boss wants him to do, since he feels that this is the way to hold his job; but if he detects any note of insincerity or lack of cooperation in the company's safety movement, on the part of his boss, he will take his cue accordingly. This is why it is so absolutely essential to get the complete support of the men who have contact with the rank and file of the organization. This is where the committee system fits in, since it provides the means by which policies are handed down through committee contacts from the top to the bottom of the organization. Through these committees it is made known to all that the company is desirous of improving its accident prevention work and is going to insist on the full cooperation of every employee, and further, that it is going to take the initiative in the effort to make things safe.

This leads to a condition whereby everybody in the organization becomes safety-minded, and where it is recognized and understood that safety with the company is a major operating problem and is to be considered hand in hand with production and costs. When this safety spirit or atmosphere has been obtained you will have a condition where the work will proceed more rapidly and with more satisfactory results.

Safety competitions and the payment of safety bonuses have been powerful factors in maintaining interest. Five separate companies in our organization compete for safety trophies which are awarded annually to the company having the best safety record. Departmental trophies are also awarded annually to the departments engaged in the same class of work having the best safety record. All of this is a spur and a stimulus to the maintenance of safety interest and the improvement of the safety atmosphere that I speak of. In order to have the proper spirit everybody in the

*"Safety Organizations in Arizona Copper Mines" by E. D. Gardner and D. J. Parker, Bureau of Mines Technical Paper 652.

organization should be boosting safety work and no one knocking it, and there should be no grounds for questioning the company's motives.

The executive officers and management of the company should be recognized as being active in the accident prevention work and not just passive. It should be understood that the management is willing to remedy conditions that are not safe and is willing to spend money, and big money if necessary, on this phase of the work. This is a necessary part of proving the sincerity of the management to the men. If the company is not willing to do its share first, it has no right to ask its employees for their cooperation. When an employee thinks the safe way, not because of fear of losing his job nor because his boss tells him to, but because he believes it is right, and when he does the safe thing instinctively, you have the proper condition and the correct atmosphere in the organization for getting good safety results. All of this is a necessary background to the three main divisions of safety work mentioned previously.

Proper organization is one of the essentials of successful safety work because unless you are properly organized in the way of committees to investigate and analyze accidents which occur, discuss and act upon suggestions and recommendations relating to improvement in conditions and to handle the many matters that come up for discussion, you are going to be badly handicapped through lack of system. It is unnecessary to dwell on this because the proper organization and line-up in any class of work is essential to success, and safety organization is no exception. So it is quite necessary to see that the flow sheet is the correct one and that it functions promptly and efficiently.

The matter of protective or safety measures is also one that I do not intend to discuss at length in this paper, because it goes without saying that to eliminate accidents, measures must be taken to safeguard the man at work. Unsafe appliances and equipment must be made safe; moving machinery properly guarded, dangerous conditions eliminated, and in general obvious hazards corrected. As an organization we are strong on the use of goggles, safety hats, safety shoes; and as a result have some rather surprising figures to show on reduction of accidents in lines of work where previously without these safety measures we had numerous accidents. For example, one company had 103 eye injuries in the year 1924; in 1928 there were none, and last year there was only one eye injury at this mine.

Looking back on the experience of the last five years, I feel that the most interesting phase of safety work and possibly the most important one, whether it be in mining or in an industrial plant or in everyday life, is the third division, namely, education. I believe that our different safety committees have stressed this matter of education more than any other one point. If progress along safety lines sometimes seems slow to us, it probably is because of this feature of education, which in itself is a slow process and incapable of being rushed, as it is intimately tied up with the human equation, which is at the best uncertain.

In connection with this important question of education I want to outline briefly the Phelps Dodge safety organization's experience, and to mention what now appears to us to be some of the most essential educational fundamentals. There must come first a recognition of what are unsafe practices, and the correction of them. We have insisted at all times with our men that the most efficient way to do a thing is the safe way, and vice versa. In analyzing accidents we have noted numerous cases where an employee through lack of education or instruction was doing his work in the wrong manner. It might be timbering or it might be blasting practice, or it might be the work of loading a car at a haulage chute, or it might be a section gang handling heavy rails, or it might be the starting and operating of machinery, or it might be a hundred and one other things. Usually we learned after the accident had happened that something was being done the wrong way and that nobody had told the workman the right way to do it.

As a consequence, upon learning that unsafe practices on which the workmen had

never been properly educated, or instructed were a major source of accidents, we started to make job studies of our different operations where accidents were occurring and where we felt that the practices could be standardized. We got together committees composed of superintendent, foreman, bosses and workmen and studied all of the movements connected with a certain job or operation and agreed on what was the most efficient and safest method of performing the work. Having decided on that, rules were put into force regarding that particular practice, and the workmen throughout the mine or plant were instructed in the correct way of performing their work.

Having recognized the hazard and standardized the practice along safe and efficient lines, and having properly instructed the workmen, the next step is to have correct supervision. It is not enough just to issue safety rules and instruct men. For a time at least there has to be close supervision to see that the correct methods are properly understood and are being carried out. So supervision is one of the links in this educational chain that cannot be neglected.

Following proper supervision comes the question of placing the responsibility for an accident where it belongs. In the case of accidents that do occur after it is thought that all proper precautions have been taken and where ample instructions have been given, this matter of responsibility is something that has to be looked at and treated without fear or favor, and whether it is the company's or the foreman's or the boss' fault it must be squarely admitted and recognized, and steps taken to prevent a recurrence of a similar accident. Our committees always have made a point of investigating and analyzing every accident very carefully and trying to get as much light as possible on how it happened and then attempt to place the responsibility in the proper quarter. At the start there was a tendency to place the blame on "trade risk", or on the injured employee. However, after thoroughly analyzing such accidents we reached the conclusion that if the company did not take the trouble to ascertain the correct method of doing the work and then instruct its employees, the company could not in all fairness place the blame for the accident at the door of the man himself. When at fault the company must be willing to shoulder the full blame and take the steps necessary to prevent a recurrence of that type of accident. So the careful analysis of all accidents, serious or slight, and the placing of the blame on the proper person or on the lack of safe practice is one of the essentials and fundamentals of successful safety work.

The next link in the chain after responsibility is discipline. If you are going to install correct practices, instruct the employees, and after an accident occurs place the responsibility where it belongs, you must have discipline. In order that safety rules will be strictly enforced, discipline is a necessary adjunct to safety work and one of the fundamentals in the educational campaign. Regardless of whether it is a foreman, a boss or a workman, if after instruction he fails to show the necessary interest or cooperation, or indicates signs of carelessness or repeatedly gets injured, it is necessary to use discipline.

So in this matter of educational fundamentals, we have covered the following links, which, if properly welded together in a safety chain, will contribute greatly to the success of any safety campaign—at least they have in our case. To enumerate them once more, they are:

- (1) Recognition of unsafe practices,
- (2) Correction of unsafe practices by studying the job and lining it up in the safest as well as the most efficient way,
- (3) Proper instruction to all concerned in these correct and standardized practices,
- (4) Sufficient supervision,
- (5) Placing responsibility for accidents where it belongs,
- (6) Discipline.

A few other miscellaneous points in connection with educational work may be mentioned. When we started out on our safety campaign we were kept busy analyzing

accidents that had happened and in trying to see there was not a recurrence of the same type of accident. Now that we have very many less accidents to analyze we have more time to consider possible accidents and their causes. This study of the causes of potential accidents is quite essential in safety work. We should not have to wait for an accident to happen to show us what is wrong. We shouldn't have to lose a man in order to find out an improper practice. Every man on the job should be so safety-minded that he is looking for conditions and practices that may lead to an accident and yet at first glance appear to be safe. And in doing this nobody has to slight in any way his regular operating job. In the functioning of our committee work we look into "no lost time" accidents almost as thoroughly as we do into serious or fatal accidents because we recognize that the line between a "no lost time" accident and a fatal accident is often very slight. We realize more and more that often a man goes on doing something in the wrong way day after day without an accident, then something just a little bit different happens and the result is a bad accident. The proper time to look for causes of possible accidents is before rather than after an accident, or when you are not having them.

While there cannot be very much flexibility in safety organization there can and should be in educational work. Sometimes we work along lines that do not appear to be getting results; it is then the part of wisdom to analyze the situation and reorganize the educational work so as to more effectively accomplish what we are aiming at.

In the metal branches of the Phelps Dodge Corporation and Old Dominion Company, much progress has been made but much yet remains to be done before all of us in the organization can feel really satisfied. Our aim is not simply to reduce accidents but to eliminate them entirely. With this goal in view we are not yet prepared to say whether the first five years of organized safety work are the more difficult or the easier as compared with the next five.

CHAIRMAN HENRIE: Now we have fifteen minutes allotted for discussion.

ROY HERSEY (Nevada Consolidated Copper Co., Arizona): How far do you go in disciplining your supervisory force? If the foreman is at fault, is he laid off?

MR. BECKETT: He is laid off for a week or two weeks for his first offense.

MR. HERSEY: You feel that it is more effective to lay off a foreman than one of the workmen?

MR. BECKETT: Yes, because the supervisory force is the point of contact with the rank and file and you look to them for safety results. If there is a weakness in cooperation from the supervisory force, it is bound to be magnified with the day man.

L. FERN PETT (Utah Copper Co., Bingham Canyon, Utah): How do you define a lost time accident?

MR. BECKETT: If a man is unable to handle the job he was working on when he was hurt after three days off it is a lost time accident.

CHAIRMAN HENRIE: If a man does not report for work on the shift immediately following an accident, we consider it a lost-time accident. If he does report and is placed on light work, such as cleaning track or other light work, he must be back mining at the beginning of the fourth shift or we also call it a lost-time accident.

LEX LONG (Climchfield Coal Corp., Dante, Va.): Do you consider the record of a foreman with the company in fixing his penalty for a violation?

MR. BECKETT: We consider his safety record above his production record.

MR. LONG: We endeavor to make supervision alert to dangerous conditions. The removal of dangerous conditions is as necessary as the control of dangerous practices.

We find that the most effective way to handle cases is to make a thorough investigation, and establish the facts, which, frequently, is difficult without the evidence of the injured man. Then we reach an agreement as to the responsibility, and endeavor to impose some discipline which will be effective in avoiding recurrences.

FRANCIS FEERHAN (U. S. Bureau of Mines, Pittsburgh): How many times during the month or the year is it necessary to apply the penalty of suspension or discharge to mine officials and employees for violation of the rules on safe practices?

MR. BECKETT: Suspensions and discharges are decreasing. They are, of course, more frequent among the men than the supervisory force. During the month men sometimes have to be laid off or discharged quite frequently for not doing what they had been told in safety work.

MR. LONG: If you lay off a foreman for two weeks, what is his attitude when he gets back? Is it good or bad?

MR. BECKETT: I think good. Regardless of how he may personally feel about it, it is good as far as the safety work is concerned. His feelings may have been hurt, and his dignity lowered a little in the eyes of his men which is, however, only temporary.

W. G. METZGER (Hudson Coal Co., Trenton, N. J.): Have you ever found it necessary to discipline an employee or official a second time for an offense?

MR. BECKETT: I would say not in the case of the supervisory force; yes in the case of the workmen.

MR. PETT: Does a reprimand to a foreman decrease his control over his men?

MR. BECKETT: I would say no.

CHAIRMAN HENRIE: Our next paper was written by Mr. W. D. Brennan, president of the Utah Fuel Company. Unfortunately, Mr. Brennan is not able to be with us, and he has asked Mr. E. H. Denny, of the U. S. Bureau of Mines, Denver, to deliver this paper for him.

Methods of Educating the Miner

By W. D. BRENNAN

President, Utah Fuel Company, Salt Lake City, Utah

The coal mining industry can be bettered by the education of the miner, improved both for the miner himself and the operator.

Coal mining is, and will continue to be, an important and vital industry of the United States. At present its working force is composed largely of incompletely trained and semi-experienced miners, and the training of these men is one of the problems of to-day.

Before the men can be taught the proper methods of doing their work, the bosses must first take each work job and make a job analysis and study all common practices pertaining to each job. By this method bad practices can be eliminated or corrected. Good practices are taught and generally used. Preferred practices are standardized, thus simplifying supervision. It also tends to eliminate misunderstanding and specifically defines responsibility. It discloses opportunities for organized training and improvement, and brings out the more instructional material, which when in written form can be used in training new workers.

When the bosses make the job analysis and agree what should be the accepted way of doing each operation, they put their stamp of approval upon the instructional material based on these practices. The bosses are the keymen and no training program that is not in harmony with their point of view is apt to succeed; therefore, job practices taught to the workers are accepted practices approved by the management.

In the past very little time has been devoted to the common worker and many of the practices which he uses were taught to him by his partner, or picked up from experience, with the result that many of them are faulty. By the elimination of poor practices accidents can be decreased, and it will help the worker by having safer ways of working. The proper way of working is the faster way, hence more pay to the worker. The proper way is also the easiest way. It helps the worker to avoid unpleasant controversies with the bosses by establishing the proper way jobs should be done. It also gives a feeling of confidence in the worker; hence giving him a new

pride and satisfaction in doing his work right. Theoretical discussion is avoided as the ordinary workers are not interested except to know the "Why" and "How", and soon tire of subject matter that does not seem closely related to the immediate problem. It is better if the workmen can apply the knowledge as they learn it and put it into immediate practice.

Hand in hand with the job practices are adequate rules and disciplinary procedures. During the process of hiring, each man is instructed in the company's rules, with special emphasis given to the most important ones. He is instructed that when he reports for work he must have a "protective" or "hard boiled" cap, screen goggles, and shoes with hard protective toe cap, and other tools necessary for his work. When reporting for work he is placed in care of an assistant boss who instructs him in the proper procedure of reporting to the fire-boss, checking in, and how to receive his lamp, etc. He is instructed to search himself thoroughly and make sure he has divested himself of all matches, cigars, cigarettes, or pipe. He is also instructed how to return his lamp when coming off shift, and how to check out, much emphasis being placed on the importance of checking out.

He is then shown the mantrip and instructed never to get on or off while it is in motion, to sit down in the car and keep his hands or arms from the top of cars. After leaving the mantrip he is accompanied to his working place by the assistant-boss who explains the reason why the men should travel on the clearance side of the entry away from all power lines, as there is danger of tools touching them and the man receiving a shock. When entering his working place he is instructed how to look for dangerous conditions along the roadway, how the fire-boss would dead-line the place if dangerous, at the same time explaining why it would be dead-lined, and never to cross over said dead-line until a boss or fire-boss removes it. He is shown how to pick out a safe place to leave his lunch bucket and coat. When approaching the working face he is instructed by demonstration how to test the roof by tapping lightly with the butt end of a pick and sometimes supplementing this by holding the other hand against the roof to feel for any vibration. He is told how the fire-boss marks loose roof, or where props are needed, and to look for these marks. When loose roof is found or marked he must first either pull it down or place props to secure it. He is shown how to pull loose roof down by using a bar instead of using an empty nail keg or other insecure platform. He is told how to obtain more props or other material when he needs it, and is shown how to block the car securely at the face before starting to load.

Such jobs as timbering require much instruction, for instance, how to prepare a place for a prop, how to measure for it, the proper way to prepare to cut it, how to square the ends with either axe or saw, and how to use these tools properly. How to make a square or angle cut and how to brace the timber for sawing, how it can be braced with an axe or against another timber, how to make the initial saw cut by not placing his hand alongside the blade, but on top of the blade to guide it, at the same time keeping the hand away from the coarse teeth. This is followed by instructions how to make a cap-piece, explaining why a large cap-piece should be used in preference to a small one, why it should be square on two sides instead of round to get a good bearing on the prop. When shaping the cap-piece it should be placed on a good foundation where there is sufficient head room to swing the axe, and position for chopping should be such that a glancing blow of the axe would not catch the foot or leg of the worker. The axe handle should be short and should be held near the end to avoid the exposed end catching in clothing or striking against some other object and deflecting the blade.

So far we have merely scratched the surface in regard to instructions to the miner: the above details were mentioned to give an idea of how important it is to catch every small item; none is too small to overlook.

Get your bosses together in a room provided with a large blackboard. Make out

a list of payroll jobs—each of these jobs can be broken up into work jobs—and divide each work job into each operation; how to do the operation, with special information. The bosses, themselves, will be surprised that there are so many operations, and will receive an education while analyzing the various jobs.

This is no wild dream but has been proved a success in several of the mines in the Rocky Mountain Region, and has attained excellent results.

CHAIRMAN HENRIE: Mr. Brennan's paper furnishes a rather fertile field for discussion.

K. L. MARSHALL (U. S. Bureau of Mines, Pittsburgh, Pa.): There has been a dearth of information on how information from job analysis is put over to the miner. It is often taken for granted that the supervisors know the right way. Ideas on how to do certain operations vary with different foremen. A miner was told by one boss that this was the way to do a job; his way was not at all satisfactory to another boss. You can't get any reaction from ordinary mine laborer under conflicting methods of instruction.

The "run-of-mine" laborer is unable to take classroom instruction as readily as the official force. Conflicts over teaching a job can be eliminated by working out clear and definite rules and methods at general meetings of supervisors.

One of the sorry things about rules, after they get in printed form, is that changing conditions in the mines render them obsolete; they are not deleted, and they are not kept up to date. There follows a lot of trouble for changed conditions demand a change in method, but the obsolete rules remain in force where they absolutely do not suit.

A large turnover will defeat an educational program. It is successful when turnover is a minimum and the official has time to train the new man. A large labor turnover points to something radically wrong in the operating organization.

Classrooms in the mine during short periods, at lunch hours, fifteen or twenty minutes, are valuable, and especially when a well known laborer is asked to demonstrate his method of doing a piece of work. It is very effective to hold the meeting in a working place where the demonstration can be given under actual conditions. It is absolutely necessary to have a verbal or written description of a method and perform it before the person who is to be taught.

With these points in mind, the Bureau is arranging for a talking movie picture on the analysis of each major underground job. We know this cannot be done for every mine in the United States; we are not trying to be entirely specific. But we are establishing fundamentals for every important job—information which can readily be applied, with very little additional material, to suit practically any operation. This talking picture can be translated into any desired language at a slight additional cost.

I desire to emphasize the importance of reporting and investigating non-injury accidents. I can truthfully say that I have gotten more material from an accident that did not injure anyone than I ever got from an injury case, for the simple reason that the bars came down when the man was hurt, but they were up and facts easily uncovered when no serious injury occurred.

W. F. SULLIVAN (Phelps Dodge Corporation, Sonora, Mexico): Some instructors, in trying to get the point over to the men, really talk over the men's heads; in other words, they assume that the man immediately understands. They may give him an order and walk away from the man, not knowing whether he understands the order. As a result, the order is not carried out efficiently and safely. In instructing men, I think all bosses should assume that the man is totally ignorant so as to be sure that the man understands what he is talking about.

Men are reluctant to admit their ignorance in classes. You bring up a point, and ask, "Those that don't understand, kindly raise your hands." You will get no hands. Check up and ask a man to explain the point. If they can, your point has gone over.

SECRETARY HARRINGTON: The record of the Phelps-Dodge Corporation, in both

its coal mining branch at Dawson, New Mexico, and at its metal mining branches in Arizona and in Old Mexico, is one which, not only the Phelps-Dodge Corporation, but the entire mining industry in the United States, may well be proud. They have gone into active prevention work with a will. Phelps-Dodge has put over a piece of safety work which any of you people, irrespective of the fine records which you may be able to show, will have to work hard to equal, and if you can beat it, you are going some.

CHAIRMAN HENRIE: Our next feature is the Question Box, which will be in charge of Mr. F. C. Dunbar, who is General Manager of the Mather Collieries Company. I ask Mr. Dunbar to take the Chair and act as Chairman during the Question Box period.

CHAIRMAN DUNBAR: At our meeting in Chicago last year, we decided to make the Question Box a part of this year's program. A number of questions were suggested, and the Committee chose the ones for discussion.

The first question this afternoon is "The Analysis and Classification of Accidents," and I have asked Mr. W. W. Adams, of the Statistical Bureau of the Bureau of Mines, Washington, D. C., to lead the discussion.

The Accident Situation

By W. W. ADAMS

U. S. Bureau of Mines, Washington, D. C.

I want to present, first, the accident situation last year, 1929, which is the latest full year for which we have information, and then to point out what I conceive to be the primary purpose of having accident statistics. The information for 1929 is derived entirely from the record of the companies that participate in the National Safety Competition. Nation-wide statistics for the entire mining industry are not complete yet, but the records of those companies in the National Safety Contest show that 1929 was a particularly good year from a safety point of view. All branches of the industry showed an improvement over the preceding year's record with the exception of the anthracite group. The bituminous mines showed particularly marked progress. Non-metallic mineral mines showed equal progress. The metal mining industry, taken as a whole, about held its own as compared with the preceding year, but the net result was a good improvement over 1927.

The frequency of accidents in the mining industry is, in its entirety, due to the large number of accidents in the anthracite group, and the somewhat higher severity rate for the industry as a whole, is due to the average seriousness of the accidents in the bituminous mines. The metal mines as a rule have a fairly favorable accident experience, particularly the iron mining industry. There are about 150,000 lost time injuries in the mines or quarries of the United States each year; 115,000 of that number are in the coal mines, anthracite and bituminous; about 25,000 are in the metal mines; and about 10,000 in the stone quarries.

It is known in a general way that these accidents are due primarily to roof falls, haulage, explosives, and the various well known causes of accidents, but I think what we need is to extend our statistical service to the point where we can give answers to such questions as how the accident occurred, which, of course, is now being attempted by giving the cause, and who gets hurt when an accident occurs. We want to have statistics by occupations of the employees; where did the accident happen; in what part of the mine do most of the accidents occur; and, last, what is the result of the accident.

Figures on the total number of accidents in the mines tell us very little. We need to know the seriousness of the accident, whether it was fatal, whether it resulted in permanent disability, or whether it resulted in temporary disability; and, in the

latter case, it is quite significant to know whether the man loses one day, one month, or one year. We must have information enough to enable us to classify the accidents according to their seriousness so that remedial measures might have some relation to the seriousness of the accident.

Another field of inquiry for the statistician and for the industry is the influence of permissible explosives on mine safety, the effect of the use of rock dust, and particularly now do we want to know the effect of mechanization of mining operations. That is a particularly live subject just now, one on which there is a great variety of opinion, and one on which there is very serious need of definite information.

Accident statistics are prepared or should be prepared, I think, from three different points of view:

1. From the national point of view covering the entire mining industry and all of its branches,

2. From the standpoint of the individual state or a particular mining district; and

3. Particularly important, from the standpoint of the operating company.

It follows that national statistics cannot be as elaborate as the statistics of an individual company. It is quite simple for the company to follow its accident experience to the last detail, but in national statistics and in state-wide statistics, much detail must be sacrificed. However, it is extremely important, I think, that all statistics, both national and state, as well as company, be expressed in a universal statistical language. Many companies find it to their advantage to compile accident data to fit their local needs which is good, but it may prevent more companies from compiling their accident data in a language that will make their experience comparable with other mines doing the same class of work, with mining districts, with the state, and with the nation.

This morning we heard considerable about the responsibility of management in mine safety. To my mind that is the most encouraging feature in the mining industry today. We accept the principle of the responsibility of management for safety in mines. I believe that when we have good accident statistics, coupled with the accepted responsibility of management, we will have safety in the mining industry.

CHAIRMAN DUNBAR: We now have a man from the bituminous district who is also familiar with accident statistics; I am going to ask Mr. Clyde MacDowell to state the next thought on this topic. Mr. MacDowell is the Personnel Director of the Pittsburgh Coal Company.

Analysis and Classification of Accidents

By CLYDE MACDOWELL

Personnel Director, Pittsburgh Coal Company, Pittsburgh, Pa.

Why analyze accidents? Why classify accidents? The first consideration will be the formulation of a determined and definite safety program to cover a considerable period of time. The cost should be carefully considered as no worthwhile program can function efficiently and effectively without sufficient money, cooperation, and particularly a required personnel to carry on most effectively accident prevention work.

With the program definitely agreed upon it is then possible to determine how far analysis and classification of accidents should be considered. Plans should be made for definite action after analysis and classification figures have shown the causes. This, we believe, will lead to the consideration of classification before analysis, which should be emphasized and studied minutely in relation to the entire program.

Classifications are made for study as to definite causes, and these should be so arranged as to bring out minor causes monthly by mines and departments. Charts

or similar forms for comparisons should be used and number of lost-time accidents, number of no-lost-time accidents, and number of days lost should be shown on this chart. It may be necessary to have a chart for each division. A chart should be used to cover at least a three-year period, which would permit quickly of monthly or periodic comparisons.

The Pittsburgh Coal Company classifications for accidents are divided into eighteen major divisions with one hundred eight minor divisions, as follows:

<i>Inside:</i>		
1. Falls of Rock or Roof Coal	7 divisions	
2. Side Falls, Rock or Coal	5 "	
3. Haulage; cars, motors, and rope	20 "	
4. Mining Machines	6 "	
5. Track Work and Timbering	7 "	
6. Mechanical Loading	3 "	
7. Electricity; shocks and burns	5 "	
8. Live Stock	2 "	
9. Explosives	4 "	
10. Shafts and Slopes	2 "	
11. Other Causes	12 "	73 divisions
<i>Outside:</i>		
12. Shops; Machinery	4 "	
13. Tipples; Screens, Chutes, Tables	6 "	
14. Railroad Cars; Trimming, Handling	3 "	
15. Construction; Repairs	2 "	
16. Teaming; Live Stock	3 "	
17. Electricity; Shocks and Burns	3 "	
18. Other Causes	14 "	35 "
		108 "

In the classification of accidents consideration should be given Mechanical Loading and Hand Loading. Mechanical Loading should be sub-divided by certain types of machines. These two divisions, therefore, are necessary for a comparison of hand loading and mechanical loading accidents. This requires, however, two separate charts or the use of symbols, as most all inside divisional causes of accidents would be in each class.

Classification of accidents are necessary under each foreman and each assistant foreman for comparison and study in any worthwhile program. The classifications should show number of lost-time accidents and number of days lost.

To make my point clear as to our interpretation of detailed classification of accidents and why they are necessary, you will be interested in this statement. The official family of each mine or department of the Pittsburgh Coal Company receives monthly a report showing the name of injured, classification number, nature of injury, days lost, and estimated compensation for each accident charged to that mine or department. The classifications are numbered and printed on the reverse side of this report for the guidance of those making a careful study of the accidents.

They also receive a monthly summary compiled from the above reports showing by mines and departments total number of accidents, total lost-time accidents, days lost, symbols for permanent disabilities, estimated compensation cost, and estimated doctor and hospital cost. This is an excellent comparison by mines and departments. This report also shows the above information for all mines and departments by major causes.

Classifications of accidents should also be considered in a manner that would show the nature of injuries to different parts of the body, particularly the eye, finger, hand, toe, and foot.

We certainly should not forget the periodic study necessary from classifications by nationalities, by ages, by occupations, by years experience with company, by total years experience, by hours of the day, by day of the week, whether injured person received first aid treatment and by whom, and whether injured person was trained in first aid.

The above explanations on classifications lead us on to the proper forms necessary to make such analysis, and this is very important.

It is then time to consider the analysis of accidents. A fair analysis of accidents cannot be made without a Personal Injury Report form which will record the different phases of classification. This form should be given most careful attention in order that your classification may be of real value.

The real thought, however, back of making an analysis of accidents is the fact that those in authority who have been delegated to make out such Personal Injury Reports must be educated to what is desired as this naturally is the source and basis of any worthwhile accident prevention work.

CHAIRMAN DUNBAR: Have you any questions?

It seems to me that sufficient attention is not paid to the physical condition of the man having the accident.

R. DAWSON HALL (Engineering Editor, Coal Age, New York City): It seems to me that the men who have accidents should be examined for poor vision; color blindness, and whether better light would not have prevented the accident.

CHAIRMAN DUNBAR: It has always been an open question as to whether physical examination is necessary and proper, especially in the mining industry. I have asked Mr. Thomas Lightfoot to lead this discussion.

Physical Examinations in the Mining Industry

By THOMAS LIGHTFOOT

Engineer in Charge of Accidents and Compensation, Koppers Coal Company, Pittsburgh, Pa.

It so happens that the company with which I am associated inaugurated the physical examination of prospective employees at the same time that systematized accident prevention work was started, and it is a little difficult for me to imagine a concern that does not require a physical examination of applicants for employment, although I realize there are a large number of companies that have not yet gotten around to it.

We would not be without a system of physical examinations for a minute. Unfortunately, we have rather a large turnover in our West Virginia mines, though conditions are similar in adjoining mines, but we feel it would be a great deal larger if we didn't have physical examinations.

We conduct physical examinations without any additional cost to the company. Whether the physician is employed on a salary or whether he is employed by the men, he is required to make examinations of men applying for work without any remuneration either from the company or from the men. The plant physicians took over this work without any objection, realizing that such examinations would in the long run lessen work for themselves. The results of our physical examinations have been interesting in several ways. The number of rejections seem to run almost constant. It goes up a little at one mine and down at another, then up again, but year in and year out, we run an average of 6 per cent rejections. Some of our mines have gone as high as 11½ per cent, and others down as low as 2 per cent.

The principal reasons for rejecting employees are:

1. Defective eyes and blindness
2. Hernia

3. Heart defects and similar heart diseases
4. High blood pressure
5. Deformed or missing members
6. Venereal diseases
7. Tuberculosis
8. Miscellaneous defects, of which there are quite a number, but not enough of any one kind to make a separate classification.

The majority of the rejections fall in the first four classifications, defective eyes and blindness, hernia, heart defects, and allied diseases, and high blood pressure.

These totaled 77.7 per cent of our rejections for the year 1929.

If men had been permitted to go to work with any one of those four defects, an accident case and probably an expensive compensation case would have followed.

The hernia feature of physical examinations has been of particular interest to us. No less a person than the Hon. Lee Ott, Compensation Commission of the state of West Virginia, told me that in his seventeen years of experience in compensation work, he only saw one case of hernia that he considered caused in coal mining. Most, in his opinion, were aggravations of pre-existing hernias.

Physical examination of employees will automatically weed out a large number of pre-existing hernias and save considerable compensation, loss of time and lost production. One of the largest items of compensation expenses, particularly in West Virginia—is due to defective eyes. The Compensation Department of West Virginia pays out tremendous sums for eye injuries, largely the result of previous defective vision. Many cases are paid on the basis of total blindness, whereas one eye was defective to start with, and possibly both eyes were partially defective. Many times just a slight injury, causes the loss of sight in one eye or total blindness because of previous defects, when men were not examined prior to employment. We feel that our experience fully justifies pre-employment examination.

Hernia Records Proved of Great Value

CHAIRMAN DUNBAR: I had a number of years experience in eastern Kentucky where we employed a large number of colored men. A colored man is subject to hernia. But, through physical examinations we were able to record the man who had a hernia, and by having a record we were not liable to compensation in case he claimed a hernia.

We are examining all applicants and we pay the doctor. It does not cost the man a cent for this examination. We examine particularly for hearing, eyesight, heart and venereal diseases, high blood pressure, and the like.

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Michigan): Our company has required a physical examination of employees for about 15 years. We have found it beneficial for the employer and the employee.

We had a man who entered a claim for a hernia. We checked back our records to the year 1915 and found that this man had a double hernia at the time of his employment.

In addition we re-examine all employees each year. It gives the employer a further check on a man's physical condition. It also gives the employee an idea of his condition.

In the examination which was conducted last October one of our most valuable employees was found to have diabetes. He was not aware of it, for his previous yearly examination showed him to be O. K. He immediately followed the doctor's advice, and his condition has cleared up.

We think the procedure justifies itself. We have no trouble from the men. They understand that they have to be examined before they are hired and re-examined yearly. All examinations are made on the men's time.

W. G. METZGER (Hudson Coal Co., Trenton, N. J.): In making physical examinations have your surgeons paid any attention to the question of miner's asthma?

MR. TRESTRAIL: We recommend that, if the man is employed underground he be placed on the surface, or that he find some other form of employment.

MR. METZGER: You do not reject him on that basis?

MR. TRESTRAIL: We have some risks on our property that we still keep on the payroll.

MR. LIGHTFOOT: Unless the case is bad particularly, the man is not rejected.

W. F. SULLIVAN (Phelps Dodge Corp., Sonora, Mexico): Do the men feel that the company is trying to get something on him by requiring a physical examination?

MR. TRESTRAIL: There is no discrimination. If a re-examination discloses a serious condition, we do not discharge the man though he becomes a risk. We have some men with very high blood pressure, and we still keep them on the job.

LEE LONG (Clinchfield Coal Corporation, Dante, Va.): Do you have any fixed age limit?

MR. LIGHTFOOT: Absolutely no fixed age limit. If the older man does more work than the young man, we give him the job.

Overlooking an Important Feature of Safety Work

E. A. STOCK (National Lead Co., St. Francois, Mo.): I tell you, men, if you do not have physical examinations, you are overlooking an important feature of our work. It will open your eyes.

ROBERT H. SEIF (New Jersey Zinc, Franklin, N. J.): Do companies that give physical examinations to their new employees include a chest X-ray for the detection of tuberculosis?

MR. LIGHTFOOT: It is not one of our problems.

FRED NESBITT (Tri-State District): In our clinic at Pritchard, Oklahoma, we give X-ray for silicosis and tuberculosis. We also have a free clinic in which we treat all men, and their families, who are afflicted with venereal diseases.

J. J. FORBES (U. S. Bureau of Mines): What action is taken when a man is found physically unfit on re-examination?

MR. TRESTRAIL: I think out of regard to his family he wouldn't want to stay in a hazardous occupation. If he is an old employee we manage to keep him doing something. We try to take care of our old employees.

CHAIRMAN DUNBAR: Some of the men who have gone back for re-examination had developed defective eyesight; we have persuaded them to get glasses. Some men who had not taken out insurance, because they felt that they had some physical defect, were able to pass an insurance test. We haven't found antagonism.

MR. WASPIER: During 1930 we placed the physical condition of a man who was injured on his accident report. We have a record now showing the effect of the man's physical condition on his injury.

O. F. McSHANE (Utah Industrial Accident Commission, Salt Lake City, Utah): Unless there is some modification and some explanation, it would appear that there are icicles forming around the hearts of a lot of employers of labor. I do not believe that is true. We have, in our state I think, as fine a set of employers as anywhere. They are giving physical examinations which I approve of wholeheartedly, if for the purpose of giving medication to the man who is in need of it, or if given for the purpose of intelligent placement of a man who has a weakness and will not have that weakness aggravated or accelerated by the class of employment in which he is placed.

The International Smelting and Refining Company, gives a strict physical examination. However, no man who is able to work is turned down because of a disability. He is intelligently placed by the foreman in charge who knows of his physical con-

dition. The International Smelting and Refining Company has better accident experience than any company that refuses to employ men with some physical defects.

CHAIRMAN DUNBAR: The officers would like to know what you think of the Question Box idea. All in favor of having the Question Box in future programs, please raise hands.

(The vote was almost unanimous.)

ADJOURNMENT

Wednesday Afternoon Session
October 1, 1930

H. C. HENRIE, Chairman
Phelps Dodge Corporation, Bisbee, Ariz.

The third session of the Mining Section convened with Chairman H. C. Henrie presiding.

CHAIRMAN HENRIE: Our first speaker this afternoon is Mr. D. L. Boyle, Superintendent of Mines, Associated Gas and Electric System, Johnstown, Pa. Mr. Boyle will speak to us on the subject of "Safety Organization for a Small Company."

Safety Organization in a Small Mine

By **D. L. BOYLE**
Superintendent of Mines, Penelec Coal Corporation, Associated Gas and Electric System, Johnstown, Pa.

The organization herein described is that which is in effect at Penelec No. 5 Mine, Seward, Pa., a town situated ten miles northwest of Johnstown. The mine is a captive operation supplying the needs of the Seward Station of the Associated Gas and Electric System, of which system both are integral parts. The station has a capacity of 40,000 KW and consumes approximately 15,000 tons of coal monthly.

The seam of coal mined is the B-Miller or Lower Kittanning. In this area, it is gaseous, forty-two inches thick, generally flat, and has overlying it a two inch to four inch band of bone. Low flat rolls and roof spars intercept the regularity of the fire clay bottom and slate roof. The coal is relatively hard, there being no tendency to break off, and where pillars are being extracted, the hardness is somewhat increased. The overburden ranges from 180 feet to 300 feet, and there is approximately 28 feet of slate cover between the coal and sand rock. Sand rock thickness varies upward to the extent of 52 feet. Some little trouble is experienced from roof conditions, as fissures and cutters make the hard slate indecipherable.

Both the advance and full retreat systems of room and pillar mining are used. Cutting is done with fifty H. P. machines which are approved by the United States Bureau of Mines. These machines cut approximately 90 per cent of the total tonnage. When mined, the coal is hand loaded and hauled to the shaft bottom by means of electric locomotives. It is then sent to the surface through a double compartment shaft which is equipped with automatic feeds and self dumping cages. Outside of the mine, the coal is dumped into steel hoppers and transported to the plant by steam traction locomotives.

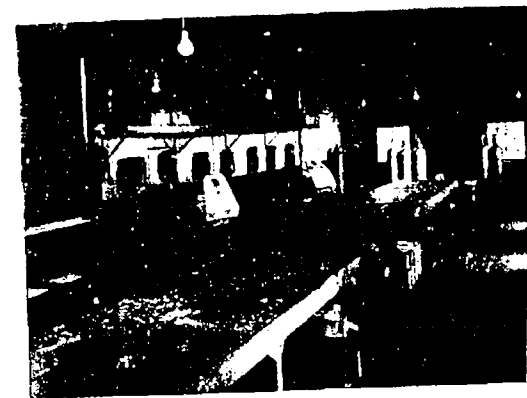
Ventilation is furnished by means of a nine foot Sirocco fan which exhausts from the mine 140,000 cubic feet of air per minute. The total volume is divided into six splits, all of which have in excess of 15,000 cubic feet on the intake. Stoppings along the main and flat entries are constructed of brick. Stoppings on room entries are built of gob rock. In all entries, no more than the last two cut-throughs are allowed open at any time, the outby cut-through is open for switching and must be temporarily checked. Extra protection is provided against an explosion hazard in that the mine is completely rock dusted and is one of the few mines in the state of Pennsylvania receiving full credit from the compensation rating bureau for this protective measure.

Underground, in the various sections, are first aid stations which contain all

necessary emergency equipment, such as first aid supplies, self rescuers and All Service Masks. Self rescuers are also provided at the mouths of all entries. These are placed in locked boxes which are cached in the rib. Surface equipment includes a modern equipped mine rescue and training station.

It has been the aim of the company to equip, maintain and operate the mine in as safe a condition as possible and every possible effort has been put forth to reduce accidents. This might be conveniently set forth when cited, that at the time of acquisition, during the year 1920, the compensation rate paid was \$3.04 per \$100.00 Pay Roll, which was far in excess of the average Bituminous Rating of \$2.52. One year after the date of acquisition, the rate was reduced to \$1.35, as compared to the

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Mine rescue station at Penelec Mine No. 5

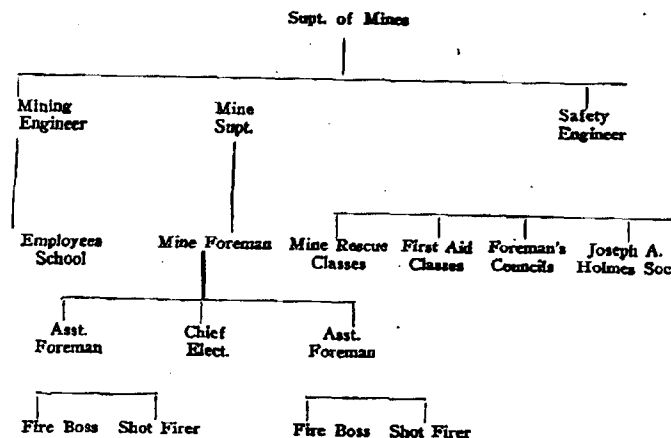
average Bituminous Mine Rating of \$2.27. At the present time our adjusted rate is \$1.88, which compares favorably with low rated mines in this field.

Organization

Accidents occurring over a period of eight (8) years were analyzed, which analysis showed that a major portion of the accidents could be imputed to failure and inability on the part of the workman. To eliminate these causes and materially reduce the ultimate cost of production, it was decided to include with the supervising safety methods, educational work giving the employee a training in fundamentals. Considerable thought was given to just how this work could be presented. It was finally decided that through consistent contact this could be accomplished. The aim of the contact being to keep safety in the foreground at all times, and by the continual supervision and instruction to build up the immediate supervisor to propagate this work.

The following is the scheme of organization and a description of its various parts:—

ORGANIZATION CHART Showing Contact



Mine Officials

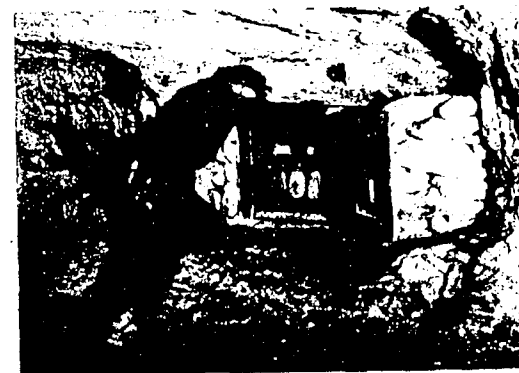
The local officials, superintendent of mines, safety engineer, and engineer have duties which are, of course, found in other organizations, plus those as illustrated in the organization chart. In addition, two rounds of a section is required of an assistant foreman. Shot firers are required to visit all places working on their section twice each day, regardless of the amount of shooting required. These men, while not invested with authority, other than the control of places to be shot, report to the assistant and keep him well informed at all times of the status of each place.

Employee's School

In the public school building of the town, the mining engineer conducts a night school for employees. This school meets two nights a week, six months out of a year, which are usually the six months preceding state examinations. It has been the practice to teach the fundamental mining subjects, and as far as possible co-ordinate the instruction with the practical training given the men following their occupation. It is pleasing to report that practically all the officials of the mine at one time have attended this school prior to the time of their serving in an official capacity, and it might be termed that these men are a product of the combined school and mine training that has been offered.

Joseph A. Holmes Society

It was evident, after several years of work with the Foreman's Safety Council, that there was still a vast area that remained untouched, meaning that in our efforts we had failed to reach certain members of the organization. In a mining community, like any other, there are some who, while not employed as officials, have in them qualities of leadership. To influence and direct this leadership into the proper channel, or to have it coordinated with the leadership of others, was considered more economic than to allow it to go by unnoticed or to be misdirected.



Opening a self-rescue box in Penelec Mine No. 5

The organization scheme of the Joseph A. Holmes Society is such that numerous individuals are permitted to take an active part. It also provides some diversity for the men. Upon request, the United States Bureau of Mines organized the Chapter, which has been quite active since. Programs are arranged, which include with the instructive talks and pictures, music and other entertaining features. Officers and directors are taken from the mine personnel. Officials take an active part only when acting as advisers or when taking part in the program.

First Aid and Mine Rescue

In years previous to 1929 we had in effect a policy whereby we trained only a sufficient number of mine rescue and first-aid men to answer all emergency calls and to have distributed about the mine good practical first aid men. In the year 1929, we realized that it was through this medium that we could lay the foundation for safety training, so it was with this in view that we started to enlarge on our program, and in the same year the employees of the mine were 100 per cent trained in first aid work, and all men physically able were trained in mine rescue work.

In order to follow up the work, we have at the present time, one evening each month in which all day men, officials and as many other employees as we can get,

are required to attend first aid meetings. At these meetings, the majority of the time is spent in a review of first aid work, but to associate first aid work with accidents, it is the policy of the instructor to describe certain accidents and their resultant injuries, and have the men take care of the patient whom it is assumed is the victim of the circumstances resulting in an accident.

At the present time, and during the last year thirty-six men have been trained in mine rescue work. Not only are these men trained in the use and care of the apparatus, but they are given the advanced course in mine rescue which is prescribed by the United States Bureau of Mines. Essential to the work followed in this course is equipment, which can hardly be termed as equipment necessary in a mine rescue station, as it is almost an impossibility to have all rescue men skilled in the use of such apparatus, but when we consider that it might at some time or other be the duty of some of these men to serve as rescue crews, we can assume that the valuable experience obtainable on such occasions can only be absorbed when these men are equipped with a suitable foundation.

Then again during the past several years, examinations for State Mine Inspector, mine foreman, assistant foreman and fire boss have taken into consideration very much material pertaining to this phase of mine work, and it can be readily seen that to give men a very thorough knowledge of recovery work is not only beneficial to the company, but a benefit to the men.

Conclusion.

Whether or not safety in a small mine is any different than safety in a large mine is in the writer's mind somewhat hazy. Safety, we readily admit, is so closely allied with economy that we make no attempt to shatter the relationship. Economy is essential in both large and small operations. The use of the word "Safety" too often reflects only a meaning of conservation of life and limb, and too often we forget that to supervise more thoroughly the human at work means added supervision to property.

To show the close relationship between safety and economy, let us use for example a particular problem in ventilation at this mine. During the latter part of 1928, it was particularly noticeable that some changes were necessary. In fact, the ventilation was becoming rapidly inadequate. A survey was made of all airways, taking into consideration the many factors that affect the flow of air. The amount of increase of air and power consumption necessary to supply the additional amount were estimated. After much study it was decided to decrease the pressure on the existing ventilating apparatus. This was done by eliminating certain airways, increasing the area of tight places and rounding out abrupt corners.

This work, when completed, made it possible to circulate 140,000 cubic feet of air per minute with the same water gauge that was required to circulate 85,000 cubic feet. The total cost of making these changes was \$3500.00. To circulate the same amount, or 140,000 cubic feet of air, at the estimated increase of water gauge would have cost \$8000.00 per year for power consumption only. In this particular instance, the safest way, or ventilation with a low pressure is by far the more economical.

It is peculiar that only in certain industries does the management recognize and take advantage of the fact that they have at hand vast resources in the form of personnel sometimes more valuable than the mineral at stake. It might be better termed to say that if we had our organization in its entirety pulling on the same side, company would not be a factor, but all factors would be economic.

Safety in itself is not a high pressure means of extracting from the employee ideas, nor does it curb any inclination of the man to advance. An operator or employer before he can show dividends, must first invest, likewise he must do something to impart to the individual a feeling of surety and sincerity before he can ever hope to have loyalty in return. In this mine, before acquired by its present

owners, there occurred two explosions resulting in the loss of eight and three lives. Subsequent to purchase, labor turnover was extremely high. Labor turnover means accident to life and property. Accidents cost money, and if the money spent on the safety has only reduced our turnover to its present degree, it has been well invested.

Easy it is to formulate a bulk of alibis when results haven't been obtained, and easy to enumerate the many factors we consider so necessary before a safety organization can function and obtain results. But to me, the one and important prerequisite is the man who is in a position to say yes or no. It is he that is responsible for the final results, and to him all responsibility for accidents can be traced. The more willing he is to accept excuses, the higher accident frequency he will have.

CHAIRMAN HENRIE: We have two papers on the subject of safety organizations. The next is by Mr. Carl T. Hayden, General Manager of the O'Gara Coal Company, Chicago.

Safety Organization For Large Mining Companies

By CARL T. HAYDEN

General Manager, O'Gara Coal Company, Chicago, Ill.

In the fall of 1927 the O'Gara Coal Company, operating seven mines in Saline County, Illinois, realizing that it was experiencing too many accidents in the production of coal, decided to organize a very complete accident prevention and safety campaign.

Two methods of organization were considered—first, the installation of a safety department entirely separate from the producing department, which would devote its entire time and activities to accident prevention work; and, second, to make the production department, in addition to its producing activities, also the safety department, thus holding the entire operating organization directly responsible for the accident prevention work.

A great deal might be said regarding the merits of either plan. A number of the larger coal companies have adopted the policy of maintaining a separate safety department, which reports its investigations and recommendations direct to the vice-president or the general manager, rather than to the general superintendent in charge of operations only. This method has certain definite advantages, in that the safety department is entirely free to make any investigations and recommendations it may see fit without reference to, or consultation with the producing department. Too often, however, this method may lead to a lack of cooperation between the safety and producing departments. It has been our feeling that the producing department is responsible for accident prevention, and in our case, our entire operating department constitutes our safety department.

It is generally conceded that the success of any safety program is largely dependent upon careful and detailed supervision of all activities in and around the producing properties, and that, in order to procure this type of supervision, it is essential to have the hearty cooperation of everyone in the organization from the highest official to the trapper boys. To foster cooperation and create an interest in safety, practically every employee of the company was given a first-aid course, through the cooperation of the United States Bureau of Mines, the Department of Mines and Minerals of Illinois, and the United Mine Workers of America.

It was very gratifying to note the interest displayed by the men in connection with this first-aid course. Classes of 50 were first organized and handled by one instructor. It was found necessary, however, to reduce the number in each class to 25, and with over 2,000 men to train, this program extended through most of the winter months of 1927 and 1928.

The results of this course in first-aid were three-fold: first, it gave the employees

a conception of the seriousness of minor injuries if not properly taken care of; second it fitted them to perform simple first-aid service; and, third, it created the proper basis on which to build an aggressive accident prevention campaign in the mines.

In order to study the progress made in our accident prevention work, a monthly accident report is compiled in the general manager's office, analyzing all accidents, first, on the basis of employment; and, second, on the basis of causes. It further contains a statement showing, for each foreman, the number of accidents to men under his supervision for the month; the number of man-days worked under his supervision; the number of man-days lost, due to accidents, by employees under his supervision; also his rating, which is determined by dividing the number of man-days worked under his supervision by the number of man-days worked, plus the number of man-days lost. The report also contains a statement of the tons produced, per accident at each mine, and a discussion covering the month's experience.

Each foreman is furnished a copy of this monthly accident report for his information and study. He has an opportunity, through this report, to compare the results obtained under his supervision with the results secured by all other foremen at the various mines. Very keen competition has developed between the various foremen to secure the very best possible rating every month.

In order to stimulate this competition and to compensate the various foremen on the basis of the results secured in accident prevention, a monthly bonus plan has been devised. This provides that each foreman be credited with one cent for every man-shift worked under his supervision during the month, and charged one dollar for each man-day lost during the month, due to accidents. We have had foremen with over 3,000 man-shifts worked under their supervision without a man-day lost due to accidents within the month. These records result in a very substantial monthly bonus.

When accidents affect the individual foreman's pay envelope, he becomes keenly interested—first, in the prevention of accidents; second, in seeing that accidental injuries have the proper first-aid and medical attention; and, third, the injured man is again at work at the earliest opportunity.

Because of this accident report, it is relatively easy to supervise the activities of the various foremen, as each month's results are clearly set forth and the failure of any individual or the marked success of another is readily noted.

Once a safety program is installed and the entire organization is sold on its results, it becomes very largely self-sustaining. It is, however, necessary to maintain a constant interest which, with other methods, is achieved by the use of safety bulletins. For a number of years there has been on the market certain illustrated bulletin services, consisting of pictures of current events, and inspiration messages from leading men throughout the country with a safety message. All of these are very desirable. We have been fortunate enough to develop, in the ranks of the Miners' Organization, an employee who prepares our own safety bulletins.

The fact that this man is one of our own organization (a top man at one of our mines) adds a personal touch to this service. There is the further advantage in that he is able to prepare any type of bulletin that we may desire to combat accidents from any particular cause. A number of these bulletins are on display; they cover a wide range of subjects.

Payroll inserts—both, the bought and home-made—have been used from time to time in an effort to carry the safety idea to the individual miner and, if possible, to his family at home.

We hold safety meetings at quite regular intervals. They are attended by the supervisory force of our company, I invite representatives of other operating companies within the field, and also certain leading citizens from the immediate community. These men usually give short talks on the safety work carried on by their particular companies, which has a tendency to give our organization something new, or at least the same story from a different viewpoint.

In giving the first-aid training to practically all of our employees, a number of men became particularly proficient and displayed a keen interest to further increase their knowledge and training. To maintain interest in accident prevention and better train these particular men, an inter-company first-aid meet is usually held during the summer months, the winning team being sent to the International First-Aid Meet. It has been our policy, in addition, to hold a mid-winter O'Gara First-Aid Meet, in which compete, not only men from our own organization, but boy scout first-aid teams that have been trained by our own men—interesting the boy scouts carries the idea of safety to the individual home and to the community.

Summarizing, it has been the policy of the O'Gara Coal Company, first, to sell the entire organization, from the highest official to the lowest employee, on the idea of accident prevention; second, to enlist the hearty cooperation of every employee; third, to place the responsibility for accident elimination on every foreman in the operating department; fourth, to analyze in detail at regular intervals, the results procured by these foremen; fifth, to maintain a constant interest in accident prevention not only at the mines and during the hours at work but also through the entire community.

The exact results of this safety program are difficult to measure. There has been a number of satisfactory accomplishments: during the ten-year period prior to the installation of this safety program, this company produced approximately 300,000 tons per fatality, but since this program has been in operation, the last three years, over 800,000 tons of coal have been produced per fatal accident.

We were able to operate from November 30, 1927, to February 26, 1929, without a fatal accident, for which we were awarded a Joseph A. Holmes Association certificate. During this period we produced 1,850,777 tons. We also operated from March 27, 1927, to September 21, 1929, without a fatal accident due to "falls of rock or coal," and during this latter period produced 2,735,551 tons of coal. These results have been accomplished only by the hearty cooperation of our entire operating department.

Discussion

CHAIRMAN HENRIE: We are now ready for any discussion.

WM. G. METZGER (Hudson Coal Co., Trenton, N. J.): What should determine whether a company is large or small?

SECRETARY HARRINGTON: A company that has 500 or more employees may be considered a fairly large company.

B. D. SHOVE (Oliver Iron Mining Co., Ironwood, Mich.): There has been considerable difference of opinion in the Lake Superior Mining district, on the value of first aid in preventing accidents, but I think we are going to have 100 per cent first aid training the first of November. However, in my opinion, if the amount of time spent in 100 per cent first aid training was spent in holding safety meetings, we would get further with our accident prevention work. I do not believe we can eliminate accidents by training men how to bandage injuries. I believe in having a number of well trained first aid men, but not in having all employees partially trained, and therefore, unable to do a good first aid job.

MR. METZGER: I don't quite agree that safety is the same in a small company as in a large one. In a large company there are many more men to educate, train, and supervise; and that, to my mind, is a problem which is very much harder than with the small company.

D. L. BOYLE (Associated Gas and Electric System, Johnstown, Pa.): The fellows that have the big companies (10,000 or 15,000 employees) can get the same results as those with a couple of thousand.

W. H. COMINS (National Lead Co., St. Francois, Mo.): I understand that Mr. Shove isn't sold on 100 per cent first aid training?

MR. SHOVE: Yes.

MR. COMINS: I agree with him, although last year our friends from the Bureau of Mines emphasized 100 per cent training.

J. J. FORBES (U. S. Bureau of Mines, Pittsburgh): I say to Mr. Shove and Mr. Comins that they wait until they have it. They are not sold on it. "Convince a man against his will, he will have his opinion still."

We don't feel (and I think I stated that emphatically at the last Mining Section meeting) that first aid is the panacea for all accidents. We never did. We do claim, however, that first aid training is a real aid in any company's accident prevention program.

We have on record plenty of evidence that first aid training has been instrumental in reducing accidents. A safety director of a large petroleum company, 2,500 men had been trained in first aid work over a period of something like two years, told me, "We have kept a very accurate record of accidents occurring to men trained in first aid as against men untrained, and found that the man who is trained in first aid has only one-fourth the chance of being injured as against the man who is untrained."

The vice-president of a large coal corporation in the south made a statement at Cincinnati, at the American Mining Conference, that that ratio is eight to one. To date there has been about 350 large coal, metal and petroleum companies throughout the United States that have ordered their employees trained in first aid; all of the letters that we have received are favorable.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): About Thanksgiving or Christmas time all our men will be 100 per cent trained. I don't think first aid is a panacea, but it should be a benefit to a community.

C. A. MACDOWELL (Pittsburgh Coal Co.): I believe I was one of the first to take up 100 per cent first aid training. I have advocated 100 per cent first aid training since that time, 7 or 8 years ago.

I am very much in favor of the new idea of the Bureau of Mines, to train key men properly and let them train the other workers, even though it takes work to do it. Is it worth while? I say yes, if you keep it up.

You must not think that first aid training is going to reduce your accidents. You must not consider that any one activity in accident prevention work, will reduce your accidents.

We have what is termed a movable first aid station in each mine, within 2,000 feet of every worker. On the outside of each station, on the clearance side, is a green light. In the rear of the station is a white light, and as employees travel to their working places, the green and white reminds them of safety.

ROBERT H. SEIF (New Jersey Zinc Co., Franklin, N. J.): Mr. MacDowell has said that we don't agree on how safety work shall be done. I have jotted down a few points on which we all seem to agree.

First, The humanitarian or sociological view of accident prevention has given way to the economic view, that safety is good business.

The second, that a safety code is essential to good safety work.

The third, that the maintenance of these standards and the responsibility for accident prevention falls upon the foreman or the boss.

Fourth, while not perhaps directly mentioned in any paper, safety engineers too often have conflicting interests; they are charged with safety work as a side line in connection with other work.

MR. STOCK: Is first aid training done on company time or the men's?

MR. FORBES: I think at least 95 per cent of the training is done on the men's time.

JOHN LYONS (Ziegler, Ill.): We had approximately 130 injuries before 100 per

cent first aid training started in our mines. By the time we were half way through the training course, accidents had dropped to 85. We don't believe that the reduction was entirely due to first aid training, although we give a lot of credit to it, for our first aid meetings were also safety meetings.

CHAIRMAN HENRIE: Mr. Hayden brought out an interesting point when he said that they had more fatalities or more injuries due to highway accidents to employees, than they had on the job. It seems that we are rapidly getting to the point where a man will be safer while at work in a mine than he will in his home and on the highway. This is an actual fact, not only in one company, but in several companies.

I was somewhat astonished last year to find that we had 232 accidents off the job, highway accidents, home accidents, street accidents involving lost time, against 72 accidents on the job. In other words, we only had one-third as many accidents on the job as our men had off the job. If many of us had similar statistics, we might have a slogan that the miner is safer in the mine than he is on the highway or around his home.

Attitude of the Bureau of Mines

SECRETARY HARRINGTON: I want to try to clear up a little misunderstanding concerning the Bureau of Mines and its attitude towards first aid training. The Bureau of Mines does not now, never did, and never will say that first aid training is the only type of safety work which should be done in or around mines.

The Bureau of Mines does advocate first aid training; we know that first aid training is of benefit in accident prevention work. We feel, in fact, I think we could prove that due largely to the training work which has been done by the Bureau of Mines during the past seven years in connection with first aid, at least 200 lives are annually saved in and around mines in the United States.

I think, we are going to get no place by clinging to the humanitarian point of view. Until we put accident prevention on the cold blooded dollars and cents basis we are going to have very little safety in or around our mines. I would like to call your attention to a paper which was read last week at Wilmington, Delaware, by a Mr. Heinrich, before a meeting of the Industrial Accident Associations of the United States and Canada.

He claims accidents are costing the people of the United States upwards of five billion dollars per year; a large portion of those accidents involve no compensation. He claims that he can go into almost any commercial organization, and show that accidents which do not result in an injury cost the company practically as much, and in some cases, much more than the accidents for which compensation is paid.

CHAIRMAN HENRIE: I will ask Mr. Dunbar now to take the chair and proceed with the Question Box.

CHAIRMAN DUNBAR: The question is "What is the relation of a man's education or intelligence to his liability to accidents? In other words, is an uneducated man more liable to an accident than an educated man?"

Mr. Rush Hosler was to lead this discussion, but I believe he is in another meeting, and I have called on a pinch hitter who has had a number of years' work along educational lines in the mining industry, my friend and co-worker, Bill Duncan.

WILLIAM DUNCAN: Those who have studied men have arrived at this conclusion: a man acts as he does when he thinks as he does. In other words, to be as a man thinketh, so he is. Psychology also tells us that there are only three ways in which the human being changes: First, in knowledge—he can increase his knowledge; second, he can acquire skill—motor and intellectual skill; third, he can change his ideals. Those are the only three points in which an individual can be changed.

We define education as that knowledge, skill, and experience which enables a person to solve life's problems successfully. If a man has additional skill, additional

knowledge so that he can forecast the future and the results of his actions; he will not knowingly or willfully risk life or limb in those practices which result in catastrophe to himself and his family. So we believe that educational methods, first aid, foremen's training classes, the instruction and supervision given by mine inspectors, foremen and others in the mining industry, will result in lessened accidents.

It may be true that your intelligent man, your educated man may do things which result in a personal injury, but the man who did not have the education would have probably made a great many more mistakes.

I call your attention to the fact that no muscular action, except those so-called involuntary actions, can take place unless the man thinks. The brain center must act first before the muscles can react. Therefore, the education that you give a man, the light upon what the results of his action will be, results in less accidents in the industry. Our safety efforts and our inspection forces are charged with calling attention repeatedly to those in the industry and those along life's pathway, that they must look to see the results of their actions.

In industry, as on the streets, we can't put a policeman at every corner to guard us from danger. We must be our own safety men. A child, must be taught how to cross the street safely, whether a policeman is there, and whether there is a light at the corner.

It is said by those who should know that a man who is absolutely honest, who is loyal, and who has courage, will not fail to be a success in any undertaking. Many of us, however, are not absolutely honest. In our classes we teach that there are 76 pounds of coal to the bushel, and yet on an operating basis, if a bushel doesn't weigh 100 pounds, the man who is responsible loses his job. To practice the golden rule in accident cases is like telling you that you need the multiplication table to plan a steam turbine. You must know how to meet your fellow men; get their loyal support—let them know that you are for them and not trying to feather your own nest by bringing yourself into the limelight, if you are to get the cooperation that will reduce accidents.

An Argument that Convinced Them

CHAIRMAN DUNBAR: I am going to ask Mr. Roy V. Hersey of the Nevada Consolidated Copper Mining Co., if he will talk on this question.

MR. HERSEY: There are various ways in which we might educate workmen; one of the best ways, I believe, is to show workmen you are interested in their welfare just as much if not more than you are in the welfare of the company. Convince the men that you are sincere, that you want to help them; and that you want to help their families.

You can convince men that you want to help them. I wanted to introduce the Sankey foot guard in certain work. The idea was ridiculed by the management and by the men, but I called a group meeting anyhow.

I asked every third man how much he thought his foot was worth. The price ranged anywhere from \$5,000 to \$1,000,000, and in the end, they wanted a job for life. I told them that the State said your foot is worth so much money; you can't get a nickel more. Furthermore the company is not obliged to provide you with a job; your possibility of securing a job from some other company would be rather remote.

Then I brought up the question of the guards.

Out of 85 men there was only one who questioned the value of the guard. The plan was successful and no doubt will be in operation as long as our mines work. Unless you convince them of the benefit to them rather than to the company, you will never get very far with educational work.

CHAIRMAN DUNBAR: I request Mr. Dodge to speak on the subject.

Relation of the Individual's Education or Intelligence to His Liability to Accident

By CHARLES H. DODGE

Safety Engineer, The Buckeye Coal Company

We are all agreed that a truly "educated" man is self-disciplined, he is trained and skilled in his particular profession or work, he is well informed, can observe accurately, reason justly, and express himself clearly.

A man's degree of intelligence is rated by his capacity to know or understand; has he an active mind, does he have ability to reason, is he quick sighted, and is he sensible? What bearing do these characteristics have on his liability to accidents? The most direct possible is our answer.

This discussion is to be limited to the coal mining and metal mining industry. Many of our problems are paralleled in other industries to which comparative references can be made.

Because the greater proportion of our men are employed underground, we are apt to give most attention to this group of mine workers, although the safety of both the outside and inside receive their fair share. The frequency and severity of the underground accidents are usually somewhat higher than those of the outside plant.

A study of accident statistics reveal a continuance of the major causes for accidents during 1930; falls of roof coal and slate account for 54 per cent, haulage 17 per cent, explosives 11 per cent, explosions 4 per cent, electricity 4 per cent, and miscellaneous 10 per cent.

For purposes of our safety education does such a table tell the story? What part of the 54 per cent of accidents due to falls of roof coal and slate occurred at the working face; what part along the haulage roads; how many of these accidents occurred during the making of falls; while loading coal; how many of these accidents reported as falls were really cases of miners pulling this material over onto themselves; which were traceable to faulty timbering, improper trimming, derailments, additional hazards developed by mechanical loading methods, undue haste, faulty supervision, poor judgment, natural hazards, physical handicaps of the workman, lack of or improper equipment, carelessness, or inadequate inspection.

It will be necessary to mostly rely on individual experiences and plant records for analyzing the relation of the individual's education or intelligence to his liability to accident.

First of all, is not the workman's attitude towards safety a fundamental factor in determining such liability? A workman or official who is self-disciplined, conscientious in the performance of his duties, and actually feels a sense of responsibility, not only for his own safety, but for the safety of those around him is not among those overloading the labor market of today, although we are glad to believe that this type of American miner is on the increase.

Education in the sense of having completed the prescribed course in any college or school, or successfully passed the state mine examinations, or has labored at any or all of the underground occupations does not indicate that the individual is qualified as a safe workman. Character may not be the exact word but it approaches the summation of what we would demand of an employee before elevating him to the degree of a "safe workman".

We have noted, time after time, that it is the so-called safe workman who gets hurt. Whose responsibility is it that such men get on the injured roll? If the attitude of the company and management is one of known militant, aggressive and determined policy towards the promotion of the employees' safety then it also rests with the worker and foreman to take advantage of such a condition.

The progressive employer picks his prospects with an eye to ability, intelligence and attitude towards safety. He does not want a weakling neither does he want a juggernaut. It is not always necessary to release difficult workmen to the next company who will hire them. More interest in their men, clear cut explanations, a saner balancing of capabilities are a part of management's program for its foreman. Education is never ending.

Of all the tried and proven methods for promoting safety of men, discipline is paramount. Without adequate inspections, understood and appreciated supervision and deserved censoring there will be little tendency to strengthen the miner's respect for his own safety and that of others.

Can we divide the classes and types of labor into groups and say that this or that group, on a basis of intelligence, of education, is more liable to accident than another group. Such a division will be limited for, if we exclude any mine labor that can be classed as mentally or physically unsound, we have removed but a few and the large majority will be found to require other yardsticks with which to measure their liability to accident.

Certain departments have definite physical and mental requirements. For example, motormen should be experienced brakemen and brakemen or snappers should be exceptionally alert and agile, physically and mentally; trackmen should be conscientious and skilled in their work, requiring not so much agility as strength and efficiency in track laying. In every case the efficiency and safety of one class of work is bound up in another.

A knowledge of the hazards of a particular occupation must be had before any fundamental rules can be drawn up for the promotion of safety in that occupation. This is a part of the workman's safety education. It is true that extreme care and forethought are not always exercised in the setting up of certain rules. It is argued that placing limitations in rules kill the spirit of such rules, although it has been proven that, unless such rules made specific and limited to the field wherein they apply, there is a loss in the enforcement of other rules as well as the rules in conflict.

The safety education of the employees is better attained when there is a clear understanding throughout the organization as to the purpose and scope of the safety rules of the organization. It is unfortunate that instructions issued verbally by the executive after passing through the hands of several officials may reach the workman for whom it was intended in a more or less garbled condition.

It is not necessary to set up an elaborate safety organization to accomplish the desired results. The closer the contact between the safety director, safety engineer, inspector, and the foremen, and through them to the man at the working face the better the safety appeal can be made, methods for accident reduction be devised and installed, and the truer the picture of local accident prevention efforts be painted. At the same time, without a safety organization the mine will be seriously handicapped in this phase of its operation.

The plant safety organization, whose purpose is to educate and instill employees with the spirit of safety and provide ways and means for reducing occupational and natural hazards should be headed by an executive safety committee comprised of department heads. These men receive, digest and formulate information for plant and personnel improvement.

Safety meetings of the mine officials at regular intervals permit organized discussion and action on the local accident records, comparative safety information, and vital safety topics. This is the safety school for foremen. These men should leave every one of these meetings with a safety message for their men.

Safety rallies for all employees, for their families, for the schools, for the various mine departments, all hold an important place in the plant's safety schedule. Safety education and safety spirit can receive a strong impetus from such meetings. To

properly program such rallies is a constant problem, since safety topics can so easily be limited to repetitive, dulling speeches, in place of attractive, inspiring and educational rallies. If only one safety resolve is brought home to each man attending, the safety rally has accomplished its purpose.

Department or section safety committees are not only additional ears and eyes for safety through their inspections but can also be builders for the safety morale of their departments.

The safety director, engineer or inspector should never pass up an opportunity to further the safety education of the individual or the organization. Being in direct charge of safety meetings, rallies, inspections, bulletin board service, etc., and advisor to the management, he cannot afford to neglect his own safety education, and he must be ever ready to enthuse others with safety promotion.

Recognizing the need for enlarging the scope of their courses to meet industrial needs for safety leaders, colleges are offering subjects in safety engineering and giving safety greater prominence in other of the regular courses. So, too, are the employers of large numbers of workers recognizing this need and are employing men to devote their time and energy to this phase of industry.

It is disappointing to learn that during the past several years there has been an increase in the fatality and injury rates for the coal mining industry of the United States. According to statistical information furnished by the Department of Commerce, coal mining is the only large industry in the United States which has made no progress in the reduction of fatality and injury rates. Fatalities and injuries in our industry have increased where other industries have shown amazing decreases.

We cannot alibi this condition. On a basis of exposure or number of men employed, transportation is the most hazardous of mine occupations, producing the most accidents per shifts worked; this occupational rate is not on the decrease. Railroads have made, as you know, enormous decreases in accidents during the past decade both to employees and passengers. How? By safety campaigns, insistent demands by the railroad companies for safety in the work, and the elimination of many of the causes for accidents.

Mining is similar to other industries in that it requires management's and their officials' constant vigilance, and the steady, never-ending presentation of the safety appeal to their men. If this safety education is to be maintained and progress ensured within the organization.

With the complete story of each accident at hand, the student of accidents is impressed with the fact that the human factor plays the important role in the majority of cases. Among the human factors can be listed accidents due to dulled mental or physical condition of the victim caused by lack of sleep, home worry, dissipation; undue haste towards end of shift; lack of cooperation between workmen or officials; ignorance of existing conditions.

The safety education of ourselves must be given consideration before we can expect to direct or enlist the efforts of others. Who has been at fault in the past, management, foremen, or workers? None are exempt. More and more attention must be given to each of the three. There may be a natural or economic limit to our safety progress but none will boast that the barrier as yet has been reached.

ADJOURNMENT

Thursday Morning Session
October 2, 1930

H. C. HENRIE, Chairman
Phelps Dodge Corporation, Bisbee, Ariz.

The fourth session of the Mining Section convened with Chairman H. C. Henrie presiding.

CHAIRMAN HENRIE: The first topic for discussion this morning is "Problems of the State Mine Inspector." We have with us Mr. W. H. Glasgow, Secretary of Mines, State of Pennsylvania.

Problems of a State Mine Inspector

By WALTER H. GLASGOW
Secretary of Mines, Commonwealth of Pennsylvania, Harrisburg, Pa.

The basic principles of the mining laws of the Commonwealth of Pennsylvania are set forth in the preamble to the Acts covering the operations of both anthracite and bituminous regions, to wit: "To provide for the health and safety of persons employed in and about the bituminous (anthracite) coal mines of Pennsylvania and for the preservation of property connected therewith."

These laws have been compiled, from time to time, from the records of the best practice known since mining has been recognized as a scientific pursuit, and cover in detail all phases of mining. It can be truly said that they constitute in reality an authoritative textbook on safety in this great industry.

The enforcement of these laws is delegated to the state mine inspectors through the administrative office of the Department of Mines. These inspectors are appointed by the Governor from a civil service list and are endowed with police powers. As the powers granted are very broad, responsibilities are accordingly heavy and naturally problems of a numerous, varied, and at times complex nature arise to confront the inspector in the performance of his duties, as each matter of omission or commission in conflict with the mining code sets up a definite problem.

Should the inspector interpret and enforce literally the laws as set forth in the mining code, his duties would be very perfunctory, but the legislature has issued mandatory instructions that the inspector shall exercise a sound discretion in the performance of his duties under provision of the Act. It is this discretionary power granted to the inspector that creates a problem for him when there is a departure from the standards as set forth in the mining code.

General Rule No. 1 of the Anthracite Mine Law, for instance, breathes generously of the spirit of the makers of this law when it gives utterance to these words:

"The owner, operator and superintendent of a mine or colliery shall use every precaution to insure the safety of the workmen in all cases, whether provided for in this act or not."

Article XX—Section 1—Bituminous Mining Law says:

"The inspector shall exercise sound discretion in the performance of his duties under the provisions of this Act."

The ideal mine inspector is not only to comply with the law but go beyond the law to the extent prescribed by law, and the problems arising in his mind to be solved will be determined by the intensity to which he gives himself over to the task of assuring safety and the clearness with which he sees the things to be accomplished.

The inspector must use a proper sense of proportion and take into consideration

the laws of probability and chance in regard to any violations of the code. He must enforce the spirit of the law from a sound and practical standpoint.

A mine may be in such a condition from poor ventilation, bad drainage, faulty timbering or an inadequate supply of working materials that operations should cease until the defects are remedied. In closing down this mine practically all employees will be idle and in all likelihood there will be little opportunity for them to secure other employment with the result that suffering will bear heavily on their families; also the financial structure of the company may be in such a condition that they are unable to carry on a defined program for betterments. What shall he do? Close down the mine or allow it to operate by spreading over a period of time the improvements that are necessary. It may be this particular mine is generating gas and is of a dry and dusty nature. The coal dust may not be treated or if treatment is applied it may have been done in a very negligent or incomplete manner, then, indeed, the problem does begin to carry weight. Against the picture of unemployment and bankruptcy he can visualize a catastrophe with all the horror that attends such occasions.

The human element of the mine, both in regard to the management and the employees, is another problem with which the inspector has to deal constantly.

"Foremen should be selected not only because of their knowledge of mining and the mining law but also their strong, upright, law abiding characters—they should be examples of truth, honesty, courage and diligence. These characteristics to be so marked in their lives that the employees will become impressed and influenced by them.

The foreman must not only be an outstanding man morally, but a man who knows mining and has executive ability. How is the work of a mine inspector related to this subject of foremanship?

This year, 1468 men submitted themselves to be examined by the State Mine Inspectors and their boards for mine foremen's and assistant mine foremen's and fire bosses certificates. Of this number 923 were successful.

The State Mine Inspector can, and should by exercising his rights under the law on this board, see that the mines are supervised by the type of men who will be helpful to the industry as a whole. To possess a foreman's or assistant foreman's certificate now is not a legal requirement, but you can find few if any who do not possess them as the coal companies are showing a fine spirit and a proper conception of this work by employing no one who has not given ample evidence before one of these examining boards that he has the necessary legal qualifications.

The State Mine Inspector has no greater responsibility than that of maintaining a high standard for the men whose duty it is to see that proper supervision is given to the mines."

On account of his acquaintanceship and the fact that he is the dominating member of the Board that recommends the granting of certificates of competency to applicants that sit for examination as mine foreman, assistant mine foreman and fire boss, he is constantly being asked by the operator to recommend men for official positions in connection with the mine, and also by the men to recommend them to the operator for any positions that may be vacant. A person so recommended may be a failure in one organization, yet make a success with another. Working conditions, temperament of supervisors, living quarters, wages, and various other matters enter into the question of whether the connection will be satisfactory to all parties concerned. It is a problem with the inspector to reconcile these different factors. Also, a careless, penurious and arbitrary attitude on the part of the management coupled with a careless, resentful and stubborn spirit on the part of the employees cause many problems to arise to which the inspector must give attention.

How long and how far shall the inspector carry the responsibility of a mine while necessary recommendations that he has submitted are being carried out?

How long shall he continue to allow workmen who are careless and indifferent to the mining law to continue their vocations in the mines?

How far shall he insist on capital expenditures for necessary betterments?

How long shall he tolerate a management that has shown it is utterly incompetent to operate a mine?

Shall he insist on jail sentences or be satisfied with a nominal fine and reprimand for law violations that fortunately cause no injury?

Shall he insist on punishment to persons who are injured through violating the law? These are but some of the problems that are constantly confronting the inspector.

Another problem that vitally affects the inspector personally is his conduct in matters affecting rescue and recovery operations after a mine fire or an explosion. His responsibility here is very great indeed, for custom has set forth that he shall be in complete charge of these operations. The procedure must be very carefully planned and carried out. Subordinates and assistants must be chosen with extreme care. Orders must be precise and clearly given. There must be no doubt or question in this respect. Decisions must be made without delay and in every case must be sound, for any indecision or delay might lead to immediate loss of life either on the part of those entombed or to those who are engaged in the rescue work, or both. His problems in an affair of this kind are many and are very burdensome.

That the responsibilities and problems with which the inspector is constantly confronted have some effect on his mental and physical being is borne out by the fact that the score of inspectors who have passed away during the last three decades, with very few exceptions, have died suddenly, without any protracted illness.

CHAIRMAN HENRIE: Our next speaker on this subject is Mr. John F. Daniel, Chief of the Department of Mines, State of Kentucky.

Problems of the State Mine Inspector

By JOHN F. DANIEL

Chief, Department of Mines, Lexington, Ky.

We, in Kentucky, have been striving for the last few years to make a reduction in our fatal accident record. We haven't succeeded very well, but we have done some good.

In the year 1928 we mined approximately 63,000,000 tons of coal and had 196 fatalities. In the year 1929 we mined just a little short of 62,000,000 tons of coal and had 200 fatalities. Out of those 200 fatalities, 118 or 59 per cent were due to falls of roof of coal, 47, or 23½ per cent were classified as haulage accidents, which makes a total of 82½ per cent of our accidents which were at the face or near the face, and on our haulage roads. The falls of roof and coal average is not far from the general average throughout the country.

Most officials believe in boosting any kind of publicity that recommends itself as effective, whether it be in the form of weekly, semi-monthly or monthly safety meetings, for the purpose of airing the various accidents that have occurred in and about the mines since the previous meeting. Many approve strongly of the posting of the safety bulletins of the National Safety Council, Elliott's Service, and like bulletins at frequent intervals. On the other hand, some officials, and not a few of the rank and file, are only lukewarm when the question of accidents or the methods for their prevention are brought up for discussion.

Safety bulletins have frequently been ridiculed and given no thought whatever by the men they are designed to help. We are thus brought face to face with the question of the best method to pursue in order to derive the most benefit and secure the highest degree of safety.

I will give a few of the details of our Kentucky plan to bring fatal accidents before the entire personnel. Being in a position to analyze a great many accidents from month to month, a number of which result fatally, I began, in December of

1928, to make an inquiry into the manner in which the various companies throughout Kentucky were bringing the question of accidents to the attention of their employees.

An inquiry was sent to the mining department in several of the other States asking what was being done in bringing lost time and fatal accidents to the attention of the companies in their States. After considerable thought it was decided to publish a monthly report covering only the fatal accidents occurring in the State. This report was sent to all the operating companies and safety directors throughout the State, and to various persons.

The reports covered each fatality, giving its cause in detail, together with the recommendations offered by the district inspector who investigated the accident. It was my purpose that all concerned might profit by reading the reports, and that these particular types of accidents would be eliminated as far as possible. This report was originally similar to that published by the Alabama Department of Mines, from whom the idea was partially conceived.

A report has been published monthly since February 28. We have received many inquiries for additional copies, and understand that they are either discussed at the regular safety meetings, or placed on the bulletin boards of practically all the companies throughout the State. In addition, a majority of the companies receive our bulletins and circulars which are submitted for discussion at the safety meetings and placed on the mine bulletin boards.

This is just part of our program to bring fatal accidents to the attention of officials and workmen. Some of our companies get as high as 600 copies. They think it worth while to distribute one of those copies to each of their employees.

CHAIRMAN HENRIE: We have with us Mr. W. B. Hillhouse, Chief Mine Inspector of the State of Alabama, who will also talk to us on this subject.

The Problems of a State Mine Inspector

By W. B. HILLHOUSE

Chief, Department of Mines, Birmingham, Ala.

In Alabama there are in regular operation 230 coal mines, which are opened on 30 different coal seams, the openings being drifts, shafts and slopes, the latter predominating in number. These seams vary in thickness from 20 inches to 7 feet, and lie from horizontal to an inclination of 65 degrees. The strata lying directly over the coal seams vary from a soft shale to a firm sandstone. Methane gas is given off in 40 per cent of all operations, and ranges in quantity from 20,000 cubic feet to 1,400,000 cubic feet every 24 hours. Some of the mines are naturally wet, but in the dry mines the application of water or water and rock-dust is practiced for the suppression of coal dust. Rock dust when used is applied in quantities to render the coal dust harmless.

In Alabama, as in other coal producing states, the paramount problem, in so far as the State Mining Department is concerned, is the preservation of human life and limb. In the pursuit of this end, we also endeavor to help constructively with suggestions for the better physical and economical mine operations. Consistent with safety, we are always careful to avoid suggestions entailing unnecessary expense. It is quite gratifying how the mine officials have come to receive and act upon these. This is, of course, as it should be, because certainly we are all "in the same boat."

Cooperation must, of course, always exist among all persons having to do with the operation of the mines, as otherwise good results cannot be attained. It goes without saying that this is just as true in mining as it is in other lines of human endeavor.

Perhaps our Alabama Mining Department has an advantage over many others of like nature in that its activities are confined to eight counties with the city of Birmingham which is headquarters for the State Mining Department as well as most of the mining companies in the center of that area. By reason of this location close personal contact exists between the mine managements and the head of the State Mining Department. Such close contact brings about frequent and friendly consultations covering the many features of the work, and results in continuous and friendly association of great benefit in every way to our mining industry. In like manner the Associate Inspectors make their examinations in a spirit of friendliness and helpfulness, and not in a spirit of antagonism or criticism. Working from both ends in this manner, the spirit of cooperation which exists all along the line goes far to promote the safe and efficient operation of the coal mines in Alabama.

In Alabama, as in other coal producing states, the principal sources of injury come from roof falls, ignition of gas, transportation, and electricity, and the substantial reduction of accidents from these sources is regarded, of course, as our outstanding problem.

Roof falls are responsible for approximately 45 per cent of the mine fatalities throughout the United States. The Mining Department of the state of Alabama has been and is endeavoring to reduce the accidents from this particular mining hazard. Realizing fully that the visits of the State Inspectors to individual working places (where 80 per cent of these accidents occur) are not, and in the natural order of things, cannot be made often enough to render much direct aid, a special educational campaign for the reduction of accidents from falls of coal and roof was inaugurated.

Wide distribution of circular letters was given. These letters were posted on bulletin boards or other conspicuous places at the mines. They dealt entirely with the hazard from coal and roof falls, and created such great interest as to bring about much beneficial discussion amongst the miners. Following these letters, men prominent in mining affairs were induced to address meetings at the various mines. They confined their remarks to that subject alone, stressing the importance of the individual miner always exercising the necessary care to take down all loose or overhanging material, or promptly place necessary timbers where and when needed. Cash prizes were awarded mine officials and State Inspectors for the best essays on "Prevention of Accidents from Roof Falls."

Great interest was created in this manner, and it still exists. The very satisfactory results achieved bespeak the decided effectiveness of our efforts. Fatalities from roof falls in Alabama mines since August, 1927, at which time the campaign began, show a very gratifying decrease compared with preceding years. A lower fatality rate is now shown, based on tons mined, than the average for the United States. In all mines systematic timbering rules should exist, and be enforced whether the roof is good or bad, and independent of the timbering rule, the miner should place additional props where the roof conditions warrant it.

The following figures show the wonderful effectiveness of the drive:

Year	Fatalities	Tons mined per fatality
1924	39	502,973
1925	42	483,920
1926	49	438,955
(X) 1927	61	330,999
1928	28	644,861
1929	28	657,711

(X) Campaign on Roof-fall fatalities began August 15th, 1927, and prior to that time 48 lives had been lost during the year.

This problem is far from solution, but if the adoption of systematic timbering becomes general, with closer supervision of roof conditions by the foreman through

daily or more frequent visits, and greater care on the part of the miner himself, much more can be accomplished.

The Mining Laws of the state of Alabama stipulate a quarterly inspection of each coal mine, but going beyond this requirement, the Inspection Department has for the past three years made monthly inspections of all gassy mines. With a period of three months between inspections, many things can happen in many mines which will lead to serious trouble. If such mines, however, receive monthly inspections, sub-normal conditions can more easily be found and the remedy applied before an accident happens. We find that our extra precautions of this kind frequently find and bring about removal of hazards which otherwise would exist for an additional 60 days.

Adequate ventilation distributed to the various mine sections and into the working faces is primarily, of course, the solution of the gas problem, and the more frequently we have assurances of such condition through our examinations, the more assured we feel regarding the welfare of the workmen therein. Frequent air readings and analyses of the mine atmosphere go a long way toward giving this assurance. I venture the opinion that if the State laws required larger inspection forces, mine accidents of all kinds would decrease in proportion.

In the year 1927 there were in use in Alabama coal mines approximately 3,000 electric cap lamps. At this time we have 9,135 of these lamps in use. We believe this great increase has played its part in keeping down the number of casualties from gas and other causes.

Attention is called to the number of gas casualties which took place both before and after the program as outlined above was put in effect.

Year	Fatalities	Tons Mined	Tons per fatality
1924	3	19,515,935	6,538,644
1925	66	20,408,656	309,222
1926	45	21,508,812	477,973
1927	3	20,190,926	6,730,309
1928	0	18,056,116	Infinite
1929	12	18,415,914	1,534,659

Underground transportation of coal presents a problem in safety difficult to combat. The electric locomotive, now in almost universal use, in hauling long trips at high speed, presents a hazard which did not exist in former days. Strict rules and regulations, with necessary discipline, must govern this feature of mining if casualties are to be further reduced. Practices, such as pushing trips, back polling, flying switches, coupling cars while in motion, jumping on and off moving cars, and many others, must be stopped, otherwise injury is sure to result. Ample clearance must be provided overhead as well as between the road and the ribs. Shelter holes sufficiently close to each other should be provided, and at convenient points so that men, when traveling the haulage roads, may easily and quickly find safety from passing trips. It is obvious that the responsibility of haulage safety depends to a great extent on the employee himself. Strict supervision and rigid discipline on the part of the underground officials are also very necessary.

During the past 20 years electricity has taken a firm foothold in mine operations in Alabama, and due to the numerous thin seams, the ever-present and daily hazard is great. Much of our trolley wire is unguarded. When electrification of Alabama mines began, 250 volts was not considered a particular hazard. As a result of this, many miles of unshielded trolley wire extend through our mines. To require shielding of this wire now would entail much expense, and without laws would be difficult to accomplish. In some of our newer mines, however, trolley wire shielding is practiced, where the suspended wire is less than 6 feet above the rail. In the older mines we have been able to secure shielding of trolley wire at crossings, side-tracks, and at other points where men pass under in going to and from their work. Contrary to the former belief regarding the hazard of 250 volts, practically all of our electro-

cutions occur from some portion of the body making contact with the trolley wire carrying that voltage.

Early in this year an investigation was made for the purpose of selecting the best insulated shoe for underground workers. Samples were submitted by various manufacturers, and selections made. Many stores at the mines now carry this shoe in stock, and we are urging their use by the underground men. A similar investigation was made for the selection of an insulated cap. Samples of these have also been submitted by manufacturers, but no selection has yet been made.

For the purpose of presenting the manner in which mine accidents occur in Alabama, in a form easily understood by all classes of mine workers, an additional man who is a practical mining engineer was placed in the Chief Inspector's office in May of this year. His duties are confined largely to the investigation of accidents, going into details, and endeavoring as far as possible to place the responsibility where it belongs. Free-hand perspective sketches are drawn, which portray the accident just as it took place, and these are sent out in the form of bulletins to all the mines. If the accident was occasioned by a fall of roof, the position of the rock is shown prior to and after the occurrence. The positions of nearby timbers are shown, and the distances they are spaced apart are indicated. If the accident has resulted in electrocution, the wire or other equipment causing the fatality is shown. The details are likewise shown for any other character of accident. The causes leading up to each particular accident are shown, and warnings are given against a repetition of other accidents of a similar nature.

The sketches are distributed by the hundreds, and through the active cooperation of the mine managements find a conspicuous place on the mine bulletin board. While this practice has extended over only a short period, we feel that the display of the easily understood sketches proved to be a reminder to the individual who may be working under similar circumstances to those where the accident took place. If these sketches continue to be given the careful study and attention they warrant, we hope for further reductions of accidents.

In closing I would feel that an injustice had been done if acknowledgement were not made of the cooperation and assistance of the Alabama Mining Institute, the Holmes Safety Association, and the U. S. Bureau of Mines with the Alabama State Department in its daily problems.

CHAIRMAN HENRIE: We had another speaker, Mr. Lambie from West Virginia. Mr. Lambie, unfortunately has been called west on an inspection trip. We now have a few minutes for the discussion of these papers.

WILLIAM ROY (Hanna Coal Co., Ohio): I disagree with my friend, Mr. Harrington, when he says that safety work can only be successful when placed on a dollar and cents basis. Although I have only attended two sessions of the National Safety Council, ideals have been expressed that are far more important than costs. The National Safety Council may be instrumental in solving many problems in the mining industry; they certainly will, if ideals be higher than cost. I don't believe we think of cost when we see the hearse go by, followed by the dependents. I don't believe we think of cost when we see somebody leading a blind man.

Some four years ago we started what is now the Hanna Safety Campaign. We have forgotten about cost, and we have dealt with the problem from a human standpoint. At the start we had a 10 per cent penalty on base rates under the Ohio Compensation law, but today, in some instances, we have more than a merit rate 50 per cent, less than the base rate.

We have forgotten cost; reduced forces in order to give men steady work; and paid good wages. We can deal, therefore, with our men and get their cooperation in our safety work.

O. F. McSHANE (Utah Industrial Accident Commission, Salt Lake City, Utah): Isn't it necessary, to sell safety to the management on the theory that it is going to pay dividends? I can't conceive of any employer who would not take the cost

into consideration; I believe it is unsafe to approach an employer with a safety program unless we can show that a saving can be made. I believe that safety pays.

CHAIRMAN HENRIE: Mr. Clyde L. Lutton, Safety Director of the H. C. Frick Coke Co., will speak to us on the subject of "Protective Clothing in Accident Prevention Work in Mines."

Protective Clothing in Accident Prevention Work in Mines

By C. L. LUTTON

Safety Director, H. C. Frick Coke Company, Pittsburgh, Pa.

The use of protective wearing apparel by underground coal mine workers as a safeguard against injury from some of the inherent hazards peculiar to that industry and as an additional protection against omission of the human element to consistently function properly, thereby indirectly causing injury to certain parts of the body has, within the past few years, met with commendable success in some mining districts where it has been applied. Probably the greatest progress in the prevention of injuries by the practical application of this type of material has been made by the use of eye protectors (goggles) by underground workers while performing certain classes of work hazardous to the eyes from flying chips of material.

The major number of this class of injuries occur in connection with the use of hand tools—particularly coal picks, sledge hammers and axes when workmen are mining, dislodging or fracturing coal, slate or rock, and in connection with the installation of roof supports, haulage tracks, etc. The handling of material where mud, water, or dust is present also contributes to foreign bodies in eyes of workmen.

Some years ago, a mining company with extensive operations in western Pennsylvania were experiencing an alarming number of disabling eye injuries to employees. The majority of the alleged causes were attributed to flying coal from the pick, slate from hammers, etc. During the years 1924-1925, that company experienced a disabling eye injury accident rate (per 100 full time workers, two-year period) of 5.20 per cent. The management seriously considered the introduction of goggles for use by some classes of underground workers while performing certain classes of work known to be hazardous to the eyes. Wire screen and glass lens type goggles were selected and submitted to eye specialists for tests to determine the probability of their use affecting the vision of the wearer. Upon being informed that the use of goggles was not detrimental to vision, it was decided to conduct an extensive educational campaign among mine officials and workmen regarding the advantage of the protective features and their practical application. The campaign was conducted during the year 1926, and early in the year 1927, they were required to wear goggles when performing certain classes of work. The disabling eye injury accident rate experienced during the two-year period (1926-1927) was 1.42 per cent per 100 full time employees. During the two-year period (1928-1929), the use of goggles having been thoroughly established, the eye accident rate of 5.20 per cent experienced in the years 1924-1925 before goggles were used.

It is worthy of mention that notwithstanding the advancement of numerous theories that the wearing of goggles would expose underground workmen to other hazards and indirectly cause more serious or fatal injuries from other causes, during the four years of experience with the use of goggles underground, not a single injury from other causes was attributable directly or indirectly to the wearing of goggles, except in two or three instances in which wire screen type goggles with broken wires were struck by flying material and the ends of the broken wires punctured the flesh or eye of the wearer.

Other mining companies have experienced equally as favorable results in the prevention of eye injuries to underground workmen by the use of goggles.

Experience has determined that the wire screen type goggle is not as durable or as adaptable for mine work as the glass lens type goggle.

Regulations promulgated by the Department of Labor and Industry, Commonwealth of Pennsylvania, require the wearing of eye protectors by workmen exposed to eye injury in industrial plants that come within the jurisdiction of the department; but the wearing of eye protectors by underground coal mine workers has not been generally adopted notwithstanding the large number of eye injuries occurring to mine workers.

In the introduction of safety toe shoes to underground mine workers as a protection against injury from falling material in connection with mining, handling coal, slate, rock, and other classes of mine material, some difficulty was encountered due to the fact that a large percentage of underground workers in many mines wear rubber boots which were not, until recently, manufactured with safety toe protection caps. It required considerable time to be consumed in experimental work in connection with the manufacture of boots of this type that would provide maximum protection and not cause discomfort to the wearer. Many changes were made from time to time, until, thanks to the cooperation of the manufacturers—finally about two years ago, a fairly satisfactory safety toe rubber boot was obtainable. Since that time, their use has become more popular.

Records are not available to determine accurately to what extent the use of safety toe shoes have contributed to the prevention of toe injuries. There are, however, records of many instances where large pieces of coal, slate or rock, steel rails, mine timbers, and other materials fell striking the safety toe caps, causing no injury to the toes of the wearer; and in other instances, the toes were injured because of the great weight of material striking the toe cap, but the extent of the injury was undoubtedly mitigated. In some cases where the wheels of mine transportation equipment ran over the safety shoe cap, the toes of the wearer were fractured, but in all probability would have been amputated had non-safety toe shoes been worn.

One mine in western Pennsylvania employing approximately 600 full time workers, who had been equipped 100 per cent with safety toe shoes for the past 19 months, have experienced one disabling toe injury during that time.

The management of one large mining company with operations located in western and central Pennsylvania and northern West Virginia, were so favorably impressed with the protective features of safety toe shoes that they decided to require all employees exposed to foot and toe injuries to wear this type of footwear while at work. Their employees were finally equipped 100 per cent with this type of footwear in April of this year. The company experienced a reduction of 66 per cent in the number of foot and toe injuries during the first seven months of this year compared with the same period of 1929.

There is at least one feature in connection with the manufacture of rubber footwear adaptable for use by underground mine workers that should receive the attention and serious consideration of manufacturers, namely—the providing of non-slip material in the soles and heels. It has been conclusively proved that many injuries of a very serious nature, in some cases fatal, have been caused indirectly by persons slipping while performing dangerous work, especially when workmen are walking or standing on wet fire clay, or horseback formations, inclined rock, etc., due to the fact that after the corrugation of the sole and heels on new rubber footwear is worn smooth, they provide very insecure and treacherous footing. The heels wear off to about the same level as the sole under the arch of the foot in much less time than is required to wear the sole out under the ball of the foot, developing very unsafe footwear for mine work where safety of individuals necessitates surefootedness to insure the safe performance of certain classes of work requiring accurate, agile foot movements.

Safety toe leather shoes probably provide more protection from toe injuries, slipping, tripping, etc., and are more adaptable for use in dry mines than other types

of footwear. Rubber footwear should not be worn in coal mines where conditions are favorable for the use of leather. Excessive wearing of rubber footwear by miners develops fallen arches, tender feet, etc., because of the extreme flexibility of the material.

To the best knowledge of the writer, the introduction of the use of hard hats by underground coal mine workers is in its infancy. However, I am informed that they have recently been adopted for use in some coal mines and are extensively used in some metal and ore mines with very satisfactory results—there being records of numerous instances where fatal or serious injuries were avoided when falling material struck the hard hat of the wearer.

The hats are manufactured of a lightweight non-conductive material, designed to protect the head from injury from any blow that the neck can withstand, and when properly designed will not cause head injuries by compression if forcibly driven down on the head by falling objects.

The wearing of gloves in some instances provides protection; in others, they create a hazard. The practice of wearing loose-fitting gloves tends to increase injuries to persons handling material and those of the gauntlet type catch on projections and are particularly dangerous for use by workmen around moving machinery and transportation equipment. The wearing of wet, slimy gloves tends to increase injuries to workmen when using hand tools. The use of neat-fitting gloves, manufactured of proper material with close-fitting wrist bands, provides protection against many lacerations, abrasions and puncture wounds of the hands and fingers.

There is a demand developing among mine workers for a legging that will provide protection to the leg below the knee. It should be so constructed as to absorb shocks to which the leg is subjected from rolling or sliding pieces of strata, and from being struck against projecting materials.

The utilizing of adaptable protective wearing apparel in connection with the prevention of accidents to mine workers is largely a matter of education of officials and workmen relative to the protective features against injury from some unavoidable occurrence or omissions on the part of individuals.

Discussion

CHAIRMAN HENRIE: We now have a few minutes for the discussion of Mr. Lutton's paper.

E. A. STOCK (National Lead Co., St. Francois, Mo.): You stated that the screen goggles are not satisfactory underground.

MR. LUTTON: I said the screen goggle was not as durable or as adaptable for mine work as the glass lens goggle. Our experience has been that the men hold them up and carry them around in their clothing which causes the wires to break; and if they are struck by an object, when worn in this condition, the loose end of the wire may penetrate the eye.

We have had numerous glass lens fractured in the frame, but no fragments went into the eye. We have had several injuries that resulted from the wearing of the wire screen goggle.

MR. STOCK: Do you use a non-shatterable glass or laminated glass?

MR. LUTTON: No.

MR. STOCK: We find that the glass goggle gets dirty. The men do not find it convenient to carry a cloth for wiping them. So I find that the wire screen goggle is a mighty good goggle to have underground. We haven't had any accidents as described by Mr. Lutton.

MR. STOCK: I would like to know from Mr. Henrie and Mr. Lutton whether the safety shoes they are using have a metal cap or a composition cap in the toe?

MR. LUTTON: Composition in the leather shoe, and I think what we call a moulded rubber cap in the rubber shoe. I think rubber companies now manufacture safety toe shoes not only in booties, but in rubber boots.

MR. STOCK: From whom do you purchase them?

MR. LUTTON: Any of the rubber companies—U. S. Rubber, Goodyear, Goodrich.

MR. STOCK: Mr. Henrie, could you give us any experience on your shoes?

MR. SULLIVAN: The cap of the leather shoe, the one we had experience with the last five years, breaks down and gets soft after three or four days work in water. It is very hard to fit men with a safety shoe for they seem to hurt the foot back of the toes. The men take them home, stick them in the oven and soften the toes. Immediately the safety shoe is not a safety shoe.

The rubber bootie with the hard rubber toe, I think, is the best safety shoe. It stands up longer; but there is the danger of slipping on slippery rock, on ladders, and so forth. At the present time I don't know of another shoe that will stand up under water, particularly in metal mines.

An Improved Safety Shoe

ROBT. SKIP (New Jersey Zinc Co., Franklin, N. J.): With the cooperation of one shoe manufacturer we have developed what we believe to be the ultimate in safety shoes, furnishing ample protection not only across the toes, but for the little toe, and extending, to some extent, up the instep.

The toe does not soften, partially due to an added protection over the leather cap, in addition to the composition safety cap. Previously the men complained of the shoe pinching their toes. The manufacturer immediately produced a shoe that was from an eighth of an inch to three-sixteenths of an inch higher through the toe, which eliminated that difficulty. We honestly believe this to be the best safety shoe that is on the market today for miners.

MR. STOCK: May I ask from whom you purchase these?

MR. SKIP: Those shoes are sold, I believe, by Willard Davis, and manufactured by the Dayton Shoe Co., Williamsport, Pa.

MR. STOCK: I have attended these Congresses since 1926 and I say to newcomers that they can certainly gain a lot by attending them. Since we have attended these sessions, we have gone into physical examinations—we put that over; we went into this goggle situation—and we also put that over. There are two very important jobs that we have found out by attending these Congresses.

FRANK SCOTT (Insurance Department, National Lead Co., New York City): I would like to know whether Mr. Lutton, in talking about wire goggles, means the old type, large screen or the new type, are defective?

MR. LUTTON: We have made inspections in which we found 50 per cent of them defective.

CHAIRMAN HENRIE: I notice that Mr. Lambie arrived a few moments ago. Mr. Lambie, won't you talk to us for a minute or two?

R. M. LAMBIE (Department of Mines, Charleston, W. Va.): The greatest problem today is helping the operators get a little more money for their coal. Safety cannot be had at the price coal is being sold today. This may not be showing up at the present time statistically, but it is only going to be a short time before it will. The gravity of the situation calls for cooperation by all coal mining men, and a survey of the situation to find out what can be done, and do it.

CHAIRMAN HENRIE: We shall pass on to the Question Box. Mr. Dunbar, will you take the chair?

CHAIRMAN DUNBAR: The first question "What effect does the saving or curtailment of the safety program have on the accident cost?" will be discussed by Rush Hosler.

RUSH N. HOSLER (Penn. Compensation Rating & Inspecting Bureau, Harrisburg, Pa.): Any curtailment in your safety program is going to increase your accident cost and accident frequency.

CHAIRMAN DUNBAR: Does anyone else have anything to say on this question? A. A. BAWDEN (Pickands, Mather & Co., Ironwood, Mich.): I drew up rather a crude chart of our experience over a period of years, from 1912 to September 1, 1930. With a severity rate of 1.73 per cent, our compensation cost incurred in the year 1926 was \$44,410.38. With a severity rate of .57 for the first ten months of this year, it is reduced to \$19,999.70.

CHAIRMAN DUNBAR: The next question is "What are the qualifications of an efficient safety engineer?" I know some of you safety engineers will like to know what some of the operators think of you.

T. G. FRAR (The Consolidation Coal Co., Fairmont, W. Va.): The first great qualification, to my mind, of the safety engineer is that he should know what he is doing. If he is a safety engineer in a coal mining company, he should know coal mining. I have seen men from other industries brought in as safety engineers, and were lost, simply because they didn't know this work. Safety is simply knowing the proper way of doing things, and then doing them that way.

Perserverance is another great qualification; our engineer worries me more than all of the higher executives in our company. These two, to my mind, are the two great qualifications.

CHAIRMAN DUNBAR: I would like to hear from Bill McCoy, who is a State Mine inspector.

WILLIAM L. MCCOY (State Mine Inspector, Ingram, Pa.): I would also add executive ability for it is essential for a safety engineer to obtain the full cooperation of operating executives to insure the success of his safety program. He must also be able to educate and train men.

D. L. BOYLE (Associated Gas and Electric System, Johnstown, Pa.): If a safety engineer has the right personality, along with knowing his work, he can put his program across.

MR. MARTINSON: Personality, of course, is very essential. I made mistakes when I was just starting out. I was going to remake everybody in the organization of about 2,025 men; and gentlemen, I couldn't do it. I finally have adopted as my slogan, "You can catch a whole lot more flies with honey than you can with vinegar." I will try all sorts of schemes and methods to get a fellow with me.

CHAIRMAN DUNBAR: The next question reads: What is the real cause of accidents, and who is responsible?

R. A. MAIZE (State Mine Inspector, Uniontown, Pa.): Is the man who is injured responsible? No, not always. There are certain inherent hazards in the coal industry. Some say there are none, but I don't agree with them.

Statements have been made that 90 per cent of the accidents in mines are caused by carelessness. Immediately one thinks, "Well, John Smith was killed because he was careless;" but that is not always the case. Sometimes John Smith may be killed because I was careless; John Smith may be killed because the man who sits in the swivel chair out in the office, or the superintendent, was careless. The man is not always to blame because he was killed or injured.

CHAIRMAN DUNBAR: Since 42 per cent of the face accidents in a certain mine was charged to one assistant foreman, the management decided to remove that foreman. The foreman got a job as an assistant foreman at another mine, and went 18 months without a face accident. How could this foreman have 42 per cent of all accidents in a section, and go to another mine and run 18 months without a face accident.

An investigation showed that he could not get sufficient material of the right kind to properly protect his face, and, hence, had a large number of accidents. Furthermore, he was given the poorest kind of miners. He was discriminated against.

MR. HENRIE: In my opinion, a careful study of the causes of accidents leads to the conclusion that few can be classified as the fault of injured employees. Let's assume that a foreman has issued instructions, but his instructions are not carried out, and the man is killed or injured. Apparently the foreman is clear, but he is not. He should have discipline.

Several years ago we had a case where the boss, in visiting a place early in the morning, told a man to put a plank over an opening. He visited the place again at two o'clock, and said, "Well, boys, you better get those planks down, somebody is going to fall in there." In going off shift a man fell from one floor to another and broke a leg. The accident was classified as the fault of the boss. Why? He should have had enough discipline on his rounds so that his orders were carried out.

We have had men injured who obviously should not have been working in the mine. Some have been old-timers whose hearing or eye sight had failed. Primarily, such a man is not to blame; but the company, if they are going to keep that man on the payroll (and if he is an old-timer, they should) should put that man on some work in which he is not a hazard to himself, and to his fellow workers.

A. H. TRESTRILL (Pickands, Mather & Co., Caspian, Mich.): I want to cite a case in which the night shift sliced down, and a part of the slice was held up by a pillar. In the morning when the mining captain gave instructions, he particularly cautioned two men not to get under the cave. The men started to put up the taking up set before drilling, stepped under the cave and with the first blow struck, the cave dropped and a man was killed.

There were two sources of responsibility in this case. The mining captain had discipline, but if he had taken the precaution to blast the loose one immediately, instead of waiting, as he had told the men, the accident would have been avoided. Also the man who was killed was having trouble at home; his mind was on other things. When a man is having trouble at home, you have a problem on your hands to get his mind on the job.

SECRETARY HARRINGTON: I have made an analysis of the attendance at our meetings. We have 165 in coal mining, 49 in metal mining, and 89 which might be termed miscellaneous, apply to both coal and metal. Of the total, 102 are strictly operating men—a figure which I want to impress on you—102, at least, were operating men, from presidents down to fire bosses. There are very few more safety men than there are operators. I have not made an analysis of the 89 miscellaneous.

The total is 303. This is the biggest attendance, in my opinion, that has ever been at the sessions of the Mining Section of the National Safety Council.

CHAIRMAN HENRIE: I want to introduce to you the officers for the coming year. Our Chairman for next year is Mr. Rush N. Hosler. First Vice-Chairman, Mr. Comins. Second Vice-Chairman, Mr. Lightfoot. Third Vice-Chairman, Mr. Mendelson. Fourth Vice-Chairman, Mr. Dunbar. Your Secretary needs no introduction, Mr. Harrington.

I ask Mr. Hosler to take charge of the meeting.

CHAIRMAN HOSLER: The Nominating Committee, in submitting the officers for the coming year, also nominated the following committee chairmen: Chairman of the Program Committee, Henry Bannister; Chairman of the Statistical Committee, W. W. Adams; Chairman of the Engineering Committee, John Boardman. Slides Committee Chairman, Mr. Forbes and Entertainment Committee Chairman, Jack Ryan. Executive Committee, H. C. Henrie, Fred Nesbit, and Clyde A. MacDowell.

The publicity committee will be composed of A. W. Allen, of the Engineering and Mining Journal, R. Dawson Hall, of Coal Age, and M. R. Budd of the Explosive Engineer.

Safety Practice On The Witwatersrand

By W. F. BUCHANAN

Editor, "The Reef", Johannesburg, Transvaal, South Africa

A survey of the "Safety First Movement" on the Witwatersrand, to be complete, should contain an adequate comparison of the methods employed in other countries. This paper does not pretend to that completeness. It contains merely the history of the movement and, it is hoped, a sufficiently general description to allow a reasonably clear conception of the manner in which it functions, and a description of the various preventive measures taken to eliminate avoidable accidents in the mining industry.

The field covered by the accident prevention campaign on the Witwatersrand extends to 33 producing mines employing approximately 22,000 white men and 200,000 natives. The output from the mines for 1929 was 39,000,000 tons of rock, of which 30,742,000 tons were sent to the mills. The gold recovered amounted to 9,980,000 fine ounces, valued at £42,388,600. The wages paid to white employees totalled £8,113,000 and to natives £6,481,000. Stores and materials to the value of approximately £14,000,000 were purchased for consumption, and dividends amounting to £8,085,000 were distributed to shareholders.

It is necessary to explain that the success of the safety movement is due in large measure to the cooperative activities which are only rendered possible by the existence of the "Group System"—a system under which "the control and administration of all the companies, with one or two minor exceptions, are in the hands of one or other of a few large corporations possessing strong financial resources, long and intimate experience of mining enterprises and efficient technical and administrative staffs" . . . and the close cooperation and assistance of the Department of the Government Mining Engineer.

The principle which actuates the administration of The Rand Mutual Assurance Company, under whose aegis the accident prevention campaign was launched and continues, is that of meeting claims for compensation "in a spirit of sympathy, not concerning itself merely with paying claims but also by mitigating the consequences of injuries by supplying, free of charge, the most competent medical, surgical and other treatments. The company deals with claims in a spirit of fairness rather than on fixed, rigid lines, and very few cases are referred to Court."

The activities of the company have received much encouragement and help from the National Safety Council, and the conduct of the campaign against accidents has been modeled, as far as practicable, on the admirable system in operation in the United States of America.

It has not been considered desirable to incorporate in this paper elaborate statistics reflecting accident and accident death rates from various causes. So far as these are interesting and desirable they have been included primarily as an indication of the beneficial effect of the campaign against accidents.

The origin in 1913 of the safety movement on the Gold Mines of the Witwatersrand was stimulated by the results of investigations into the indiscriminate and apparently reckless contravention of the Government Mining Regulations. Considerable discussion had been provoked by the frequency of fatal accidents in underground workings; and in the course of investigation by The Rand Mutual Assurance Company—an "accident carrier", the membership of which is composed of every mining company of importance on the Witwatersrand—it was discovered that there existed an apathy in regard to accidents and a marked absence of the sense of responsibility. These factors, combined with negligence on the part of white employees and ignorance on the part of the aboriginal workers, complicated the difficulties by which the industry and the assurance company were confronted in the proposal to institute a safety campaign. The Government Mining Engineer was emphatic in his opinion

on the cause of the high death rate; the company was concerned by the growing demands made for compensation, and the urgent need for effective steps to be taken to prevent avoidable accidents.

The legislation affecting accident prevention was, and is, embodied in the Mines and Works Act and the regulations framed under it. These provide for the active participation of the employer and the employee in the safe and efficient working of the mines. Under this Act the supervision of all mines, works and machinery is placed under the Government Mining Engineer, Inspectors of Mines, Inspectors of Machinery and Inspectors of Explosives.

The Act lays down the hours for underground labour and provides for the trial of persons charged with breaches of the regulations and for enquiries by Inspectors of Mines into accidents; the regulations framed under the Act deal in detail with the various matters affecting the safety of persons employed on mines and works. Under these regulations responsibility is fixed for dangerous practices upon managers, officials and miners, and compliance with the law is aided by an adequate system of mining and machinery inspection both by Government officials and officers appointed by the mine managements.

During 1928 the number of charges under the Act and the regulations made against owners, officials and employees in Magistrates' Courts was 110, of which 78 were successfully proved; in the Courts of Government Inspectors 1,337 charges were preferred against employees for breaches of the regulations of which 1,268 succeeded.

The underlying principle of the regulations is the rule of safety; the unwritten rules which came to this country with the early miners from Cornwall and elsewhere, which were the basis of safe mining practice, were maintained, and these were added to in the light of experience and as modern methods replaced older practices.

But, in the knowledge that without the education of the sense of responsibility of those directly concerned not the most stringent legal provisions or the activities of the most efficient Inspectors could, by themselves, accomplish the aim of reducing accidents, the Industry, represented by The Rand Mutual Assurance Company, approved the formation of a "Committee of Safety." This committee—which later became the "Prevention of Accidents Committee"—was composed of representatives, administrative and technical, of the controlling mining corporations, or "Groups", the Department of Mines and of Native Affairs. The present chairman is Frank Raleigh, who is also the chairman of The Rand Mutual Assurance Company. The field of operations was limited to the mining industry, and, from the outset, co-operative and friendly relations were established with the Government. This state continues today.

At the same time it was decided that, since experience in America had justified the view that one of the most effective means of securing the help of employees in measures of accident prevention was the creation in individual undertakings of safety committees composed of workers, similar organisations, both for the surface works and for underground, should be formed on each mine on the fields. This organisation, formed without statutory foundation, had as its object the realization by workers of their share of influence in the application of the regulations framed for their protection, the invitation to devise practical suggestions for safety which, on adoption, would be rewarded, and the improvement of working conditions.

It will thus be seen that the safety movement on the Witwatersrand is not governmental but a private association of employers formed for the promotion of the ideal of safe and efficient working; and it has demonstrated the principle that a mutual insurance institution need not be sponsored by a Government to work actively and effectively for safety.

It may be convenient at this point briefly to recite the nature of the liabilities of The Rand Mutual Assurance Company, and the amounts paid since 1913 in accident compensation.

Originally, the liability of the company under its policies was limited to the compensation payable to the white employees of its members under and outside the Workmen's Compensation Act. This was subsequently added to by the inclusion of compensation payable for accidents to native employees and, later, by the addition of claims under the common law. Fire and other sundry insurance were also included at a later stage.

The cost of accident compensation is pooled among all members, based on the premiums paid which in turn are based on the wages paid to white employees and the number of native workers.

While all members insure 100 per cent. of their white and native employees accident claims, there is a varying percentage placed by members for fire and other insurance.

Compensation claims paid on behalf of individual members frequently exceed the premiums paid by them to the company. Under its policies, the company is liable to its members up to £25,000 for common law claims for any one accident. It has paid out as much as £17,000 for one accident and others have amounted to about £10,000 each.

The expenditure on compensation paid by the company on accident claims by white and native employees since 1913 is over £1,000,000.

In addition to the above compensation, most of the members of the company pay, through The Rand Mutual Company, the cost of hospital treatment and medical attendance in serious accident cases to white employees. Treatment to natives involved in accident is carried out free of cost at the various mine native hospitals.

In effect, the strength of the company is the strength of the gold mining industry, and by its constitution it adopts a common policy in respect of those matters which come within its scope.

The invitation to responsible representatives of the Government to become actively associated in the administration of the Prevention of Accidents Committee made plain the intention of the industry to cooperate with the Government in the effective observance of the regulations promulgated in the interests of safety.

From a study of the fatal accident record (Appendix A) it will be seen that the almost immediate effect of the institution in late 1913 of the campaign against accidents was a lessened death rate. In 1914 there was a saving of 182 lives and the death rate per annum per 1,000 employees in service was reduced from 3.81 to 3.22. This encouraging result was favourably commented upon, and the value of the new concerted movement toward eliminating avoidable accidents became apparent.

The efforts of the committee, which for the first year were directed to a general appeal for carefulness and caution, were broadened; and as statistics revealed the more prolific causes of accidents, attention was focused on the introduction of safety measures in order to reduce the frequency. It was recognised that the compilation of reliable and detailed statistics was of high value in determining the measures to be taken in combating the various dangers inherent to mining, in calculating the human deficiencies among workers and as a measure of estimating the burden imposed by accidents upon the Industry.

But it should at the outset be emphasised that there existed in the early days of the movement considerable difficulty in dealing with this important matter. The labour force of the Witwatersrand mines is composed of approximately 200,000 natives, i.e., aborigines drawn from a number of tribes throughout South Africa, the neighbouring protectorates and Portuguese East Africa, and about 22,000 white employees. The average period of service of a native in the mines is about nine months, after which he returns to his home and remains there until necessity, or inclination, sends him back to work. In this way the native labour force is a continually changing one. The total wastage for last year was 178,425. These figures reflect one of the difficulties in the accident prevention campaign. The native has been and is the manual labourer, and upon his dexterity depends in large measure the efficiency of operations and the maintenance of output.

The fact that comparatively few of his bosses have been able clearly to convey instructions to him increased the natural difficulties of efficient mining; while his earlier fear of medical treatment for injury and an innate aversion to entering hospital were responsible for a large number of deaths, through neglect, from minor injuries. It was a common occurrence for injured natives to hide for days, aided and abetted by their friends, and not until their recovery or death would the mine authorities be aware of an accident having occurred or an injury sustained. This has, however, been largely overcome, and the achievements which led to the condition that now exists are referred to later.

The language problem has always offered difficulty in the progress of the safety movement on the Witwatersrand. It will be obvious that among a large working force of whites and natives, in which English, Afrikaans, Zulu, Xosa, Sesuto, Shangaan and other dialects are commonly employed as media for orders and in conversation, misunderstanding and confusion is inevitable; and the raw material which provides the overwhelming bulk of the labour on these fields has, ever since mining was begun here, been a sufferer from the fact that his overseer, generally speaking, is not adequately equipped with a working knowledge, even of one of the various native dialects. It is a difficulty which has not yet been overcome; the white man has not studiously endeavoured to become proficient, and although a patois known as "pidgin kaffir" has been evolved and is widely used, the native has, by force of circumstances and in his own interest, had to learn to interpret his master's instructions. It is doubtful if so severe a philological handicap exists in any other industry, and it is suggested that the achievements of the safety campaign on the Witwatersrand must be measured relatively to the disabilities which follow the employment of this form of indigenous labour.

The activities of the Prevention of Accidents Committee included, therefore, not alone the direction of the various managements of mines to the need for the efficient organisation of safe work, and whole-hearted cooperation among the white employees in preventing accidents, but an intensive educational campaign designed to convey to the aboriginal mind the value of care and thought in their work. This has been successfully achieved by various methods which have had the effect of creating a profound interest in safety and its corollary, first-aid treatment.

An active branch of the Prevention of Accidents Committee is the Technical Advisory Sub-Committee composed of mining, mechanical and electrical engineers. This committee devotes itself to the scientific side of accident prevention.

The recognition by the members of this committee that in an industry so rationalised as the gold mining industry, the alleviation of working conditions is one of the best means of increasing productivity, has prompted them to study the influence of various favourable factors such as efficient lighting, rapid and safe transportation, labour saving devices and other modern equipment, on the working force in the mines, and to make recommendations for their adoption. Their knowledge of working conditions has materially assisted in the study of accident prevention methods and their status in the Industry has impressed their findings with authority. They are consulted when changes are proposed in the Government regulations which may affect safety and responsibility and are an effective factor in the practical application of the measures designed to promote efficiency and to safeguard the worker.

The Publications Sub-Committee, another branch of the Prevention of Accidents Committee, concerns itself exclusively with propagandist activities. It controls the publication of *The Reef*, a monthly magazine devoted to social news on the mines and to accident prevention; the design, preparation and issue of the volume of bulletins and illustrated posters in English and Dutch and the various native languages depicting safe practices, recent and typical accidents, fire hazards, etc.; the publication of abridged editions of the mining regulations, books on first-aid methods, pamphlets dealing with the health of employees; the delivery of safety and first-aid lectures and the exhibition of cinematograph films; the promotion and regulation of safety-first and ambulance competitions (first-aid) and other devices.

This committee works closely with the South African Red Cross Society toward the dissemination of a knowledge of ambulance and first-aid work on the mines. The result of this cooperation has been most successful, and the growth of the work can truly be said to be phenomenal. Particularly is this the case among the native workers. Encouragement is given to "boss boys"—natives who hold senior positions among their fellows—to become proficient in first-aid treatment. Lectures are delivered and practical demonstrations are given on each mine by doctors and qualified laymen, and inter-departmental, inter-mine and inter-district competitions, for which prizes are awarded, are regularly held. Great interest is displayed by the contestants and the standard of ability shown is considered by medical judges to be very high.

Since this phase of safety activity was developed in 1922 over 24,000 certificates of competency in first-aid have been awarded to natives in competitive examinations in the practice and theory of the subject. Last year 4,500 natives earned the distinction and the total number now qualified to render efficient first-aid is about 25,000. The value of this work is bearing excellent results and not infrequently the they capably attend to injuries sustained underground by white employees. The enthusiasm of a large number of natives in this spare-time occupation of first-aid work is almost unbounded. Beyond the fact that an additional payment of five shillings per month is made to those who are qualified as first-aiders, there is a natural keenness to learn, and it is not uncommon for 25 teams (150 men) to contest an individual mine competition.

It is this excellent feature of the safety movement which has been largely responsible for breaking down the barriers of suspicion and fear of the "white man's medicines" by which natives in the early years of mining were possessed. The admirably equipped and organised centralised native hospitals—used extensively for accidents and sickness cases among native employees—and the influence of skilled surgical treatment and capable nursing have completely won their confidence. These native hospitals are under the control of doctors in the employ of the various mines, and of recent years there has been established a Minn Medical Officers' Association composed of these gentlemen and the medical staff of the Witwatersrand Native Labour Association and the Native Recruiting Corporation, associations sponsored by the Transvaal Chamber of Mines and through which the native labour force of the industry is recruited. The effect of this relationship has been to strengthen the safety movement, since its deliberations and decisions on the problems of hygiene, diet, sickness and accident are given effect to in the treatment and care of the native employees.

Closely identified with the prevention of accidents campaign is the Association of Mine Managers, an organisation composed of the managers of the mines on the Witwatersrand, devoted to the practical study of problems of mining and metal-lurgical practice, safety, health and other factors connected with the profession. This association is also consulted in the practicability of adopting the various suggestions made for improving safety practice. It is a valuable ally to the movement and is represented on the Prevention of Accidents Committee. By these various agencies the activities of the safety movement are effectively co-ordinated with all aspects of mining.

While technical measures of protection are an indispensable part of accident prevention and should be carried to the highest degree of perfection, it is realized that the human factor is essentially the starting point in any endeavour successfully to obtain a reduction of accidents. Particularly is this a fact on the Witwatersrand, where, as has already been mentioned, 90 per cent of the labour employed on the mines is composed of aboriginals, 80 per cent of whom are illiterate, devoid of initiative and, so far as their work is concerned, without individuality. They are, however, docile, and by experience attain to a certain degree of efficiency. The balance have by long training and teaching become versed in mining methods and a number of these have reached a state of competency. It is this band who are the

"boss-boys" and who, having satisfactorily served their apprenticeship, direct their "green" fellows in safety methods of shovelling and tramping, machine drilling, timbering, sweeping and other details of mining which they are by the regulations permitted to perform.

It may be interesting to know that an intensive system of training of "boss-boys" has been in operation for some time. This system was originated on the Crown Mines—a mine with a native labour strength of 13,000—and has been adopted by other gold mining companies. The training applies to those branches of mining which natives of intelligence and good conduct are qualified to undertake, to safety first principles and to first-aid. Practical demonstrations are given at working places and also by means of models of underground workings erected on the surface. Examinations, oral and practical, are held weekly by officials and the successful candidates are awarded badges of competency and granted special exemption from such disciplinary measures as are imposed on the rank and file. Since the inauguration of this scheme, over 2,000 badges have been issued on one mine alone. What is interesting here in this connection is the fact that by this training system it is sought to obtain both a reduction of accidents and a greater productiveness in manual labour by physiological and psychological measures.

The training of the youth of the country to become efficient and safe miners is also an important feature, and though at first glance its relation to the safety movement may not be apparent, there is, nevertheless, a definite and distinct relationship.

The gradual diminution in the white mining force of the Witwatersrand for reasons of ill-health and incapacity was foreseen long ago, and, with the cooperation of the Government, the industry has established schools on six mines in different centres on the Reef. These schools are known as Government Miners' Training Schools, and nearly 500 young men are at present being qualified by practical experience to become proficient in the trade they have chosen. These schools are controlled by a Board of Management nominated by the Transvaal Chamber of Mines and the Minister of Mines, and are under the supervision of a superintendent, who is a mining engineer, and a qualified staff. The apprentices under the guidance of expert miners work "sections" of the mines on which the schools are established. The efficiency of these schools is good, and there is no lack of demand for the services of those who have completed the course, which extends over two years, during which time the apprentices are paid adequate wages. Over 1,000 apprentices have already passed out to the mines, and a large number have graduated to become efficient and respected officials. It is significant of the value of vocational training and the caution exercised by these youths in their work that during the past six years only four fatal accidents have occurred among them in their training period; three of these were caused through falls of hanging rock and were unavoidable.

The net cost of maintaining these schools during last year was £43,550, of which sum one-quarter was contributed by the Government and three-quarters by the industry.

Causes of Accidents

Having described in general terms the form of the safety movement and its co-operative relationship, we may now conveniently consider the more prolific causes of accidents, the reasons therefor, and the methods employed to, as far as possible, avoid their occurrence.

Falls of ground whether due to rock bursts or earth tremors, or as a result of insufficient care in the examinations of hanging, have for many years accounted for a large proportion of fatalities. This source of accident has formed the subject for Committees of Enquiry, and valuable recommendations emanating from their reports have, where practicable, been given effect. The most recent enquiry by a committee appointed by the Honorable the Minister of Mines on the occurrence and

control of rock bursts in mines showed that one of the most prolific causes of serious accidents in this connection is "Remnants."

The following extract from a commentary by the Chief Inspector of Mines on this and other points in the report will be of interest:—

"A remnant is defined as a block of ground which has been reduced to a size at which the risk of a collapse or burst becomes a matter for consideration. It is that piece of solid ground left standing between approaching stope faces, and naturally it is constantly diminishing. No exact dimensions can be stated in the definition as to when danger may be expected, as risks may occur with blocks of very different sizes at different depths and under different circumstances. On the other hand, remnants may be, and very frequently are, worked out completely without any trouble or danger at all. As some rough guide, however, it may be said that, below a depth of 1,500 feet, a block of 100 feet or less in width may be looked upon as a potential remnant.

"Some mines have adopted the principle that, in areas where danger may be anticipated, remnants are left as soon as they reach that stage, to be worked at a later date as reclamation. The recommendations of the committee are that in stopping out remnants:—

- (a) The working face should be advanced rapidly and continuously.
- (b) Ample support of a character that will stand shocks should be kept close up to the working face.
- (c) The minimum number of persons necessary should be employed near the working face.
- (d) The direction of the working should be carefully selected with a view to safety.
- (e) The hanging wall portion of the face should be kept advanced.
- (f) Stope pillars should not be cut."

"Amongst other important recommendations in connection with mining policy, the committee advance the following:—

- (a) Large shaft pillars should be left for vertical shafts.
- (b) Incline shafts should be in the footwall and be stoped over completely.
- (c) Except where cross-cuts are protected by the shaft pillars, pillars or remnants should not be left above or below traveling ways and, where such pass through dykes or faulted ground, their sides should be stripped and packed or pigstied.
- (d) Main levels, if in the footwall, should be stoped over; if not, they should be stripped and packed or pigstied beyond the stope limits.
- (e) Reef drives should be widened out in advance of stope faces and packed or pigstied both above and below.

"The committee state that the need for precautions against strain bursts in particular places will usually be indicated to the mine officials by the occurrence of minor bursts, not causing casualties, in those places. Study of mine and stope plans gives the best indication as to where trouble is to be anticipated.

"In development workings where there is danger of rock bursting, it is sometimes desirable to shape the roof of the drive like a gable roof, by carrying an extra hole at the top of the face so as to eliminate the usual curved surface from which, in some cases, stones, flake or rocks of triangular section suddenly drop.

"The recommendations of the committee have been carried out in detail by the majority of managers whose mines are liable to suffer from rock bursts or earth tremors, and the whole question continues to receive the closest attention of the Mines Department and all those interested in the control of the mines."

The working depth of the mines of the Rand has advanced considerably since the publication of the report referred to. The deepest workings are those of the Village

Deep 7,600 feet vertical and the average working depth of all mines at the beginning of 1930 was approximately 4,500 feet. A consideration of this factor and that of the extent of the workings (which may be said to be continuous for a distance of nearly 50 miles) will reveal that the accident death rate from falls of hanging is not unduly high.

A comparison of the rates from this cause with the total accident death rate during the past 13 years is given in the accompanying table.

Death Rate Per Thousand Per Annum

	Falls of Hanging	Total
1917	1.08	2.64
1918	0.91	2.55
1919	0.77	2.43
1920	0.81	2.45
1921	1.01	2.28
1922 (Strike year)	0.73	1.91
1923	1.20	2.59
1924	1.04	2.63
1925	0.84	2.40
1926	0.87	2.29
1927	1.23	2.83
1928	0.84	2.29
1929	0.95	2.60

In the last published report issued by the Government Mining Engineer, that gentleman, commenting on the hazards of mining, with particular reference to falls of rock, makes the following pertinent observations:—

"As the mine workings extend, the problems for research become more numerous and complex, and the duties of those charged with the safety and health of employees become more arduous and involved. A reference to the different classes of accident shows that falls of ground are of prime importance, and these, from the simple problem of adequate support of earlier days, have become complicated by the advent of earth tremors and rock bursts. In order that serious disasters consequent upon these occurrences may be forestalled and prevented, intelligent study of the conditions, combined with a high degree of skill and technical knowledge, is necessary. Such skill and knowledge have not been wanting and there are indications that the unfortunate calamities which took place in previous years have led to a close study of the subject, and it is hoped, a minimizing of the risks attending such occurrences in the future. This is a sphere, as regards accident occurrences, which presents the widest field for scientific investigation and, although, as stated above, results have been achieved, much still remains to be done.

"In connection with the support of hanging, there appears to be much more freedom of opinion, and methods are less stereotyped than formerly. Experiments are being carried out in different directions to decide which method is applicable to a particular mine or district, and extremely wide variations in this respect are noticeable. In mines with steeply inclined reefs, as at Randfontein, timber chocks with temporary loaded stulls along the face form the most favoured class of support. In mines with moderate dip, the shrinkage method has been largely adopted, whilst one mine in the central Rand is shooting off the upper waste to be packed in the form of a permanent support carried close to the face, and the clean reef is broken up separately with pneumatic picks. On the Far East Rand, where the reef dips at a low angle, the method of concrete supports is more generally favoured, whilst some other mines with a steeper dip prefer to continue the older method of systematic pillars which, with props placed systematically between

the packs and face, forms a satisfactory means of support. This variation in ideas and application of methods suitable to the local conditions has, it is thought, resulted in a reduction in accidents in the class of working referred to."

Explosives also contribute materially to fatalities on the mines of the Witwatersrand and in this class of accident, evidence of errors of judgment and of lack of caution is copious. The employment of explosives is a source of danger which cannot unfortunately be entirely eliminated, and this fact has definitely asserted itself. The low standard of intelligence among the native working population has been the chief obstacle to the efforts constantly made to lessen the accidents from this cause, but statistical records show that the campaign directed toward the education of natives employed on machine and hand drilling has not been without good effect.

The quality of the explosives now used is, as far as is known, of the highest; they are of such a character as to exclude involuntary explosions through falls and similar causes, and, if due care is exercised in the preparation and firing of the charges, regular ignition should be effected. Although there has been searching enquiry into the reasons for incomplete explosion in cases of misfired charges, definite proof is lacking that the reason is faulty explosives. The experiment of placing the primer at the bottom of the charge in the hole has been made and it is claimed that if this is efficiently done, there is little danger of the whole charge not exploding.

In this connection experiments are being made with explosives cartridges of considerably greater length than have hitherto been used. The theory that there is less danger from incomplete ignition by the use of cartridges of from 18 to 24 inches long than with those of four to eight inches, which are in general use, is being tested, and statistics so far collected have shown that comparatively few misfires have been detected in those holes in which the large-sized cartridge has been employed.

It is probable that the cause which has had the greatest effect on the risk from explosives is to be found in the increase in the number of holes drilled per working shift and the consequent temptation to haste in 'charging up'. The introduction of what is known as a "hole director", a simple device by which the position and direction of each new hole to be drilled is clearly shown to the native machine man has lessened the possibility of intersecting misfires. The provision of ready capped fuses, which are supplied direct by the manufacturers or from a capping station on the mine, has been the means of reducing accidents due to faulty crimping. This innovation has also allowed the miner more time to supervise his machines and make safe his working place.

The main danger is, apparently, the man behind the explosive and the drill. The recognition of this fact is the starting point of the investigation and experiments which have been, and are being, made with the object of minimizing dangers from explosives. The results have not been entirely satisfactory, but it is felt that since the knowledge among miners and native helpers of explosives is largely empirical, it is a matter of implanting careful habits; and that by the spread of the system of educating them to the potential dangers of misfired holes and other causes, a diminution in the frequency of accidents may be looked for. But they will always be a source of apprehension among those in authority. The regulations are stringent; the danger lies in the fact that they are often not observed. It is satisfactory, however, to know that the percentage of total accidents from explosives has been reduced from 4.78 in 1918 to 1.59 in 1929.

Accidents in haulage ways and other traffic areas of a mine have been almost intolerably frequent, and here also the human factor plays its important part. Automatic safety aids for the control of trucks employed on incline ways and on endless rope haulages have hitherto not been compulsory and a large number of casualties have resulted from the fact that although safety devices are installed, they have not

infrequently been found to be ineffective. This condition has, however, been provided for under a regulation recently issued which imposes upon the management of a mine the necessity for equipping every incline, whether shaft, winze or roadway in which trucks are worked attached to a rope, with one or more effective automatic contrivances to prevent trucks running away. This necessary precaution will in some measure help to lessen the number of accidents which occur through mechanical breakdowns or other fortuitous circumstances, and in this regard a distinct advance on former practice is recorded; but the personal factor cannot entirely be eliminated.

Frequent places of refuge must be provided in those haulage ways where traction is operated by gravity or machinery and where the gradient exceeds one in twelve or the speed of traction is more than four miles an hour. If necessary, fenced traveling ways may be insisted upon.

The essence of success in avoiding accidents in this, as in other, occupations, lies mainly in the fitness of the persons employed. The attractive and important problem of whether in this industry, with its ever-changing native working population, the selection can be made of men particularly qualified for these jobs is being tackled by the managements. It is an axiom that liability to accidents and unfitness for the occupation must be regarded as identical factors predisposing to unnecessary costs and to inefficiency. Most decidedly is this the case with those employed in the exacting work of engine driving. Here the essential attributes are the capacity of observing unfailing caution and to act rapidly and suitably in conditions of emergency. On the whole, accidents due to overwinds and defective machinery are, happily, few. The transforming of steam hoists into winders operated electrically, and the equipment of shafts during recent years with modern electric machines of ample capacity, as nearly foolproof as science and ingenuity can make them, have rendered mine traveling as safe as a railway journey.

As a relief to the engine drivers in this monotonous and responsible post, a concession of a break during his hours of shift has recently been made.

There are other types of accidents due to falling material, rolling stones in steeply inclined working places, etc., which account for a large number of accidents. Preventive measures are taken where possible, and for some time past head, foot and leg coverings for natives have been insisted on. To-day approximately 95 per cent of the total native labour force wear boots; the beneficial effect of these has been most marked.

A comprehensive statistical table, compiled by the office of the Government Mining Engineer, shows the number and the causes of accidents, the accident rate, the deaths and the death rate, the percentage of total accidents and the percentage of deaths relative to each cause—with comparisons over the preceding eleven years. It will be interesting to know that of the total number of deaths from accidents in the mines last year, 69 per cent were due to danger inherent to work, or misadventure: 15 per cent were the fault of the fatally injured persons: 14.5 per cent were due to the fault of others: 0.8 per cent was determined to be due to the fault of the management and 0.7 per cent to defective plant and material. The large increase in the number of accidents shown from 1927 is accounted for by a change in the system of reporting accidents, and since March 1927 it has been made compulsory by regulation to notify the Mines Department of every accident by which an injured person is incapacitated for a period of fourteen days or longer. Prior to that year the official reporting of accidents was left largely to the discretion of the medical officers of the mines, with consequent variations in practice. There are no material difficulties in procuring accident statistics valuable from a safety point of view, and under the system now in operation the solution of what at one time was a considerable problem has been successfully overcome. Every accident is now reported to the management, classified and investigated; and by the method of examining and treating every native worker for minor cuts, abrasions and scratches on his return from shift and before he enters his compound, complete supervision is

kept on the physical condition of the labour force. In addition to this daily examination, each white person who works underground and each "boss boy" is equipped with a waterproof antiseptic first-aid packet for use when necessary.

Although fires in mines are infrequent, some alarming conflagrations have occurred involving immense damage to property, cessation of operations for varying periods and loss of life. The causes of mine fires are necessarily difficult to determine, but for the most part they may be ascribed to candles left burning on timber packs and the careless throwing aside of fusc lighters. Effective precautions are taken to minimize these dangers, and on many mines fire patrols have been instituted, with, it is pleasing to say, most satisfactory results. This system, allied to intensive propaganda in the shape of notices prominently displayed, have attained the dual object of lessening the number of fires and of their early control.

In this connection and also with the object of having at hand a force of men available to cope with rescue work on any mine, a central training station has been established and is fully equipped with fire-fighting apparatus at which employees selected for their knowledge of underground work, coolness, powers of endurance and first-aid qualifications are trained. It is incumbent that rescue brigades consisting of not less than five members shall be organized and maintained on each mine on the following scale:

At each mine where the underground employees number more than 100—one brigade.

At each mine where the underground employees number more than 700—two brigades.

Having now reviewed the various types of accident causes, it remains to show the system carried out in the various mines by which the underground workers are encouraged to think and act safely.

Systems vary somewhat; the principle is constant. The object aimed at is to maintain the working strength at its highest possible peak.

We are not immediately concerned with the saving in costs to a mine by a maintenance of the highest output, or the increased expense due to hospital treatment of injured natives, plus the loss of productivity owing to their absence from work, but these are factors of importance secondary only to the desire that a mine shall be regarded as a safe mine, and that it is administered and controlled as efficiently as is possible. The various "prize schemes" in vogue are complementary to this aim.

On one mine a scheme for safe working has been in successful operation for some time. It is a monthly competition based on a comparison of underground working days lost. The mine is divided into classes composed of shift bosses' sections which have approximately the same average native accident rate, based on working days lost per 1,000 worked during the previous three months.

The formula is as follows:—

$$\left(\frac{A - B}{A + 0.5} + \frac{1}{C + 0.5} \right) \sqrt{N}$$

"A"—Underground shifts lost per 1,000 for the previous three months.

"B"—Underground shifts lost per 1,000 for the current months.

"C"—Average underground shifts lost per 1,000 for the four months (including current month).

"N"—The number of possible native shifts for the current month.

Prizes are awarded to each winning section in its class as follows:—

Shift Boss	£2. 0. 0
Day's pay men	One day's pay
Contractors	£1. 0. 0
Boss boys	2/6d. each

A fatal accident debars any section for the prizes for the month in which the accident takes place. When a native has been off duty through an accident for 78 working days, no further shifts are counted against a section for that accident.

APPENDIX A
Progressive figures showing number of deaths and accident death-rates per 1,000 persons per annum from the year 1913, Witwatersrand Gold Mines

YEAR	ON SURFACE						BELOW SURFACE						ON AND BELOW SURFACE					
	Number Killed			Death Rate			Number Killed			Death Rate			Number Killed			Death Rate		
	White			Coloured			White			Coloured			White			Coloured		
	White	Coloured	Total	White	Coloured	Total	White	Coloured	Total	White	Coloured	Total	White	Coloured	Total	White	Coloured	Total
1913	4	4	8	0.02	0.02	0.04	61	53	114	0.04	0.03	0.07	72	71	143	0.04	0.03	0.07
1914	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1915	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1916	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1917	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1918	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1919	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1920	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1921	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1922	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1923	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1924	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1925	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1926	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1927	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1928	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1929	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07
1930	4	4	8	0.02	0.02	0.04	64	56	120	0.04	0.03	0.07	75	77	152	0.04	0.03	0.07

* Calculations based on average number of persons in work.

† Figures abnormal owing to strike for last six months of year was 2.26.

The interest in this competition has been most keen and, of a total number of 124,296 possible working shifts in the month of April last, only 671 were lost owing to accident—a figure equal to only 26 absent workers out of a total of 4,396.

In addition to the various competitions and other methods of directly interesting mine employees in the work of accident prevention, a "Safety Competition", known as the Safety Prize Scheme, open to all producing mines has been in existence since 1915. Under this scheme the competing mines are divided into six classes. Each class consists of approximately the same number of mines, each having approximately the same average underground accident death rate during the previous three years. The winner in each class is the mine which at the end of each year shows the highest number of marks in its class, calculated by a formula similar to that referred to.

This competition is virtually a competition for underground mine officials, and the officials of the mine which wins in each section are rewarded by a cash payment or an engraved memento. The mine showing the highest number of marks in the Competition holds the floating trophy presented by the Chemical, Metallurgical and Mining Society of South Africa. Considerable interest is taken in this competition, which also has had a stimulating effect on accident prevention work.

Although this broad outline of the activities of the Prevention of Accidents Committee is inadequate, it is hoped that sufficient has been said to indicate that the safety movement on the Witwatersrand is based upon an effective application of sound principles, and that the benefits from a continuity of the organisation will be reflected in the diminution of accidents from preventable causes.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Packers and Tanners Section

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**Tuesday Afternoon Session
September 30, 1930**

**N. L. BRAINARD, Chairman
Swift and Company, Chicago, Ill.**

The first session of the Packers and Tanners Section of the Nineteenth Annual Safety Congress convened with N. L. Brainard, Swift and Company, Chicago, presiding.

CHAIRMAN BRAINARD: This afternoon Mr. C. P. Waite, assistant supervising engineer, Travelers Insurance Co., Chicago, has kindly consented to talk on "Accidents in the Packing and Tanning Industry—Why Do They Happen?" I take pleasure in introducing Mr. Waite.

Accidents in the Packing and Tanning Industry

By C. P. WAITE

Assistant Supervising Engineer, Travelers Insurance Company, Chicago, Ill.

About four years ago my superior called me into his office and said, "Waite, I want you to take all the accident records of this meat packing plant to your desk, study them, and come back and tell me what is wrong." I studied the situation, looked it over thoroughly, analyzed it, and made summaries, and went back to his office, proud because I thought I had struck just what was wrong.

He looked up and said: "What have you found out?"

I replied, "Well, there have been too many punch press accidents, too many eye cases, and too many strains."

"Sure," he said. "But tell me why they are having so many accidents of those types?"

"Oh, to do that," I replied, "I'll have to go into the plant and study the conditions." That's what I did. And when I came back I said, "They are having punch press accidents not because the machines are not guarded, but because the guards are not set properly, and in some instances the guards are removed. The reason they are having eye injuries is because men are not wearing goggles, notwithstanding the fact that there is a big sign, 'YOU MUST WEAR YOUR GOGGLES'. And the reason they are having strains is because they haven't gone about the business of repairing two electrical hoists."

"Well now, that is just what I wanted to know. Now you have some information that we can work on; we can show them what to do, and how to do it," he answered. And he also said, "In order to cure anything that is wrong, one must know why and in what respect it is wrong." I have never forgotten that statement; which brings me to my subject of "Why Do They Happen?" Why do accidents happen in the packing and tanning industries? Why do they happen in any industry?

The mechanical engineer, because his machine does not function, will look to the design, workmanship, and the operation to find out why. A doctor will make a thorough diagnosis of a patient. The safety engineer in a similar way must first take the accidents that have occurred and study them to determine the causes. He should then go into the plant and find out what exists which, if it continues to exist, will cause Tom, Dick or Harry to become injured sooner or later. Then he will summarize his findings and through good judgment and common sense find ways and means of correcting those conditions which will improve the accident record.

Let me give you some examples to illustrate what I mean. A girl who was operating a punch press with a safety device which required the use of both hands to operate that press, lost two fingers. The vice-president called me by telephone. I said, "Let things be left just as they are, and I will come to the scene of the injury." I went out and first asked him, "How did it happen?"

He answered, "The punch press repeated."

Well, I took that punch press, operated it, kicked it, abused it, and tried in every possible way to make it repeat, but for the life of me I could not make that punch press repeat. After working on it for an hour I looked at him and said, "That punch press didn't repeat. As far as the mechanical construction is concerned, everything is all right. Let's go and see the girl." I was searching for the cause of the accident.

We went to the hospital and saw the little girl. She was in tears. I asked her, "Why are you crying?"

She said, "I am afraid I will lose my job."

"Why?"

"Because I violated orders."

Upon investigation and through further questioning, she told us this, "I spent so much time conversing with my neighbor that when four o'clock came, I realized that I had to work especially fast to make my day's pay, so I put my elbow on one of the trips and fed with that hand. I finally got out of time and lost two fingers."

In answer to another question, she admitted she had been doing that for about twenty minutes.

"Had you been told not to do that", I asked.

"Yes; three or four weeks ago."

"Is it a general practice in the department?"

"Well, when we can get away with it."

Well now, you see the benefit of finding out what we learned. The vice president realized that the foreman was to blame for that accident. The foreman had given instructions, but had never taken the pains to follow through. Now what would have happened if we had started chasing rainbows and trying every punch press in that plant to see if we could make it repeat? I will come back to that accident a little later on.

Another incident. In a woolen mill a man came in to work, and the foreman said to him: "Go over and run the extractor." This man was a stranger in a strange land, and to make a good impression on his foreman, he worked quickly and as a result rather carelessly. Before the basket came to a stop, he reached in; he was thrown up against the frame of the machine; his arm was drawn in further, and he lost his arm. That is another type of supervisory failure, failure to properly instruct a new employee in the hazards connected with his job. The management realized this, and immediately set up a hard and fast rule that hereafter, all employees, new and old, must be instructed concerning the hazards of their jobs.

Another incident. A plant in Chicago had five falls on stairs. One man was coming down the stairs lighting his pipe. Another man was coming down the stairs with arms outstretched putting on his coat. Other men came down the stairs two steps at a time. Another man tripped over the cuff of his trousers.

After five incidents like this, where injuries occurred, the executives in that plant began to get busy, and they made an investigation to determine why employees were using the stairs in such a manner that they were becoming injured, and they found the conditions I have just spoken of.

Now the sad part of it all is, why did they wait until five employees were injured, instead of taking the first injury that had occurred and going to the bottom of it, finding out why it had occurred? The chances are that if they had done this, they would have saved the other four men from becoming injured.

Another case. We had a job where they were putting in gas mains, digging ditches. A laborer reported to his foreman and said: "Boss, I feel weak, dizzy, sick." The foreman sent him into the ditch anyhow, and in a few moments the man fell over, dead. This foreman was of a nervous busy type, a chap who didn't give much attention to detail, and in the investigation we found out that this foreman had given very little attention to what his men told him in general. He had not inquired of this particular man why he felt sick or weak.

Now I don't say that the foreman would ever have saved that man from dying of heart disease, but I claim that that foreman brought about conditions that hastened that man's death. Today that man realizes his mistake, but today that man isn't foreman, because all of these Italian laborers just got together and went to the president of the company and said to him: "Here, we don't want that man to be our boss any longer. We don't want a man for boss who can't lead us in all things, including safety." And the president realized the situation and let the man out.

Again, in a meat packing plant I had occasion to investigate an accident. A shackle fell in the killing room from the overhead trolley, struck a laborer on the head, and he died from a fractured skull. The executives, foremen, and superintendents in that plant started an investigation. Four weeks before the accident the superintendent had issued orders to the master mechanic to check up all shackles and switches and put them in good mechanical condition. But the master mechanic hadn't carried out his orders, and four weeks went by. Finally a man was killed by a falling shackle.

Now, why did that happen? Let's see. First, the man was injured because the shackle fell. The reason the shackle fell was because of a defective switch. The reason the switch was defective at the time was because the master mechanic had not carried out the instructions of the superintendent. The reason he hadn't carried out those instructions was because the foreman of the killing floor had talked him out of it.

When we learned all that and had a talk with the superintendent, he made just one remark that told us what caused the accident, the way down deep cause. He said: "If I had followed through that master mechanic to see that he did repair those switches, that man would have been alive today."

To sum up these four or five incidents, what have we got? First, the foreman gave instructions and then failed to enforce them. Second, the foreman did not instruct a new employee. Third, because of failure to investigate one injury, conditions causing other injuries were allowed to exist. Fourth, a man was instructed to work when he was not able to work. And fifth, in the case of the falling shackle, the instructions were not followed through. Quite a lot rests, I believe, upon supervision; giving proper instructions and then following through.

Now let's leave accidents that have caused injuries and go to another type; that is, accidents that do not cause injuries.

Here is an instance; a packing plant where they didn't have a very bad severity rate, but a frequency rate that wasn't so good. We went to work to see what we could do to improve conditions. We studied and analyzed the situation, and found one particular foreman whose department had an outstandingly bad record.

So we went to his department to see what was going on, to see what the men were doing that they should not be doing, and to see what men were not doing that they should be doing. What did we find? Mr. Foreman was too busy, and because of that we found innumerable unsafe practices. Ladders were used very recklessly; that was especially noticeable. Picture this! Here is a man standing on a ladder about nine feet high right over a filling machine that had a tank which fed down into the machine itself. This man, standing on a ladder, was rubbing against a revolving 26-inch pulley.

Here is another man climbing a ladder farther on; to get up high enough he had

to rub against a 4-inch moving belt. We found another chap coming down a ladder; he grabbed hold of the revolving shaft and swung himself to the floor like a monkey on a trapeze.

We found men were inattentive, and were distracting each other's attention. We even saw them throwing empty cans at each other. Now those are bad conditions, conditions that existed because the foreman allowed them to exist; conditions that had caused injuries, and conditions that would cause further injuries if allowed to exist.

We went to the foreman and talked to him about it. He said: "Well, I am too busy to worry about what may happen." He took the "never trouble trouble until trouble troubles you" attitude, which is a mighty poor attitude for any man in charge of help or any department to take.

Now let's turn for a moment to the punch press accident. You remember that I said the analysis and the investigation proved that the reason that girl lost her two fingers was because the punch press foreman was not following through the instructions that he had given. That was settled and proved conclusively. The president of that concern heard about it, so this thought came to him: "I wonder if that foreman is really giving instructions, and I wonder if there are any more instructions that he is not following through," taking this viewpoint, that a foreman who doesn't give instructions, and who doesn't follow through his instructions relating to safety, probably doesn't do it concerning production.

This was a serious matter the president had in front of him. It was a matter requiring his own personal attention, so he started a quiet investigation of the entire plant to find out why there were so many broken tools, spoiled equipment, and waste.

And what did he find out? He found that they had two types of foremen; one group who were not instructing their employees how to do their jobs, and the other group who were not following through.

Immediately they had a meeting. And what a meeting! I was there. I had very little to talk about. The president had the floor. First he spoke to them about what was existing in the plant that was not right. He explained in detail how to give instructions, and then how to follow through.

The executives and the foremen didn't stop there. They wanted to make sure that conditions were right, so they started cleaning up. And over each foreman's desk was posted a little slip, about eight by fourteen, bearing the two words "Follow through."

Now what has been the result? We have records to prove that this plant today has better foremen, better floor production, less spoilage of material, of tools, of equipment, and fewer accidents than ever before.

This meeting I mentioned was held on the 12th of March, this year. Up until the time I left Chicago (last Saturday) they had only one man go to a doctor—to take something out of his eye; and for the corresponding four months of last year they had sixteen severe lost-time accidents, including three amputations. Now why was this result obtained? Because they obtained information of value to them by investigating one accident, and that accident was where the girl lost her two fingers on the punch press.

This brings me down to certain conclusions; first, that the same conditions which produce injuries, are likely to be causes of inefficiency, poor production, waste of material, spoilage of tools and equipment, and loss of good will.

Second, a reduction can come only when you have a true knowledge of the cause, the real cause way down in the bottom that perhaps we haven't searched for yet in our analyses.

Third, an injury is merely the result of an accident. An accident is controllable. If we prevent accidents there will be fewer injury cases for us to worry about.

And fourth, if the causes of accidents are likewise causes of inefficiency, poor pro-

duction, spoiling of machines, tools, equipment, and loss of good will, then the prevention of accidents is good business from an economical viewpoint as well as a humanitarian viewpoint, and it is worth everything that any of us, or all of us, can do.

W. F. McCLELLAN (Armour & Co., Chicago, Ill.): I was much interested in Mr. Waite's remarks, and they follow very closely the plan we are trying to work. When we have a lost-time accident, we not only bring the injured employee in, but also all witnesses and the foreman and the department superintendent. And as Mr. Waite pointed out in those remarks about the vice president becoming interested in the punch press accident, quite often the plant superintendent will come over and take a seat in the far corner of the room, light up a cigar, and take it all in. I recall one particular case where he took a hand in the inquiry. Just his presence causes everyone to take the work seriously.

Not so long ago we started a special month's drive against accidents, and a girl slipped and fell down the stairs. The stairs were four feet wide with a hand rail on both sides, and they were in good condition as the investigation brought out. She wasn't taking the proper safety precautions by grasping the hand rail or by looking where she was walking. As a result her feet went out from under her, and she went down four steps.

She went to report to her foreman but he paid no attention to it and let the girl go back to work. She worked two hours and then walked half a mile to get a street car and go home. She lost four days, which necessitated us calling it a lost-time accident. We called her in before the review board for a statement as to why the accident wasn't reported, and also why there was no foreman's statement made out. This board of inquiry brought out all the real facts, with the result that this foreman was brought up to the superintendent's office and given a week's layoff.

We found in questioning this foreman that he couldn't tell us the date that the safety drive started, nor could he tell us when the drive had ended. We further found out that the safety literature had not been posted. He hadn't reported this accident, didn't make any attempt to tell the girl to report to the doctor's office, and for all those violations of the rules he was penalized, and came very near losing his job.

About a week later I happened to be up in that department, and asked that foreman what happened. He shook his head and said: "I want to tell you I have learned my lesson. If you had been at the meeting I had with the superintendent you would know how."

I might say we have half employees sitting on that board, and the other half are salaried supervisors. The hourly men take a hand in this questioning of employees and bring out facts just as much as the superintendents or the foremen do. We happen to have a colored fellow studying law. He is about to get his degree; he is very good at bringing out the facts. Either Mr. Barr or I act as chairman of this board, and as a rule, both of us attend.

We had another case that was very interesting, where a woman had been pricked with a prong of a rake in raking meat. The foreman brought down four witnesses. In bringing out the facts we found there was bad blood between two rakers. It was a piece work proposition, and as the meat came down the chute both girls would reach down and try to get hold of the leanest meat. In doing this it happened that one girl nicked the girl across the table and the scratch caused her to lay off one day.

Well, we called those girls in and found out plenty. The superintendent was sitting there, and he heard all these facts, and he decided right then and there that he could arrange his bench somewhat differently so that we wouldn't have to make use of the rakes.

CHAIRMAN BRAINARD: Mr. Waite reminded us of one other thing in his talk which I think needs emphasis, and that is the lack of proper instructions.

At one of our plants in the west an organization was formed to review accidents, pretty much the same as Mr. McClellan has described. While I was visiting at that plant their board met to review quite a serious accident which had happened at the plant a few days before in which an oiler had his hand badly mangled. He was oiling a piece of machinery in what was quite obviously a very hazardous way, and in that review a number of things were gone into.

I was impressed with the thoroughness with which they did the job; first they asked if there had been a way provided by which the man could do the job safely; second, if he had been properly instructed in doing the job that way; third, had it been his practice to do it the unsafe way; next, had his foreman ever called his attention to his doing it the unsafe way, and had he reminded him of the safe way of doing the job.

All of those things were gone into thoroughly. It was very evident that that foreman, when he came before the court of inquiry, had to be posted on what had occurred. He would have been very much embarrassed if he did not have all the facts ready. The court had been in operation for some time, and every foreman knew that when he went there he was going to face the plant superintendent, his division superintendent, probably the casualty man, and the plant doctor, and he knew they were all loaded with questions touching on the accident itself and the safety provisions which had been made.

It is a plan which, to my mind, is most effective, and one which we are extending to other plants.

E. D. WALKER (Quebec Manufacturers' Service Agency, Montreal, P. Q.): Mr. Waite's slogan of "Follow through" is quite correct, but as I get it, he intimated that should be done by the foremen. I think the management also should follow through.

In a pulp mill a man handling a knot saw was shocked and killed because of a short circuit in the motor. They had an investigation at the plant, and the chief electrician said the fatality was due to a broken ground wire. Probably it was. I saw the machine afterwards. The machine had been there a long time. I think moisture got through the insulation and caused a short circuit.

My point is this. The management had a duty to follow that through. If you ask the foreman, he will say he is no electrician. You ask the chief electrician, and he to shield himself will say what he thinks is the cause of it.

That doesn't go as far as it should. It doesn't prevent accidents like this happening again. I would like to have some one suggest a way of following that through especially in country districts. As it is now, we ask the chief electrician and what he tells us, we have to accept. And naturally in a case, where a fatality occurs, he is going to protect himself.

Whoever is responsible always shields himself. Can you suggest a way, Mr. Waite?

MR. WAITE: You want to know the proper way of following through?

MR. WALKER: Yes. In this case I believe the chief electrician was the man responsible, not the foreman of the shop. The electrician is supposed to keep all machines in order electrically, and through an electric defect, this man was killed. The foreman of the shop couldn't be expected to say what was the cause. That was up to the chief electrician.

MR. WAITE: Did the chief electrician make sufficient investigation to determine the true cause?

MR. WALKER: He said he did. He said it was a defective ground wire. Had the ground operated, probably the man wouldn't have been electrocuted.

MR. WAITE: Was the ground wire in such a position that it could be made defective by anything running over, or striking it or was it properly insulated and installed?

MR. WALKER: I cannot say. When I got there everything was taken away.

MR. WAITE: Some of the things to determine in an investigation of such a case are whether the insulation was defective or improper and whether periodic inspections were made of the equipment. If the ground wire or insulation was defective, by repairing that condition, they might have avoided the accident.

MR. WALKER: Upon whom should it be dependent to make the investigation? Should it be the foreman of the department who is not an electrical man or the electrical man?

MR. WAITE: Had hard and fast rules been established in that plant the equipment, especially the electrical equipment, must be inspected periodically?

MR. WALKER: Yes, but the management doesn't follow through. I asked the chief electrician. "Do you go around these machines, or have one of your men go around them, at regular intervals, and see if the grounds are working, and if the machines are all right?"

He said: "Yes. Once a year."

Once a year! How ridiculous! Isn't it? Now that should have been done at least once a month.

MR. WAITE: Why wasn't it done once a month or more frequently than once a year?

MR. WALKER: I can't say. The electrician is supposed to do his job. I say that no one can expect management to go and tell an electrician his job.

MR. WAITE: The order of inspecting equipment doesn't require electrical knowledge on the part of management. The management can say: "Equipment must be inspected often enough, once a month if necessary, to know that there will not be any danger of a man being injured or killed." But the chief executive can't take it for granted that that is going to be inspected. He should make it his business to take two minutes of his time and find out if the equipment is being inspected, and not be in too much of a hurry to take somebody's word that it is.

In your case there it seems to me that they didn't go as far as they should to find out why the ground wire was wrong, and why it wasn't discovered before.

MR. WALKER: To me it seems that they should have had a man to look out for those things, a man who is independent of the electrical department.

MR. WAITE: A man in that capacity is valuable in any organization. May I ask how much interest the management in that plant actually takes in such matters?

MR. WALKER: They take very little, and we have got a hard job of it.

CHAIRMAN BRAINARD: I think that is the answer, gentlemen. If the management doesn't take any interest, or only a very little, it certainly makes a hard job of it.

L. BARR (Armour & Co., Chicago, Ill.): The question has been asked who should check the electrician to determine whether he was telling the truth. In one of our plants we have an inspection committee composed of hourly paid men and management representatives. They are selected from the various mechanical departments throughout the plant. These men make an inspection, and check on all lost-time accidents and near-accidents occurring in the plant.

These men go to the scene where the accident occurred and make an investigation, independent of any that is made by the electrician or any one else in the organization. Therefore, if you have a committee that is functioning, they will make an investigation, and they will make periodic inspections of all their machinery and equipment. Thus they will be able to detect any machines or any equipment not functioning properly.

It is easy enough to tell where a ground wire is corroded enough to warrant replacement, or where something is radically wrong for example:

Sometimes we find in looking into fuse panels that fuses have blown out, and to prevent them from blowing out again the electrician may take a piece of fuse wire and wrap it around a fuse. If anything should go wrong, the man may be electrocuted, or the equipment damaged. I stress those points to show the value of a safety committee composed of hourly-paid employees and also management representa-

tives, one that makes a thorough investigation of all lost-time accidents and near-accidents and also a periodic inspection of the equipment in the plant.

CHAIRMAN BRAINARD: Our next subject is an address entitled "Hazards in the Manufacture of Patent Leather", by Mr. E. H. Merrill, President of Peterson, Merrill Co., Inc., Woburn, Mass. Mr. Merrill is one of the new comers in our section, and we certainly appreciate his coming.

Hazards in the Manufacture of Patent Leather

By E. H. MERRILL

President, Peterson, Merrill Company, Inc., Woburn, Mass.

After the last National Safety Congress, I received a letter inquiring about the handling of flammable materials in the manufacture of patent leather.

The question was raised as to what were the proper containers, and stated that several fires had started as the dipper was being lifted out of the container having the largest volume of material and a static spark would occur, igniting the contents of the dipper. Well, maybe—I would not say that it wouldn't or couldn't occur, but I will say that I have never seen or heard of it.

In the manufacture of patent leather we use large quantities of naptha and oil.

There is no question that due care must be used to guard against fires and explosions, and this care is used. I feel, however, that a lot of misunderstanding and suspicion exist when talking of the fire risk at a patent leather shop.

I have heard the matter discussed before, and each time what appears to the average outsider or the insurance investigator as the great big fire risk, centers around the operators on the daub and varnish benches.

As a matter of fact, I have never known of a fire or explosion at these places, nor have any of the numerous operators with whom I have talked known of fire ever taking place.

There are hazardous places in the manufacture of patent leather.

The greatest risk is at the oil boiling kettle. This work is carried on in a separate building at a good distance from the rest of the plant. Formerly wood or coke fires were used. The oil is boiled at a temperature around 580 degrees Fahrenheit and is reduced at high heats by adding very quickly a large quantity of naptha. The moment the naptha strikes the hot oil it vaporizes and rises in a cloud above and around the kettle, enveloping the men who are working so feverishly to control the oil at this operation.

Now the slightest spark at this time would be fatal. The money loss would not be much, but the men would be dangerously, if not fatally, burned.

There have been numerous cases of loss of life at this point in the operations, due to the fact that not all sparks in the fire used for this cooking were extinguished.

Today the old coke fires have been replaced with oil burners, which are easily and surely controlled by turning a valve. It has been years since I have heard of any trouble or loss of life at this point of manufacture.

Regarding containers, I cannot lay much claim for the industry to any vast improvement on this score. Both daub and varnish are stored in tanks for ageing and settling.

We formerly handled the varnish and daub from the kettle to the storage tanks by hand conveyors. They are now handled by pumps and pipe lines, direct from the kettle to the storage tanks, thereby decreasing danger from this handling operation.

The workmen need naphtha frequently, both as a reducing agent and for cleansing purposes. As a safety risk we hear a lot about the five-gallon safety can, but it does not work out in practice.

We have found it more practical to have naphtha pumps placed at convenient places about the plant where the operator can fill his small two-gallon pail when necessary.

This provides for the minimum amount that the men need at one time, and in a way that they can use it for what ever requirement they may have at the time.

For use, each dauber is provided with a square iron box-like tank with a hinge top. The tank holds about twenty-gallons. Into this he puts enough fresh daub to replenish his supply, cuts it with naphtha and kneads and mixes it with the old unused daub, ready for his next day's work.

This daub is dipped from his tank with a two-quart dipper to the grain of the side he is to coat.

The daub is spread over, and into the grain of the leather with a brush (like a shoe brush) and then the surplus daub is scraped off and thrown back into the tank to be used again.

The varnisher draws his varnish from the storage tanks into twenty-five-gallon ash cans, fitted with the ordinary loose cover.

No particular safety plan here, you say. Well, perhaps not, but they serve the purpose of utility perfectly and are the best possible things to work from.

Now, in case of fire, what happens? I have seen a fire in a Japan shop that consumed about half of the Japanning building.

All the tanks and cans were full of varnish or daub for the next day's business. Each tank or can had the loose fitted cover in place. As the fire approached and the heat became more and more intense, the naphtha began to vaporize, forming a gas which of course burnt.

After the fire we found many cans with covers still in place, but entirely empty. As the material in the cans got hot it formed a gas, made a pressure and escaped under the cover. It made a lovely fire but did not explode and nobody got hurt.

The methods of application are much the same today as they were at the start of the industry. It is all hand work. The only machinery in use is possibly a pump, blower-fan and a measuring machine.

These methods appear antiquated, as indeed they are; yet there has been much experimental work done to improve the process, but results have not been very successful thus far.

These experiments have centered principally around the air brush for the application of liquids and in some instances with enough success to warrant a few concerns continuing their experiments. They have, however, not been successful enough for the trade to adopt the air brush over the more antiquated method.

Another center of attack has to do with drying. All patent leather is baked over night in an oven, at least once, and more often twice, in the course of its manufacture, and the finished leather is sunned for a day in the open air.

The oven drying always gives some difficulty and the sun drying is a source of a great deal of uncertainty and expense.

We still use the old oven as being the best. As for sun drying, we know that the ultra violet ray lamp will do the trick and has been used successfully in Germany for a number of years, yet in this country the expense attached to its use has prohibited its adoption. It is still more economical to sun leather in the old way. A large concern has spent considerable money in developing a method to use these lamps and some day we shall probably find this method in general use.

While to an outsider, used to the newer machine methods of present day industrial life, the operations in a patent leather plant seem obsolete and antiquated; yet, outside of a few minor changes the best methods to produce patent leather follow closely to-day the methods used at the very start of the industry.

The trade is full of keen, alert young men who are trying and experimenting to improve the product and no doubt their efforts will bring results.

Meanwhile we are carrying on!

CHAIRMAN BRAINARD: We thank you, Mr. Merrill, for this most interesting paper. It is helpful not only for what it contains from an accident prevention standpoint, but also it has been quite informative to some of us who are not at all familiar with the processes used in the tanning industry, particularly as they pertain to the patent leather process.

OLIVER F. W. CROMWELL (U. S. Leather Co., Ridgway, Pa.): In the Griest-Pfeiffer Co. we use air brushes for putting on our varnish. Don't you put yours on that way? Or do you daub it on?

MR. MERRILL: Yes, I know that you use them, but you have a genius in your plant. He has always been a leader in the industry, and he has obtained a better development than any other man along that line. We use the old method. There is only one other man I know of who has made anywhere near the success that he has, and I don't think that he has done as much clever work as has Mr. Priest.

MR. CROMWELL: We found that we had to use all colored help, either Mexicans or negroes. We got better results in the matter of dermatitis from the varnish and the colors. I wonder if you had had any experience along that line.

MR. MERRILL: No. Where I was at Peabody much of the help was Polish, and where we are in Woburn, it is native, with a lot of Swedish and Norwegian. There has been a lot of trouble in the industry as a whole in regard to benzol poisoning. I am not sold on the idea that the doctors have really got the inside facts on the benzol problem. I have used benzol for the last eighteen or twenty years in the manufacture of patent leather, and up to eight years ago I never experienced any difficulty with sickness or anything of that kind with the workmen. But within the last eight years the benzol poisoning has come to the fore, and we have had a lot of it. It causes anemia, you know, and I question if it isn't the bootleg industry that has started up the benzol poisoning condition.

MR. CROMWELL: Do you have any trouble in making different patent colors?

MR. MERRILL: No, we don't.

MR. CROMWELL: We had some trouble with some of our women in putting on the daub, because of dermatitis on their hands and arms. They all use long rubber gloves now which seem to eliminate the trouble.

CHAIRMAN BRAINARD: The next item on the program is an address by Mr. Oliver F. W. Cromwell, safety Engineer and Adjuster, U. S. Leather Co., Ridgway, Pa.

The Handling or Adjusting of Claims

By OLIVER F. W. CROMWELL

Safety Engineer and Adjuster, U. S. Leather Co., Ridgway, Pa.

This is a very broad subject. It would be impossible to deal with all the phases of it in the short time allotted since a volume could be written on the subject.

The key note, particularly in relation to compensation work, should be a square deal for all. I cannot emphasize this point too strongly. Try to see the situation from the other fellow's view point, keeping the facts of the case in mind. This square deal means, be as fair as possible to the concern you work for as well as the employee you are dealing with. In many cases the employee gets the poorer consideration. Try to avoid this.

Let us consider all compensation cases as falling into two classes, namely: first the permanent injuries that result in the loss of members, or disfigurement, such as loss of thumb, eye, leg, arm, or their industrial use. These are fixed cases and the

compensation for them is fixed by statute. They do not need much consideration except from one standpoint, that is, where a question as to the amount of total disability is in dispute.

Here I mean, for instance, a man has a muscle torn in his arm, and he claims that he can't do his former work, because of muscle adhesions, or the muscle is so injured that he can't raise and lower his arm, and then, of course, there is a dispute to determine the amount of disability in the arm, and that is about the only kind of a case that comes up where it is a total disability.

This can be settled only upon competent medical testimony—not from one doctor but from several. In this class fall those cases of definite partial total disability. For instance, a man breaks a leg. He is sent to a hospital for some time, then returns home. The doctor then reports him for light work and he gradually gets back to his regular job. No adjustment is needed here.

The other class can be divided into several sub-divisions. First, those cases where the doctor states the man is able to work, but the employee refuses to try to work. Here, the next step is to send the fellow to another impartial doctor for a thorough check up, including X-rays etc., if necessary. If this doctor's report is favorable, and he too thinks the fellow should be at work, then we call the man in and explain the situation to him. We make it clear that both doctors report him able to go to work, that we will provide work for him. If it is a bad injury that he is returning to work from, we will see that he gets light work for the first few days until he gets back on his feet, and then after a reasonable time we will expect him to assume his regular duties.

I had a case like that last week. A man had fallen off a pile of lumber about 22 feet high, and dropped on his left foot. I say last week, but I mean he came back to work last week. The accident was some weeks ago. We sent him to a hospital, and he was there for about two months. He did not improve, so we sent him to a bone specialist, who practically rebuilt his foot. The man came back and worked two weeks, and then we had to shut down the mill. He then claimed total disability for loss of use of his leg. That is where it is necessary to make an adjustment.

We try to be fair in presenting the case. We explain to him that both he and the company will have to be guided by the medical reports. As a result the man will usually return to work. If he still persists, then there is no road left open except to petition the Compensation Board for a hearing to close the case.

Now let us assume the second doctor's report is unfavorable. There are then two courses left to follow. If the first doctor is fair-minded, we either call him by telephone or write him a letter giving the facts in the case, explaining that the man refused to return to work and that we had had a check-up by Doctor So and So, and he felt that there was a possibility of the man still being disabled, and ask him for his opinion. If he maintains his former stand, then we may send the fellow to a third doctor. If the third feels that there is some disability, we continue the case for a week or two, then try to close it. It may be necessary to send him back to the doctors at this time for a further check-up. We have to be guided in our future actions by their consensus of opinion. It is not that we distrust the first doctor, that we send the man to another. It is merely to be sure that nothing was overlooked. We are all human and so are doctors. Some are liable to stress one part of the examination while others will lay emphasis on another part. In serious bone injuries it is always advisable to send the patient to the nearest bone specialist as soon as possible. He is dealing with that problem every day and has it at his finger tips. Our Legal Department has the motto: "It's best to have a preponderance of medical testimony".

If, after a reasonable length of time we have not been able to close a case, then we petition the Compensation Board for a friendly hearing on it to determine the facts in the case.

Before going to a hearing you should be perfectly familiar with the case. First talk to the employee if possible. Try to be a good judge of human nature. Size your man up. You can generally judge the type of man, and experience will tell you how best to approach him. Get him to give you all the facts. See the place where the accident happened. Talk with all the witnesses and get a written statement from them if possible. Have someone take it down in shorthand and later have them sign it if necessary. This only applies to the very serious accidents.

See the superintendent and foreman concerned and get their views on the man in regard to the accident and the quality of work he is turning out, also his family relations may aid. Next interview the doctors concerned. See the X-ray plates and know the facts they present. If a hospital case, study the hospital records, and also talk to the nurses that have taken care of him. Call at the hospital once a week or so to see the patient.

I once won a total disability case by insisting that the doctors indicate the line of fracture on the X-ray plates where it was alleged that an employee had had a complete fracture of the left leg. Later I found out that he had walked unaided better than a mile to see the doctor. That illustrates the fact that you must know all the details and facts in a case. In other words, know your case before trying to present it.

Photographs

In many ways photographs are handy. I generally carry a vest pocket camera with me and sometimes one or two larger ones. You never know what pictures they will show until they are developed. It is sometimes well to take group pictures. You may be able to identify some employee by the picture later on. In settling fire losses it may come in handy. Taking pictures before of a certain locality and then one directly after an accident has happened, often produces some startling results.

Another place where a camera comes in handy, is where you have an employee who refuses to return to work and drifts away to some other section. Later you investigate and find him working for another concern. A picture showing him at work is very helpful in closing the case.

Bills

Compensation laws or statutes in the different states specify when compensation shall be paid. Try to be prompt in the payment of these claims. You never know how badly the employee or his family may need these funds. They usually have no other means of support. If they are due on a certain date, they should be paid then, or if they have to be mailed, they should be mailed so that they will be received by the employee on the designated date.

Do not adhere strictly to compensation law in the payment of your medical expenses. If a bill is fair and reasonable and extends beyond the period required by law, pay it. The doctors will be more liberal with you. Doctors will give you better service and will work with you. It will save you money in the long run.

To aid in getting facts, get acquainted with all the doctors you are likely to come in contact with. If a new doctor moves into the community, call on him and make yourself known. Explain to him your position on compensation cases. This also applies to the hospital staffs. Be fair with doctors and hospitals.

Now the last point that I want to emphasize, and which I would like to write in brilliant ink is: **PAY** all legitimate and fair bills and do it with the greatest dispatch and promptness. Doctors must live. They have bills to pay too. They have rendered the service and are entitled to their reward. This also applies to hospitals.

CHAIRMAN BRAINARD: Mr. Cromwell, what can you tell us about the best way to get a statement from the injured man himself? The reason I ask is that in review-

ing statements taken by employees of the casualty company, I see reflected in them a tendency toward leading the man in making his statements; perhaps not intentionally, yet it seems frequently that a man is led to make a statement that in a way is detrimental to his own case.

MR. CROMWELL: I wouldn't want to question any employee so that it would be detrimental to his own interests, because the employee has everything to lose in a statement. I generally get them in, or go to the hospital where they are, tell them that we want all the facts, and then have their statements taken down verbatim. I don't change the English, because the minute you do, if it is brought up at any time, the first thing that will be brought out is that it is better English than such men would use. And then you are criticized right away, and they are biased against your case.

I prefer being fair with a man, and letting him tell his own story in his own words. Of course, lots of times it is well to suggest questions to him that will bring out facts favorable to him, and to the company.

Two weeks ago I had a case where a man was found unconscious 150 feet from where his tools and gloves were, showing that he had for some reason or other, left the place of his immediate employment. He was found there by one of the men who had gone to look for him, and by the subcontractor working there.

I asked the subcontractor, and the man who had found him to attend the compensation board hearing. Now if I wanted to cheat the employee, I would never have asked those two men to come, and if they hadn't testified, the fellow would have lost his case. As it was, he received \$65 compensation, and \$100 doctor's bill, because there was a doubt that the man might have been struck on the head, and as he became unconscious, wandered away from the work. There is always that possibility. In dealing with an employee, you must be as fair and square as you can possibly be. And I find you will benefit from it in the end.

CHAIRMAN BRAINARD: We will pass to the next item, which is the report of the Nominating Committee. E. E. Drews will give the report of that committee.

Report of the Nominating Committee

MR. DREWS: The Nominating Committee consisting of A. B. Drummond, O. F. W. Cromwell, W. F. McClellan, and E. E. Drews recommend the following to be elected to the various offices of our section for the ensuing year.

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

Vice Chairman—THOMAS WEBBER, Rath Packing Co., Waterloo, Ia.

Secretary—HARRY W. EXKINS, Brown Shoe Company, St. Louis, Mo.

Chairman Poster Committee—GLENN COWGER, Armour & Co., Kansas City, Kansas.

Chairman Program Committee—DEAN MONEYMAKER, International Shoe Company, St. Louis, Mo.

Chairman Membership Committee—JOHN LAUERMAN, Armour & Co., E. St. Louis, Ill.

Chairman Publicity Committee—J. L. NELSON, Tanners Council, New York City, New York.

Chairman Statistics Committee—J. L. NELSON, Tanners Council, New York City, New York.

Chairman Engineering Committee—HAROLD M. TOOMBS, Armour & Co., Chicago.

Chairman Committee on Slides and Safety Kinks—GLENN COWGER, Armour & Co., Kansas City, Kansas.

News-Letter Editor—HARRY W. EXKINS, Brown Shoe Company, St. Louis, Mo.

Members Executive Committee at Large:

A. B. DRUMMOND, Wilson & Company, Chicago.

HENRY D. TEFPT, Institute of American Meat Packers, Chicago.

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

This completes our slate of officers with the exception of a Chairman for a Health Committee. I understand that practically all other sections have a Health Committee. Possibly you will want to consider the advisability of appointing one now, or leave it to the incoming chairman to appoint someone to this office.

CHAIRMAN BRAINARD: Gentlemen, this is the report of the Nominating Committee. Before taking up the last part of that report, about the question of some one as chairman of the Health Committee, I think we should act upon the report of the committee. I believe the first action would be to accept the report of the committee.

(Upon motion made by Mr. McClellan, seconded by Mr. Cromwell, it was voted that the report be accepted.)

CHAIRMAN BRAINARD: Are any nominations to be made from the floor? Hearing none, I declare the nominations closed. Does any one make a motion that those nominated by the Nominating Committee be declared elected?

(Upon motion by Mr. Cromwell, seconded by Mr. Drews, it was voted that the Secretary be empowered to cast one ballot for the list of nominees as submitted by the Nominating Committee, and that these nominees be declared elected.)

CHAIRMAN BRAINARD: That concludes our schedule for this afternoon, gentlemen. We have had a very good meeting. I think that the talks and papers which we have listened to have been above the average.

I now present our newly elected chairman, Mr. Hubert L. Clover, of St. Louis. HUBERT L. CLOVER (International Shoe Co., St. Louis, Mo.): Gentlemen, I will not take up your time by making a speech. It would only detract from the splendid talks you have heard. I consider it an honor to be elected to this position, and with your help I will try to keep the Packers & Tanners Section progressing in its quest for knowledge of accident prevention. Thank you.

ADJOURNMENT

Wednesday Morning Session
October 1, 1930

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

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

CHAIRMAN CLOVER: The first speaker on the program this morning is Mr. E. E. Drews, assistant superintendent, Libby, McNeill and Libby, Chicago.

Trend of Accidents in the Packing and Tanning Industry

By E. E. DREWS

Assistant Superintendent, Libby, McNeill and Libby, Chicago, Ill.

My paper covers experiences of members of the Packers & Tanners Section taken from data secured from the National Safety Council, which I believe 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 doing so.

The accident experience of members in our section has, in general, followed the tendency of industry as a whole during the last three years. During this period, lost-time accidents in industry have shown, based on exposure, a decrease of over 11 per cent, but days lost per thousand hours worked have increased about 5 per cent. The combined records of all meat packing plants and tanneries that reported in each year of 1927, 1928, and 1929 show a drop in accident frequency of 16 per cent, but a rapid rise in the severity rate from .91 in 1927 to 1.92 for 1929. The comparatively high severity rate for 1929 can be traced to an abnormal number of fatalities.

The progress of the 7 plants in the packing industry that have reported in each of the last three years has been excellent—lost-time accidents per million hours worked have declined 36 per cent in comparison with 1928 and 26 per cent in comparison with 1927. Likewise, days lost per thousand hours worked declined 48 per cent in 1929 in comparison with 1928 and 24 per cent in comparison with 1927.

The frequency rate, however, for the three identical years in the tanning and leather manufacturing establishments was slightly higher than for either 1928 or 1927; and owing to the occurrence of an unusual number of fatalities in these plants, their 1929 severity rate was much higher than for previous years.

Let me remind you that these comparisons are made possible only by the plants that have reported in each of the last three years. By omitting the records of plants they reported one year and failed to report the next as well as those that reported for the first time in 1929, the most reliable measure of improvement is obtained. Consequently, every member of this section should make a special effort to report every year. Be consistent in your reporting!

A more representative picture of our progress in safety from 1928 to 1929 is presented by a much larger number of plants reporting for, though only 21 members have reported in each of the last three years, 38 reported for both 1928 and 1929. The average frequency rate for the 27 establishments engaged in tanning and manufacturing leather goods for 1929 was 15 per cent lower than for 1928, but their 1929 severity rate, on the other hand, was much higher than for 1928 on account of the previously mentioned increase in fatalities. Individually, 13 of these plants had a lower frequency rate in 1929 than in 1928; 13 others had higher rates, and one reported no change. In contrast to the sharp increase in the average severity rate, 15

plants reduced severity in 1929, against only 9 that had worse experience, which, however, more than offset the improvement shown by the majority.

The combined records of 11 packing plants reporting in 1928 and 1929 showed an improvement of 33 per cent in frequency and 43 per cent in severity. This improvement was very general among individual plants because ten plants had lower frequency rates in 1929 in comparison with only one that had a higher rate. Lower severity rates were achieved by 8 establishments during 1929 in comparison to only 3 with higher ones.

The progress which our meat packing members have shown during the last two and three years is particularly encouraging because of the high frequency rate in this industry. The 18 packing plants that reported for 1929, some of them reporting for the first time, had an average frequency rate of 55.94. The average frequency rate for our 34 members in the tanning and leather industry that reported for 1929, some of them likewise reporting for the first time, was 31.35. The 27 industrial groups given in "Industrial Accident Statistics", 1930 edition, had an average rate of 25.53 which is less than half the rate for our packing members and somewhat less than for our tanning and leather people. The packing industry ranked 26th and the tanning and leather industry 22nd in this list of 27 industries. Can we console ourselves with the explanation that hazards in our industries are more numerous than in others? Members in the construction, lumber and woodworking, petroleum, steel and cement industries averaged fewer lost-time accidents per million hours worked than those of us in the packing industry, and cement, steel, and petroleum bettered the average frequency rate of our tanneries and leather plants. In 1919 the cement industry had an average frequency rate of 43.47 which, year-by-year, was steadily reduced until in 1929 their rate was only 9.54. I believe we can accomplish similar results.

We are having too many temporary disability accidents. In industry as a whole, one employee out of every 1,888 was killed or totally disabled during 1929; in the packing industry, however, only one out of every 5,156 was a fatality and in the tanning and leather industry, only one out of 2,953. Comparisons on this basis show that fatalities are not as numerous in our industries as in most. Only one employee out of every 1,074 in our tanning and leather group suffered a permanent partial disability accident during 1929 in comparison with one out of 430 for the industry as a whole. The comparison is not so favorable for the packing industry in which one out of every 333 employees lost or suffered the impairment of some member of the body. The frequency of accidents in the packing industry may be emphasized by the fact that one out of every seven employees had a temporary disability accident last year. By reducing our minor accidents, we are also eliminating possibilities for serious injuries—one man may slip and fall with no serious injury but another may be carried away with a broken leg.

Individually, favorable experience was achieved during 1929 by more members in our section than the average accident rates of each group indicate. We have 7 tanneries and leather establishments that achieved frequency rates less than 9.0 during 1929. Eight other plants in this industry had rates ranging between 10 and 19.9; in other words, almost half of this group that reported for 1929 had rates less than 20.0, although the average rate for the entire group was 31.55. These good records were made by plants employing from 30 to over 1,000 people.

The best records in the meat packing industry were made by four plants ranging in size from 70 to over 1800 employees with frequency rates less than 20.0. Individual records in that group of our section show that 12 organizations out of 18 had rates less than the average of 55.94. It is evident that those with rates higher than 55.94 had experience which was distinctly out of line with most of the industry. Perhaps unusual conditions, which may be temporary, account for some of these high rates, but should we not investigate accident conditions more closely in our plants?

Though the 1929 severity rate for the tanning and leather industry last year was

1.60, severity rates less than 1.0 were reported by 85 per cent of the group. Similarly, 11 of the 19 reporting plants in the meat packing industry had rates less than 1.0 in comparison with an average of 1.47. In 1928 this branch of our section had an average severity rate of 2.06; no plant reporting for 1929 had a rate higher than 1.74. It is apparent therefore, that serious accidents were limited to comparatively few plants in both industries.

The interest which our members are taking in their accident prevention work is reflected by the steady increase in reporting establishments each year since 1926. That year 11 tanning and leather manufacturing establishments reported an exposure of just over 15,000,000 man-hours, but in 1929, the group was represented by 34 plants with over 28,000,000 man-hours. Only five meat packing establishments with an exposure of slightly over 4,000,000 man-hours reported for 1926 in comparison with 18 establishments with over 100,000,000 man-hours reporting for 1929. We are getting a more and more reliable cross section of the accident situation in our industry each year. The officers of your section appreciate your cooperation in determining the improvement the section is making in its accident prevention activities.

Proper accident records are an essential part of each member's safety activities because—

- (1) Good judgment on safety policies and methods can be successfully based on the facts disclosed by the "Where, when, what, and why" of accidents in your records.
- (2) They furnish the safety man with information of interest to foremen and workers and aid him to secure their cooperation.
- (3) He knows definitely the progress he is making in reducing accidents.
- (4) He can ascertain his safety among other plants in his industry.
- (5) The contribution of annual records to the National Safety Council survey of the accident situation in the section is not only an expression of interest and cooperation in the work of our group but a contribution of information of mutual benefit.

N. L. BRAINARD (Swift and Company, Chicago): The statistics show a rather large number of fatal accidents in the packing and tanning section. In arriving at the severity rate, a fatal accident is charged 6,000 days, so that would bring the days lost per thousand hours worked up to quite a high figure.

MR. TEFFT: If you knew the nature of the accidents that caused the increase in severity, we would know what to concentrate on.

L. BARR (Armour and Company): There seems to be a tendency toward concentrating more on lost-time accidents and the frequency rate than there is toward the severity rate; and I believe for that reason our severity rate is going up and our frequency rate is coming down.

All of our contests are based on frequency of lost-time accidents in the plant. We have given very little attention to the severity rates. In our future campaigns and contests if we concentrate on both frequency and severity, then there will be a downward trend, in both rates.

MR. McCLELLAN: Do you know the size of the plants? Do they represent the entire meat packing plants as a whole?

MR. DREWS: No, sir.

MR. BRAINARD: I have a copy of the National Safety Council report for 1930, covering the 1929 experience. The severity charges amount to a total of 48,000 days on account of deaths and permanent disabilities. That is the figure which raises the severity rate on partial and temporary disabilities. The figure is practically 100,000. These weighted figures for permanent and total disabilities are practically a third of the total number of days charged for disabilities.

It is noticeable the packing and tanning industry has a high frequency rate but on the whole, as compared with other industries, a low severity rate. Our industry

stands near the top in the frequency, that is, the accidents occurring per million man hours worked; on the other hand, our severity is amongst the lowest, 1.47, and that compares with 4.62 in construction, 3.59 in wood working and lumbering, 1.60 in tanning, 1.73 in foundries, 2.49 in petroleum, 3.13 in public utilities, and 2.75 in steel. I find the figures indicate, that we have a large number of lost time accidents where the days lost is small.

I analyzed the figures at a few of our plants, and I found that taking our plants as a whole, we have many lost time accidents in which the time lost was one day, two days, three days—over 50 per cent less than six days; over 50 per cent which run the length of time where compensation was paid. We who are familiar with it know that we have a great many knife cuts and minor injuries that do cause a day or two off, and yet do not run to the time where compensation is chargeable. This gives us a high accident frequency rate but a small severity rate, compared with other industries.

MR. McCLELLAN: How many plants reported?

MR. BRAINARD: Eighteen in the meat packing industry.

MR. TEFFT: Are those plants members of the Council?

MR. BRAINARD: No.

MR. TEFFT: Do they have to be?

MR. BRAINARD: Not necessarily. Last year was the first that our houses have reported on our experience, and in making our reports we overlooked the National Safety Council's instruction to include all office workers. We have been using figures for our own comparative purposes, amongst our own plants, and we have not included office workers. To include office workers in a statistical report would affect the standing of the industry as a whole quite a little.

There should be very few accidents which require one day off. If a man can get back the second day apparently there is no reason why he should be off at all. Perhaps there are cases, where a man is shocked or he is upset and he is justified in taking one day off.

MR. BRAINARD: In analyzing the figures we have been able to show our officials what is occurring. This has resulted in cutting down not only the days lost, but the number of lost time accidents to one and two day disabilities.

MR. BARR: Mr. Brainard, do you report to the National Safety Council for Swift and Company as a unit or do you show the experiences of your various plants?

MR. BRAINARD: Our figures for last year, were reported as a whole.

MR. BARR: That includes all your meat packing plants?

MR. BRAINARD: Yes.

MR. TEFFT: Would it be possible for a plant that didn't have definite organization on safety work to make reports of value to the National Safety Council? Possibly few plants are reporting, because many have no definite safety work and they believe a reporting would require additional work.

MR. BRAINARD: We have found but little extra work is involved, as we already have the data desired since many of the plants keep the desired information in their monthly records.

MR. TEFFT: Would it be helpful if the Institute of American Meat Packers could make some effort to interest members to report accident figures? They would then have available statistics of the industry as a whole, which would show how they relatively stand. An unfavorable standing might excite a plant's interest to do safety work.

H. G. SCHAFFNER (Schaffner Brothers, Erie, Pa.): I think a good many of the plants that belong to the Institute do not belong to the National Safety Council, and if the Institute could create some interest amongst the other plants that it would be very helpful to the Council in general.

MR. TEFFT: That is what we are trying to do. If we can cooperate with the

Safety Council without appearing to solicit memberships in the Safety Council, I think it would be all right. I am speaking unofficially, of course.

Mr. BRAINARD: We believe the compiling of accident statistics has been a great help to us in stimulating the accident prevention work, and in more intensive work in some of the plants which believed they are doing well. The making of accident comparisons has the same effect as comparisons along other lines, for instance, labor costs and other operating costs. We send to each of our plants a brief statement showing its accident frequency rate and severity rates.

The terms accident frequency and severity are perhaps a little bit meaningless unless one knows what they actually mean and what is behind them. During this past year we have been surprised at the reaction of some plants to these comparative stands. Plants which have had a bad record, and which we have been hardly able to get to in any other way, have seemed to feel it is a reflection on them to have severity and frequency rates way in excess of those of other plants. It is just one of the things, that induces and stimulates a plant, to better its accident record, for example:

One of the smaller plants last year stood almost at the top because of its poor frequency and severity rates. The comparison of its rates with other plants together with some additional work on our part in analyzing its reports and in giving hints as to how its report should be analyzed, has resulted in a 75 per cent reduction in accident frequency. The fact that a brief recapitulation of the figures goes to the directors who show an interest and question us concerning them, has aroused the interest of the managers and superintendents as nothing else could.

Mr. BARR: It seems that though the figures compiled by the National Safety Council in reporting 18 packing plants are misleading, Mr. Brainard has the experience of 25 plants which he reports as a whole. I think there should be some indicating mark on the outer margin to indicate that Swift and Company's experience represents 25 plants.

Mr. McCLELLAN: That would give their key number away. They don't want that.

Mr. BRAINARD: There is to be a luncheon meeting tomorrow at which I understand this whole subject is going to be discussed. We think as does Mr. Barr, that perhaps we should separate our plants, and report them as individual plants.

CHAIRMAN CLOVER: The next subject is "Accident and Health Hazards in the Packing Industry," by Dr. V. S. Cheney, Armour and Company, Chicago.

Due to a serious illness in Dr. Cheney's family, he is unable to be with us. Dr. Joseph Wiener, physician for the Eastern New Jersey Power Co., Asbury Park, N. J. will speak in place of Dr. Cheney.

Accident and Health Hazards in the Packing Industry

By DR. JOSEPH WIENER

Eastern New Jersey Power Company, Asbury Park, N. J.

There are problems in the industrial medical field which are common not to any peculiar industry, but apply to the entire field of industry.

Five years ago if I were to have addressed this group I would have done it very apologetically. Today I don't think the physician need apologize for his appearance in industrial groups. He is fairly well justified in appearing in industrial circles, and comes with a desire to extend the scope of his activity.

Primarily the physician was called into industry to treat the results of industrial accidents—cuts, bruises, broken bones, and physical impairments of industrial endeavors. Then his scope widened to the point where he became interested in the

preventive side of these accidental hazards. He cooperated with the industrial engineers in a measure to correct apparatus and machinery of the sorts which were primarily the cause of certain types of accidents.

Until the present time his interest has been purely mechanistic, from the standpoint of correction of materials. Now realize that the time is quite ripe to approach the subject as we have at the present moment—the question of the individual from the mechanistic attitude.

Industry has until the present time looked upon the individual as an economic factor, a productive unit, and interest in the individual was merely as such; but that age, which we refer to as the humanizing of industry is one which you begin to look upon the individual more as a human, as an individual with mortal hopes and desires and dreams and fears and joys, discouragements; and it is that individual that we have to cope with. In the problem that faces us in that respect we have ultimately the better solution to your problem of cutting down your severity rates and your frequency rates, and all that sort of thing.

Don't forget when your workman comes to the plant in the morning he leaves behind him a very complex organized system of things which have their indelible traits upon his activity of the day. The industries, in the person of the physician, must realize that the individual is more than merely a coordinated group of muscles that can be taught to do a certain thing in a certain way. Behind the physical and mental being of that man is his attitude toward the group of individuals with whom he is associated.

At last night's dinner of the Industrial Health Section I was very interested in talking to a man who is uncovering some very unusual experiences they have had, and I was very, very pleased, because I am tremendously interested in this health program that we are now inaugurating.

He told me about any number of people, who during the spring, winter and fall season lose so much time, not as a result of accidents, but because of home conditions; and they have made an attempt to tabulate and investigate into the conditions at home which cause workers to lose time and disorganize the industry. One of the greatest factors they found is colds in the worker's wives, worker's children—and in cooperation with the family physician they were enabled to procure and to treat the families of some of these workers with ultra-violet light. He tells me that it is almost unbelievable to see what is happening.

They have cut down the lost time due to colds in the worker's family materially; and not only that, but they have increased the morale; they have done something to that worker that makes him feel grateful for working for a group of people of that sort.

We have two great factors, of course, in the worker; one the mental, and the other the physical. The approach to the physical factor is entirely through your physician. The physical examination, is becoming recognized as the most important part of the employment of a worker; and the repeated examination of that worker yearly or semi-annually is an important part of the maintenance of that worker.

The mental factor is something a little bit more difficult. That, most times, does fall into the hands of the physician to take care of; or of the personnel man, the foreman, or the immediate superior of the worker. How much each industry can do to overcome these factors is something which has yet not been outlined. But I do feel that there is a tremendous field in that direction for good work, and there are many things being done at the present time.

I know that the National Safety Council has inaugurated something in which we are trying to learn about the peculiarities of the medical problems in each individual industry, familiar to the men who are in the industry, like your Dr. Cheney and others in other industries who are very well versed and aware of that peculiar

problem, but the rest of us weren't, except as we came into our sectional meetings, and then only had a very fleeting picture of the thing.

The Council is appointing now one man to represent each industrial group and to make a report to the Council of the peculiar problems in industry, and then have them circulated and see if perhaps someone can't find solutions to these problems in other fields of activity, rather than your peculiar industry.

There is much that can be said about this, but one thing I would like to do this morning, is to make a plea for the endorsement and the help of you key men. You are the men who, after all have not so much the authority, but the ability and the means, and the wherewithal to inaugurate and carry forward a program of that sort.

It is going to be a tremendous and difficult thing. There is nothing as yet that is definite; the program itself is rather sketchy; but I will say that the health program and the investigation of the individual health of the workman and his social life is tremendously important to industry. We realized it, but at the present time have been unable to do much about it.

We had one man who came up to the office one day very downcast. He had many accidents; his foreman had called him to task for it; upon investigating we found his wife had been very, very ill; his finances were such he could not afford the proper sort of medical attention. There was his wife an invalid at home, with two, three, or four children; he had to work all day, worrying what the children were doing; hurry home at night, prepare his meager meal, and he had to carry the entire burden of the entire household, besides being the wage earner. There is no question but that man's value as a workman was definitely impaired as a result of that continuous mental stress and strain, which was the cause of a number of minor accidents, true, but they were accidents, and they could very well have been major accidents.

After an investigation we advanced the man enough money to take care of his wife's condition and she was operated on. We had a public health nurse come in to look after the children for part time. Today he is an extremely happy man; very thankful to the company and one of the most loyal employees we have. He is paying back to the company out of his weekly wage the money advanced to him; and everybody is exceedingly happy. I think that there is a tremendous amount of room for just that sort of activity, not only in our industry, your industry, but everybody else's industry.

CHAIRMAN CLOVER: Thank you, Dr. Wiener. Is there any discussion on Dr. Wiener's talk?

H. G. SCHAFFNER (Schaffner Brothers, Erie, Pa.): The plant suggested as to medical examination, we have carried on for the past two or three years; at least once a year all of our employees must go to our plant physician for a physical examination. You would be surprised to know the various kinds of infection discovered at these physical examinations. For instance, we ran across two cases of Vincent's Angina, or Trench Mouth, that the patients themselves didn't know had existed. They had been treating themselves for Pyorrhea, which would become of serious nature if they had let it go on.

Then we found several skin infections; and a lot of them found they had had tonsils, and were having rheumatism, and so forth. Now we are trying to inaugurate a plan whereby each man applying for a position must have first a physical examination before we employ him. Although we are not a very large institution (around 200 employees) we found it to be a very good plan, and it has worked wonders in stopping these minor accidents and lost times cases.

CHAIRMAN CLOVER: We will go on to the next part of the program—the round table discussion, to be led by Mr. Drummond. I don't see Mr. Drummond in the room. Mr. McClellan, will you start this round table discussion?

(Mr. W. F. McClellan took the chair).

CHAIRMAN McCLELLAN: If there are any problems any of you gentlemen have which we can discuss, we will help one another in advancing ideas.

L. BARR (Armour and Company): I would like to know what means the various packers have adopted to make a study as to the causes of various accidents, especially the lost time ones. For the past year I have kept a record of our Chicago plant, and at first if you asked anyone about the most common accidents in the packing industry, they would tell you that they are due to knife cuts. It is true that most of our minor injuries are knife cuts, but only a very small percentage of those knife cuts become lost time accidents, compared with the other causes of accidents.

I find in my study of the causes for the various accidents only 15 per cent of all accidents occurring within the packing industry are due to knife cuts causing the time lost from work.

MR. BRAINARD: Since we completed our last fiscal year with a full set of statistics on lost time accidents, studying as to causes, figures show quite a variation at the different plants as to lost time accidents resulting from knife cuts. In our Chicago plant we show 18 per cent, a little higher than the figure you state.

On the other hand, we have found one or two places where the percentages of knife cuts to the total time accidents run as high as 33 per cent. Part of that, I think, is readily explained by the fact that the killing and cutting operations at some plants, as compared to all operations, manufacturing processes, and so on, are greater than at the other plants.

We have found, at the same time, the necessity of getting into the causes. That was touched on here yesterday in Mr. Waite's talk—examination of every case, investigation, I should say, follow-up to get at the real causes—and we have made some quite complete statistics on some of the plants, where the records seem to be out of line with other plants.

We have been a little bit surprised at what we have found. At some plants the number of lost time accidents due to slipping and falling was way out of comparison to what it was at other plants; at some plants the number of accidents due to falls on stairs seem to have been unusually high; and we found there was a reason for that—improper lighting on stairways, and not enough attention given to safety treads and hand rails, and those things which tend to make stairways safer.

I am beginning to see the value more and more of the statistics we are keeping. Statistics in a good many respects are dry and don't mean a great deal, but I believe in getting at the causes, the class and type of accidents that are producing the greater number of accidents we found that quite a bit of help, in just pointing out to the different plants what was causing the accidents, and then going further and giving that particular cause special attention.

MR. BARR: I believe the packing and tanning industry is receiving a bad reflection through the statistics published by the National Safety Council in their last report. It shows the packing and tanning industry with a very high frequency rate; in fact, almost at the top of the list, only being offset by the construction industry which has a greater frequency rate.

I am led to believe that those figures are misleading because we are not receiving reports from the larger packing plants, and only the experience of the small plants, which is very bad, tends to cause this frequency rate to a percentage so high.

Taking the average for all of the Armour plants for the past year, we find that our frequency rate, as compared with the figures published by the National Safety Council, is better by 60 per cent; and we have also found that by stimulating the various drives over a period of a month, two or three months, that we can further reduce this frequency rate; and I am led to believe that if we can get all of the big and small packers to give us these figures, and then have the answer to the Institute of American Meat Packers response for a safety campaign among the various packing industries, that we can still further reduce their frequency rate and make a better

showing in the eyes of the other industries, as to the real picture of the accident hazards in the packing industry.

CHAIRMAN McCLELLAN: We have with us Mr. Tefft as the representative of the Institute of American Meat Packers, to point out just how far the Institute could go in getting some of the smaller or larger packers that are not reporting their accidents.

As Mr. Barr states, it is not a true picture of the packing industry when we only have a certain number of plants reporting their accidents. I don't know whether the Institute, in trying to get these smaller packers or members of the Institute to send in their reports to them, could handle it with the National Safety Council in some way; or whether or not that would embarrass the Institute as trying to make it appear they are anxious to get these men into the Council; but I do think that we can handle it through the Institute, and in that way there wouldn't be any appearance of forcing these people to join the Council.

H. D. TEFFT (Institute of American Meat Packers, Chicago, Ill.): Of course, I can't speak officially, but the primary interest of the Institute is to reduce the accidents in the industry. Any way it can be done properly I am certain the Institute would accept. I don't see any reason why there couldn't be some working arrangement made between the Institute and the National Safety Council, whereby mutual figures could be released, without involving the members in joining the Safety Council unless they wanted to. Personally, I really believe it would be an admirable thing if the members of the Institute were also members of the National Safety Council. Of course, the Council has kind of a special field of its own which I doubt very much if the Institute could ever duplicate, and it would be just a case of duplication of expense. On the other hand, there might be some members who would feel that they only want to belong to one organization.

I think that our accident prevention committee can bring the matter up officially before the Institute and see what they want to do on it. I have a feeling that an executive doesn't need to know what the frequency rate or severity rate means, but he would hop very quickly on any figures that showed a figure of 70 for him and 8 for the average of the industry, and over half with 12. He wouldn't have to have a very long explanation of what that meant. He would know it was high and he would take an immediate interest in accident prevention work.

CHAIRMAN McCLELLAN: I believe that if the Institute could interest the smaller packers, we could act for all, both large and small. For instance, the accident prevention committee could so handle the matter that we could put on drives sponsored by the Institute, and have them going on among the different packers. That way would educate the employees of your plant, as is now done by the way fire drives are now carried on. I think an accident prevention campaign sponsored for a month, probably among all the packing industries, and having your accident prevention committee of the Institute the governing body to handle it, would be making a long stride toward educating the workmen.

MR. BARR: The cement section and the paper and pulp section have put up various trophies for various safety records made by the various members that belong to those industries. As a result of their campaigns they have not only reduced the frequency rates in their plants, but also their insurance rates. The base rates that are charged by the insurance companies against these various packers, especially the small ones, are based on the experience of the packing industry as a whole. If we improve our experience, naturally we are going to improve our insurance rates. That is going to be a big selling point if we can talk to the small packers in that language.

CHAIRMAN McCLELLAN: Some of the packers carry their insurance in outside companies and they take the attitude, I presume, let the insurance carrier have the

burden. But that isn't the point. We ought to go at it from a humanitarian standpoint—the worker in the industry.

It might be we could get the Institute to set up a certain trophy, and have all these different plants compete for it, the same as the cement and steel, and all those other industries do.

MR. TEFFT: I think any work the Institute does is right in the hands of our committee, and any suggestions they care to make will be acted on very readily.

CHAIRMAN McCLELLAN: That subject could well be taken up at our next meeting of the Accident Prevention Committee of the Institute. Mr. Brainard, the chairman of that committee, is here and could have it as one of the items for the meeting.

MR. BRAINARD: I think it is well worth while to give us something to hit at, beginning this year.

MR. TEFFT: A telegram came one day from a member firm—just say it is the month of August—which said, "For the month of August we had no lost time accidents." If we could let others know of such a statement it might stimulate them to be able to do likewise.

MR. BRAINARD: If a firm shows that much interest in its record, I believe we could interest them in a comparative record for the year.

E. E. DEWEES (Libby, McNeill and Libby, Chicago): Couldn't plans for a safety contest based on monthly reports be prepared so as to start the first of the year?

CHAIRMAN McCLELLAN: Would you want to run it a year at the start or for a month to get the plants interested?

MR. TEFFT: A month. Plants might lose interest in a longer contest at the start. Some small plants take more interest in safety work than is generally realized. One very small plant to whom the Institute sent a knife bulletin reported that all of the knife cuts of its employees were on the left hand.

CHAIRMAN McCLELLAN: I believe some educational feature could be worked out that would be of benefit to all employees of the industry. All butchers and other skilled and semi-skilled men work in different plants at various times. By educating them in safety work we will get the safety message across and thus, no matter where they are employed they will have received some safety training.

MR. BRAINARD: Every plant in the industry is going to profit by the work that is done at other plants in the training for safety.

Safety education of employees is important because of the cost of compensation insurance. The more thought we give to improving the experience of the industry as a whole, the more we are all going to profit.

I do not believe the statistics published by the National Safety Council give the true experience of the packing industry because office employees are included when computing accident frequency rates.

MR. CLOVER: Accident frequency rates are based on million man hours worked. For that reason one accident in a small plant will give that plant a higher accident frequency rate than it would a larger plant because less man hours are worked in the smaller plant.

CHAIRMAN McCLELLAN: In the promotion of safety work the smaller plant has the advantage over a larger one because all the men in the smaller plant know one another intimately. This is not true in the larger plant.

MR. BRAINARD: We have found that is particularly true when we get into a contest, and have a small plant competing with some large ones. We find that the small ones have the great advantage over the large plants in keeping their accidents down.

MR. CLOVER: The International Shoe Company has several factories, some large, some small. The frequency of accidents is based on man hours worked. The large factory will crowd the little fellow out; he can't get to the top. I have in mind working out a plan whereby the factories will be put into three classes—A, B and C—

and even though the little fellow can't reach the top in man hours, he will be in the class of the factories with the better experience.

CHAIRMAN McCLELLAN: That is the way we operated in our last monthly contest. We separated the plants up to 1,000 in one group, and over 1,000 in another group. We found there wasn't any conflict, because they were in two separate and complete groups. We put up a trophy for each group.

During the fiscal year 1929 and 1930 we have run a year-round contest, by keeping comparative figures and circulating them among the plants, announcing in advance that the plants were to be on a competitive basis, and that the plant making the best showing for the fiscal year would be declared the winner and be awarded a trophy. We have not had an intensive lost time accident prevention contest over a period of a week or two weeks or a month. It has been more in the nature of a yearly contest for the last two years, and our plants have carried on by having departmental contests, which in a measure have taken the place of the old type of contest.

CHAIRMAN McCLELLAN: How long has that contest been going on?

MR. BRAINARD: We have the figures for the present fiscal year, so that at the end of August we had a ten months period.

CHAIRMAN McCLELLAN: Did you find interest lagged at any time?

MR. BRAINARD: There has been a good interest and a remarkable showing on the part of some of the plants that made a poor showing last year. We have some that have considered their record and, as a result, have given accident prevention better attention. Just as an indication of what we expect to do this year, the figures up to the present time show a decrease in our frequency rate of around 30 per cent, and in our severity rate of over 60 to 70 per cent. We feel quite encouraged by such an endorsement of the plan we are working under.

CHAIRMAN McCLELLAN: I feel that more can be accomplished by having a contest extending over a year or two years than in one of a week or two weeks, or a month. You get your employees and foremen worked up to a high pitch of interest, and after the short contest is over, the interest lags and falls off, and in a good many instances you are in worse shape than you were before you started.

MR. TEFFT: That might be true in cases where you are working with your own organization, but with plants over which you have no control, I am of the opinion that a month's contest would probably work out better. It would start them going, show them what they could do, and after that it would be more or less up to them.

MR. BRAINARD: There is value in the intensive drive for a month. It gives an opportunity to bring in a lot of educational stunts that get employees enthused.

CHAIRMAN McCLELLAN: When you started this yearly drive did you send out a plan or did each plant follow its own?

MR. BRAINARD: Each followed its own program for the work in its plant in general, however, we gave each plant some suggestions.

Some of the plants have conducted departmental contests in which the standings of the different departments are shown on a display of one kind or another. Some plants use the automobile race, some the mountain climbing races. It is left largely to them to use such devices as they desire to in their individual plants, and most all of them are doing so.

We announce in advance there will be a contest based on accident severity and frequency, and that some recognition will be given to the plant with the best record.

Last year the winning plant was our Fort Worth, Texas, one, to which we gave a suitable bronze tablet recognizing that plant as the winner. The tablet is placed on one of the cement posts at the main gateway to the plant. It is a very neat tablet and the men are very proud of it.

CHAIRMAN McCLELLAN: Mr. Brainard, will you please let us know what progress is being made towards the adoption of satisfactory guarded knives for butchers and other packing house employees.

MR. BRAINARD: As you know, the Accident and Fire Prevention Committee of the Institute of American Meat Packers has given considerable thought and time to that subject. It is expected that before long we will be able to obtain from several companies knives which are guarded in a practical manner and which the men will use.

MR. TEFFT: Considerable thought is also being given by that committee to the subject of safety shoes and boots for packing house employees.

MR. BARR: We have made a few developments during the past year on a circular ham saw and on a horn saw.

We have experimented, to some degree, with guards, and after considerable changes and improvements, we have made one for a circular ham saw that does the work with the least amount of interference. It may be of interest to the men who will attend the packers convention.

Before all we had was just a piece of angle iron over the top of the saw. Now we have a device that completely protects the circular saw above and below the table. It is cut out in the center so when a man saws a ham shank the minute it passes the cutting point of the circular saw the guard drops down to its natural position; and if a man, reaching for a ham should slip and fall towards the saw, the guard would prevent him being injured.

We also have a similar device for a horn saw, except that it is operated by means of a foot treadle. Much room is needed to permit the passage of a head under the guard. The only way that you can operate the guard efficiently is by means of a foot treadle which permits the guard to open up from 10 to 14 inches.

CHAIRMAN McCLELLAN: Mr. Brainard, what progress has been made with the safety switch for hashers?

MR. BRAINARD: The switches are installed on practically all the enterprise hashers we have in use. We are putting them at the packing houses and at the branch houses also.

At a branch house making sausage here in Pittsburgh, yesterday I saw a side feed that absolutely prevents a man from reaching in. It has an automatic switch so that when the lid is lifted it shuts the current off automatically.

CHAIRMAN McCLELLAN: The switch is only applicable on a direct drive machine, isn't it?

MR. BRAINARD: The current is automatically cut off from the motor when the cover of the machine is lifted. If a group of hashers were driven by a single motor the lifting of the cover of one hasher would, of course, automatically shut off the power for all.

MR. TEFFT: Is there anything new on the safety, non-slip brake?

GEORGE MEYER (Fried and Reineman Packing Co., Pittsburgh): One company manufactures such a brake.

We have just installed one or two. I can tell you more about them after a time.

MR. BARR: I would like to hear some discussion on what the other packers are doing towards fire prevention campaigns during fire prevention week.

MR. BRAINARD: We carry on such campaigns all the time.

CHAIRMAN McCLELLAN: This is the second year we have taken an active part in a National Fire Prevention Week by putting on a direct drive to bring it forcibly before the employees. The first year we had most successful results.

(Mr. Clover took the chair.)

CHAIRMAN CLOVER: We have had an interesting two days' meeting; though the attendance has been small the interest has been keen. There are 65 or 70 companies belonging to this section of the National Safety Council, possibly more. A greater number should attend the sessions and take part in them.

I expect that during the year a plan will be worked out to interest more of these

companies in taking part. A committee is to be appointed to make a survey of the section and ascertain how many of the members attended these meetings and how many of them will take part in the work next year.

Packing companies have shown a keen interest and have always been well represented, but the tanners, maybe one or two of them will come and make a talk or read a paper, but as a whole they just don't do it. They need a stimulating influence of some kind to bring about a greater attendance and more interest in the section.

I will make an effort this year to get committees and work under way to try to increase the attendance of next year's session.

Mr. DREWS: Don't you believe something can be done through the Tanners' Council, as long as they are members of the section now?

CHAIRMAN CLOVER: We will see if we can't get them to take part. I think that is a good idea.

The leather industry—boots, shoes, trunks—is an important industry, and comes under this section; and I see no reason why we can't have representatives of all handlers of the packing, tanning and leather industries here and problems of interest to all discussed. I think much good can come from it.

ADJOURNMENT

Thursday Morning Session October 2, 1930

HENRY D. TEFFT, Chairman

Director, Institute of American Meat Packers, Chicago, Ill.

The third session of the Packers and Tanners Section convened with Chairman H. L. Clover presiding.

CHAIRMAN CLOVER: Gentlemen, the meeting will please come to order. Mr. Tefft, will you please take charge of the meeting?

CHAIRMAN H. D. TEFFT: The Institute of American Meat Packers has a committee called the Accident and Fire Prevention Committee to stimulate the interest of the members of the Institute in accident prevention work and to co-operate with the National Safety Council.

In our educational books on packing house operations, we include in each chapter some mention on methods of preventing accidents. The National Safety Council has suggested that we should co-operate in the preparation of safety information for the packing industry.

A safety code for the packing industry has been prepared and copies distributed to you. The purpose of this meeting is to discuss this code item by item, and to suggest any additions that you think should be made.

We plan, as soon as the committee thinks the code is sufficiently developed, to submit it to the members of the industry for comment.

I asked Mr. Brainard how he thought we ought to go through the code, and he said item by item. We have marked a few items peculiar to the packing industry, and which we might take up first in order to get through with them. If you gentlemen do not wish to do that we will follow the procedure those present desire.

I had a number of replies from the members of the Accident and Fire Prevention Committee, and the Engineering and Experimentation Committee in response to a letter asking them to review the code and make any suggestions they saw fit. As we come to the different items, I will mention the suggestions that were made.

Is there anything on page one you wish to comment on?

N. L. BRAINARD (Swift & Company, Chicago, Ill.): I think perhaps attention should be called to the proper way of handling ammonia drums, and the hazards if they are not properly handled.

CHAIRMAN TEFFT: One item would be to protect from heat.

Mr. BRAINARD: Yes, but I had more in mind the dropping of ammonia drums. They should be handled carefully. And there is a right and wrong way of drawing the ammonia from the drums.

CHAIRMAN TEFFT: We could say "Removal of ammonia."

Mr. BRAINARD: Well, pumping it into the system. An engineer, of course, understands that, but there is a right way and a wrong way to do it, and if it is done the wrong way, the result might be quite serious.

CHAIRMAN TEFFT: We will do that. Mr. McClellan, you mentioned something about respirators just above the part "Wear rubber gloves, aprons, and boots and goggles, etc." Did you have any special type of respirator in mind such as nose, mouth or head?

L. BARR (Armour & Co., Chicago, Ill.): Perhaps one with a mouthpiece and a cartridge for chemical reaction against the fumes.

H. L. CLOVER (International Shoe Company, St. Louis, Mo.): I think the respirator should have the approval of the U. S. Bureau of Mines for the particular purpose for which it is to be used.

CHAIRMAN TEFFT: Are the rest all agreed on that?

At the bottom of the page is the item "Belly Rollers." That is a machine peculiar to the packing industry. Is there anything that should be included on that? I never heard of an accident on belly rollers.

MR. BARR: Under Air Guns. You say there "See Safe Practice Pamphlet 47." We are going to send this code out to various packers, and I doubt whether we find more than a dozen packers that would have a Safe Practice Pamphlet.

When you want information you want it right away. You don't want to wait a week or two weeks before you get it. If you are making a code and are going to ask people to check on this code whenever they are installing equipment or new material, and if they refer to it, you want complete information.

CHAIRMAN TEFFT: The point is, are we going to make this a more detailed safety code, covering topics that have already been covered by other agencies, or are we going to take up things that have not been covered and refer to established codes?

MR. BRAINARD: The code itself is already prepared. For instance, on the subject of Belts. We have a paragraph on Guards and yet I don't think the material we have under Belts anywhere nearly covers the subject. Might we not put under Air Guns some of the most pertinent paragraphs with reference to their use, and let the reference to the pamphlet stand. The pamphlet is a pamphlet of several pages. I believe we could well give consideration to that.

CHAIRMAN TEFFT: You mean elaborate it a little more?

MR. BRAINARD: Yes, as you have down under Belts.

CHAIRMAN TEFFT: The thing is from now on where we have made references and haven't elaborated enough, to elaborate in more detail.

As I said, I never heard of any accident on a Belly Roller, but if there has been one, let's get something on it into the code.

MR. BARR: An insert can be put in not to use hooks in handling the meat.

CHAIRMAN TEFFT: Where would that come in?

MR. BARR: Under Belly Rollers. The hooks are likely to draw the hands in.

MR. McCLELLAN: I don't believe they use them. That leaves a mark in your bacon.

MR. BRAINARD: I think the hazards are in the gears and the belts.

MR. McCLELLAN: I think it is in the machine itself.

W. F. FRIED (Fried and Reinman Packing Company, Pittsburgh, Pa.): There is a conveyor to put it on, and a conveyor to take it off. We have been operating one for a number of years and we never had a man say that he even had his fingers pinched.

CHAIRMAN TEFFT: We have a suggestion from Mr. McClellan that we include Bulletin Boards. I think we will all agree on that. We have a suggestion that right after "Supply tables" on page two we put "compiled by the Bureau of Mines."

On page three, the subject Chilling Rolls is an item of equipment peculiar to the packing house. We had a roll blow up, something I never heard of before. After the roll blew up, we figured the strength of a roll, and found that our air pressure was sufficient to burst the roll. I never thought about it before. Luckily it didn't do any harm, but it might have with the brine spattering around there. With ammonia there is a definite risk. Usually provisions are made to take care of that. There is some danger in cleaning beater picker boxes but I don't know how it can be guarded against.

MR. McCLELLAN: While testing on chilling rolls we have had several accidents. One resulted in a fatality because of too much air pressure in testing the barrel for leaks. Keeping the head up. Now at all our plants we have a standard rule that all valves must be set so you can get only so much pressure and no more.

CHAIRMAN TEFFT: That ought to come under another item, barrels, for instance.

MR. BRAINARD: Perhaps it should come under tiercing.

MR. McCLELLAN: I note it there.

MR. BARR: We use air reduction valves. Instead of using the regular air pressure which is from 60 to 100 pounds, the air pressure for testing the barrels is reduced to above five or six pounds.

MR. McCLELLAN: About three pounds, if I remember correctly.

MR. BARR: Under chilling rolls I would like to suggest something about the agitator shaft. On the bottom we generally have a protecting end, many times the lard congeals there, and it is necessary for a man to use a pipe wrench on the end of the shaft in order to turn it over. If the end of the shaft is not protected with a sleeve or little guard, a man standing close there will catch his overalls on the shaft and be injured.

CHAIRMAN TEFFT: You mean to put a sleeve over it, and then take the sleeve off when you put a wrench on the shaft?

MR. McCLELLAN: Yes, that's it.

CHAIRMAN TEFFT: In the code we have considerable on the clothing, because we believe not enough attention is paid to proper clothing around a packing house. Almost every other industry looks after the employees' clothing in some way, yet go into any packing house and you can see loose frocks and hanging clothes that are likely to be caught in moving parts.

One packing house firm does not permit its girls to wear high-heeled shoes.

MR. McCLELLAN: We carry safety shoes for women in the store so they may have the type of shoe they should.

CHAIRMAN TEFFT: Do you think there ought to be something about discouraging the use of high-heeled shoes?

MR. McCLELLAN: I would include it.

CHAIRMAN TEFFT: One firm has recommended that it is advisable to discourage the wearing of finger rings at all while at work.

MR. BRAINARD: I think that is true. I saw an accident report last week describing an accident where a man on a truck caught his ring on the edge of a tierce and was injured. That is not an uncommon accident at all.

CHAIRMAN TEFFT: Then we could change that first sentence and say: "The wearing of rings is to be discouraged while employees are at work, especially around moving machinery, etc." How about flowing neckties, etc.?

MR. McCLELLAN: The wearing of sacking or similar material about the neck should be prohibited. In our plant one of our men had a close call while painting when the loose ends of a rag he had about his neck caught in a revolving shaft.

MR. BRAINARD: The ends of loose woven stockingettes should be securely tucked in or rolled.

MR. DREWS: The use of house slippers should be discouraged. A lot of girls wear house slippers through the plant.

CHAIRMAN TEFFT: What is the particular disadvantage to the wearing of house slippers?

MR. McCLELLAN: Running nails and tacks into the feet.

MR. DREWS: They offer no protection for the toes. And it is easier to stumble down the stairs.

MR. BRAINARD: There is also danger of cuts by contact with scraps of tin.

CHAIRMAN TEFFT: This discussion brings out points that should be called to the attention of the man who has charge of the safety work in the small plant, or any other safety man.

MR. BARR: On page four, under Compressed Air Machinery and Equipment, no mention is made of a safety valve so adjusted as to prevent pressure above a certain number of pounds being used.

CHAIRMAN TEFFT: We could put in there, "Do not use over 100 pounds pressure."

MR. BARR: In some places we may have to use over 100 pounds, but mention of the safety valve should be made.

CHAIRMAN TEFFT: Is it necessary to use over 100 pounds pressure?

MR. BARR: Not always, but in some operations you have machinery driven by a pressure over that.

MR. CLOVER: Why not make a notation not to use the air pressure over the amount specified by the makers of the machine?

MR. BARR: Reducing valves are generally installed in various departments. In our cooper shop air is needed for testing tierces and a reducing valve can be installed which will prevent a pressure greater than the three or five pounds needed.

E. E. DREWS (Libby, McNeill and Libby, Chicago, Ill.): Is it good policy to specify any certain amount of pressure? You may have some equipment that may only take 50 pounds pressure. It may be a home-made tank. If you specify 100 pounds pressure, somebody may follow that literally and blow up a tank.

CHAIRMAN TEFFT: I get your point, and will make the necessary change in the code.

MR. McCLELLAN: I want to call your attention to the bottom of page four, the matter of Conveyors. It says: "Permit no adjustments or repairs to be made while conveyor is in motion," and it gives other instructions there. We have gone further than that. We have railed our conveyors. We have put warning signs over our conveyors, and yet we have had three or four had accidents, and bad accidents, where men have been crippled and never will be able to have the permanent use of their limbs.

To prevent the recurrence of similar accidents we have charged our conveyors so that if a man catches his leg between the conveyor and the draft roller an angle iron pushes the roller up out of the way.

CHAIRMAN TEFFT: I will make a note to insert mention of a device for prevention of accidents on conveyors.

MR. McCLELLAN: I would include something about safety operation at the end of the conveyors.

CHAIRMAN TEFFT: One item suggested under "Conveyors," is: "Provide warning signs that can be placed on covers of starting boxes, or at switch apparatus. If possible, provide padlocks so that repair men can keep switch under control."

MR. McCLELLAN: I think mention should be made of push button control for conveyors.

CHAIRMAN TEFFT: You mean something about having a push button control handy to the man operating it?

MR. BRAINARD: Instead of having a remote control, have a push button at both ends. I think that is very important.

MR. McCLELLAN: Not only within reach of the operator himself, but possibly further up at the head of the conveyor, or further down at the other end of the conveyor. Just so that it is near somebody working there. Such an arrangement has prevented at least one serious accident in our plant.

CHAIRMAN TEFFT: We will include under "Conveyors" reference to push button control.

MR. BARR: On page five shouldn't you say "Cover screw conveyor troughs?" In our tank houses where we use screw conveyors, we have push buttons at the various points where the men feed the product from the tank to the conveyors, so if anything should go wrong, all a man has to do is push a button to stop the conveyor and he has to go to the other end of the conveyor to start it.

CHAIRMAN TEFFT: We should be careful to state that the push button control is convenient to the operator.

MR. McCLELLAN: This will show the value of convenient push button control for conveyors. We have one conveyor running almost the full length of a room and right opposite the middle of it is a fire escape. If any one wants to get to that fire escape, if he is working on the other side of that conveyor, he must run way around one end of the conveyor and down to the fire escape unless he pushes a button opposite the fire escape and stops the conveyor and then go over the conveyor to the fire escape.

CHAIRMAN TEFFT: How would it do to say "push button control at convenient and necessary points?"

MR. McCLELLAN: That would be all right.

CHAIRMAN TEFFT: Under Cranes we had the suggestion that we should placard cranes to indicate the lifting capacity in pounds. Under "Drinking Water" we had a suggestion that to include drinking fountains or individual cups.

MR. OWEN: I suggest that the use of the common drinking cup be prohibited.

CHAIRMAN TEFFT: We will do that.

MR. BARR: Under Dryers, I suggest that comment be made with reference to the removal of projecting set screws on collars.

MR. BRAINARD: I believe that might go in there, although it is well to mention it for all shafts.

CHAIRMAN TEFFT: Under "Dryers" should be a statement, "Each man repairing or inspecting a dryer shall be provided with and use a lock to fasten the switch in the off position. Each man shall carry the key to his lock. A suitable sign should also be hung on the dryer."

MR. BARR: I believe in the code should be a general item "Tags," under which would be full information as to the use of tags on machinery, hot water and steam lines, valves and other equipment.

CHAIRMAN TEFFT: We can include such an item in the code.

Under Dust, do you think some reference should be made to particular types of respirators that are simple, and not expensive?

MR. BRAINARD: I think we should omit reference to particular types of respirators.

MR. McCLELLAN: I think the subject is covered in the code under the item "Respirators."

CHAIRMAN TEFFT: In some plants I have seen men working in fertilizer cars, many times with just a rag tied around their mouth, and not always that. There is certainly a health hazard there that can be very easily overcome by the use of a simple respirator.

MR. BARR: On page six under Electrical Equipment, is the sentence, "Inspect equipment frequently." I think all portable electric tools should be sent to the shop for testing at least once a month.

MR. McCLELLAN: That applies also to hand tools.

MR. BRAINARD: And to portable extensions.

While there are some important things under Electrical Equipment, I believe in that paragraph we should emphasize the fact that 110 volts can kill a man. Any electrical circuit should be considered alive unless it is definitely known to be dead.

STEWART J. OWEN, JR. (National Safety Council, Chicago, Ill.): The National Safety Council is making a special study of the hazards connected with the use of low voltage. The records show 107 fatalities have been caused by such electrical current.

MR. BARR: It is common, especially in large industries, to have machinery removed from a certain location, and the wires are generally cut off, taped up, and may be disconnected in the switch box. Then as time goes along, something may go wrong

with the electrical equipment, and the electricians will go to the switch panel, and they can't locate the trouble, so they will hook up the various wires that are not connected, and then they fail to disconnect them again.

To overcome such conditions, in addition to disconnecting the leads in the panel box, we have placed tags on the circuits indicating where they lead to and that the machinery has been moved, thus indicating the lines are dead and are not to be hooked up. By strictly following this practice dead lines are not hooked up and the possibility is avoided of someone taking hold of a supposedly dead wire.

Mr. McCLELLAN: I think that under Electrical Equipment should be a line as follows: "Make frequent inspections of all electric fuse boxes."

CHAIRMAN TEFFT: I will make a note to inspect fuses and fuse boxes frequently.

Mr. McCLELLAN: Only authorized employees should be allowed to fix electric lights or replace fuses.

CHAIRMAN TEFFT: Let's make it positive. Let's say: "Only by competent electricians."

Mr. DREWS: That is the rule we follow in our plant.

Mr. BRAINARD: I don't know whether this is pertinent, but how about the use of a fuse puller?

Mr. McCLELLAN: They have been adapted and found satisfactory in our plant.

CHAIRMAN TEFFT: Well, we will say that care should be exercised to obtain the proper type of fuse puller; the approved type.

Mr. BART: In most your suggestions, could we say this: "When machinery has been disconnected or abandoned, the ends of the wires of the circuit should be taped and the circuit suitably tagged to indicate the wires are dead and are not to be hooked up."

Mr. BARR: Yes.

Mr. McCLELLAN: Under Elevators, we should say something about blocking a car when a man is down in the pit so as to avoid the possibility of his being crushed by the counterweights. That is a rigid rule in our plant.

CHAIRMAN TEFFT: We will make a note of that.

Mr. DREWS: Also the elevator should be locked when not in use.

CHAIRMAN TEFFT: That can go in, too.

Mr. McCLELLAN: It is very important that the front half of a freight elevator car top be hinged to permit it to fall back readily should it strike an object as the car descends.

CHAIRMAN TEFFT: All right. We will say that the top should have the front half hinged, in order to eliminate shearing hazards.

Mr. BARR: We should also include under that part relating to elevator cars, the statement: "Elevators having winding drum machines should be provided with a slack cable which will cut off the power and stop the car if the car is obstructed in its descent."

CHAIRMAN TEFFT: We will put that in.

Mr. BARR: An emergency stop switch which will cut off the source of power should be installed in the car adjacent to the operating device for all electric elevators so if anything goes wrong with the controls.

Mr. OWEN: Grating or flooring should be provided at the top of the elevator hoist way either immediately below the sheaves or at the machine beams.

Mr. DREWS: We have all ours floored in solidly.

Mr. CLOVER: Ours is the same way.

CHAIRMAN TEFFT: We will put that in.

Mr. McCLELLAN: Yes, I would do that, because in some places they have all the machinery up above resting on beams and not closed in. A man oiling the machinery in such a place might fall down the well.

Mr. OWEN: Reference should be made that all power elevator cars should be provided with effective car safeties located under the car platform.

CHAIRMAN TEFFT: There is a note here about that, I think. We will make a note to be sure.

Mr. McCLELLAN: The subject "Elevator Doors," reminds me of beef drops which are often adjacent to entrances to elevators and which may be mistaken for elevator entrances or for other entrances. Beef drops are exceedingly hazardous because if a person should walk through one by mistake he would undoubtedly be killed by falling down the shaft. We have marked our beef drops with danger signs and provided bars across the openings. It is necessary to depend upon the human element to keep those bars in place. I believe information in regard to the proper protection of drops should be obtained and put in the code at the proper place.

CHAIRMAN TEFFT: Under Elevators there should be something about the inspection of cables.

Mr. McCLELLAN: Yes, and mention should also be made that the cables be dressed with a graphite compound.

CHAIRMAN TEFFT: The next item is Emery Wheels. I understand the American Engineering Standards Safety Code for the use, care and protection of abrasive wheels has recently been revised. I believe any data we have under Emery Wheels should conform to that code.

Mr. McCLELLAN: We use both spark shields and goggles at our emery wheels, for touching up drills, etc. The shields have a flexible joint so that they can be swung about when necessary.

Mr. DREWS: We have our spark shields fastened on so they can't be moved.

Mr. McCLELLAN: Don't you have a flexible joint on them so you can swing them around?

Mr. DREWS: No, we don't adjust them at all. A bar across the top prevents them being moved.

Mr. McCLELLAN: Well, I don't know whether that is good policy or not, especially in a machine shop where it may be necessary to adjust the shields for different sized objects.

Mr. BRAINARD: For some purposes the solid guard can be used, but there are occasions when the flexible guard is better. And then the goggles are essential.

Mr. McCLELLAN: While we are on the subject of goggles, I would like to ask some of the gentlemen here what goggle they have found is the most suitable, the fine wire screen goggle, or the glass goggle?

We use both types and carry them in stock. Some men like the glass lens goggle, others prefer the wire screen one. I would like to get an opinion from some one here. Perhaps it is not necessary for us to carry a stock of both kinds.

We have been trying to standardize as far as possible.

Mr. BRAINARD: Yes, that is desirable, but it is also a difficult thing to do. Under Exhaust Systems, should we elaborate a little more on that? Here is another case where we refer to the pamphlets.

CHAIRMAN TEFFT: Yes, there as well as under other items we have mentioned only the National Safety Council pamphlet covering the subject.

Mr. BRAINARD: I think that we should mention exits. They are important. You might think they would be properly marked and looked after as a matter of course, but it won't be a complete code unless we take care of such items. Do you think there should be anything in this code about rooms in which ammonia containers are located having at least two exits?

Mr. BARR: In any room where you have a refrigerant such as ammonia coils, you should have remote entrances.

CHAIRMAN TEFFT: Shall we say that two exits shall be provided where exceptional hazards exist?

Mr. McCLELLAN: You don't want them in the same end of the room.

CHAIRMAN TEFFT: Well, we will say two, at least, easily accessible exits, at opposite ends of the room.

MR. BRAINARD: Yes, I think that is very important.

MR. McCLELLAN: Under this heading Floor Openings, do you think the information given is sufficient?

MR. BRAINARD: I don't think it is.

MR. McCLELLAN: I think we should elaborate more fully on the subject. I have in mind, for instance, an opening where you have a trap door, using it to lift stuff up and down.

MR. CLOVER: Shouldn't floor openings be placed in the same class with well holes and elevator pits? I believe it shouldn't be under Belt Guards at all.

MR. McCLELLAN: I suggest the subject be referred back to the Accident and Fire Prevention Committee to decide.

CHAIRMAN TEFFT: Under Gas Ovens you suggested ventilation with outside air. Would that mean a hood just over the oven?

MR. McCLELLAN: Yes, that's the idea.

CHAIRMAN TEFFT: I had best say also, "Place a hood over the oven and ventilate with outside air."

MR. McCLELLAN: I don't think we have covered the subject Gasoline Torches enough.

MR. BRAINARD: I think that ought to be referred back to the Accident and Fire Prevention Committee. You can have a bad catastrophe with gasoline if you don't watch out. I read recently where a whole town was wiped out up in Wisconsin by a gasoline fire. Many of these plants receive gasoline in tank cars. They unload the tank cars by means of gravity systems instead of pumping them out. Sometimes when other cars come in they bump the gasoline car and break a connection, and you have gasoline spilled all over the street, with a good possibility of a fire.

MR. McCLELLAN: I think that subject should go back to the Accident and Fire Prevention Committee.

CHAIRMAN TEFFT: All right. We will take care of that. Under Guns (Spray), you made a notation. What did you have in mind, your chemical respirators?

MR. BARR: A cartridge respirator, or canisters. It is covered in the National Safety Council Safe Practice Pamphlet, but I think it should show more information than we do under this caption.

MR. BRAINARD: I have this note on Hand Tools: "Do not hold a chisel with your hand when the chisel is being driven by a sledge hammer. Always use tongs or some special chisel holder."

MR. TEFFT: Perhaps we had better put it in the positive form and say: "Always use chisel holder." Mr. Barr, you have a question noted about approved type of Hasher Bowls. What is it you do not understand?

MR. BARR: What are approved types of bowls?

CHAIRMAN TEFFT: Well, we know of two that are all right.

MR. BARR: I put the question there so you would bring it up today. You say to use the approved type of bowls, but you don't say where a man can find what is the approved type. And approved by whom?

MR. FRIED: We had to put a big frame around ours, and you can put more meat in it now. It is approved by the Pennsylvania Department of Labor.

MR. BARR: I would suggest that be referred back to the Accident and Fire Prevention Committee to be made right. Let them decide that.

CHAIRMAN TEFFT: All right, we will do that.

MR. McCLELLAN: Yes, the hasher bowl is a very important thing in the industry, and it also is a very hazardous implement. I think it ought to be covered very thoroughly.

MR. BARR: We don't permit our employees to feed hashers by hand. We provide them with hand paddles.

CHAIRMAN TEFFT: Yes, but do they use them?

MR. BARR: In most cases, yes.

CHAIRMAN TEFFT: You can't rely on them, though, can you?

MR. McCLELLAN: No, you can't. It is simply another case of where you must rely on the human element.

CHAIRMAN TEFFT: Well, now, let's go to Ice Crushers. They are dangerous machines and it is a wonder that more injuries haven't occurred around them.

MR. McCLELLAN: A round table discussion on the hazards of Car Icing is scheduled in the Refrigerator Section today. I would like to hear it. It might be interesting to some of the other gentlemen here. I think there should be something in the Code under the head of Icing Cars about accidents due to gaps in cars. We have a way of handling such a condition that is pretty good. It may not be fool proof but we think it is good. I would like to find out what other people are doing in that respect, because it is a serious situation.

Where we have a gap in the cars, we have a sign made, and as the man comes along pushing his bucket ahead of him, he will hit that sign, and it will jar him. It is placed about fifteen feet back from the end of the car. Of course, the physical layout of the plant makes for gaps at times, and I would like to get some information on how to better avoid accidents in these places. Our sign with the word "Stop" is on the running board on top of the car.

CHAIRMAN TEFFT: Do you think we ought to try to develop something more on the subject of Icing Cars? Do you think we ought to elaborate on it a little?

MR. BRAINARD: I think we should.

CHAIRMAN TEFFT: Well, I will try to develop something on it for you.

MR. BRAINARD: Under Jacks I think we ought to mention that lifting jacks should be placed securely on a solid footing. And also a man should not be allowed to crawl under a load supported by only one jack.

CHAIRMAN TEFFT: So if one jack should give away, the other would still support the load.

MR. BRAINARD: There is danger in lowering the load. A man should keep his hands and feet clear. Sometimes a jack kicks back.

CHAIRMAN TEFFT: On Ladders, what have you to say?

MR. OWEN: Under what conditions would you require safety belts and hooks as recommended at the bottom of page 12?

MR. McCLELLAN: Suppose a man is working at the top of a thirty or forty-foot ladder, and has to raise both his hands over his head to do the job. It is just the same as a pole climber who puts on his big leather belt, and hooks it around the pole, and digs himself in with his spurs, and then does his work. That is what we had in mind here.

MR. McCLELLAN: Don't you want to say something about hooks on the top of the ladders on a job like oiling shaftings? Very often a straight ladder is placed up against the shafting.

CHAIRMAN TEFFT: That is taken care of under Oiling.

MR. BRAINARD: Just a moment before we pass on, please. I don't see anything about Manhole Covers. Isn't it possible that we might want to say something about that?

CHAIRMAN TEFFT: You mean work up some material on that? I will make a note of that. We will also put a note under Ladders, "See Oiling."

MR. McCLELLAN: I am not satisfied with Machines, especially Casing Cleaning.

CHAIRMAN TEFFT: We had a man lose an arm on the spoke hazard.

MR. McCLELLAN: We have had three or four accidents.

MR. BRAINARD: Let's refer that back to the Accident and Fire Prevention Committee.

MR. McCLELLAN: I think we ought to do that. I think this whole Section of Machines ought to be given a lot of attention by the committee, especially under Casing Machines. We have put a new device on the Casing machine in one of our departments, so that we can stop the machine in a jiffy. We have a hand brake on it.

CHAIRMAN TEFFT: Yes, they are bad machines, especially because of the fluted knife.

MR. McCLELLAN: Under Oiling, on page 14, there is nothing mentioned as to the particular type of can to be used.

CHAIRMAN TEFFT: You mean the long nose?

MR. McCLELLAN: Well, I don't know about that, especially, but I recall we had a fellow who had to have a kidney taken out because he fell on a straight snout and it punctured him.

CHAIRMAN TEFFT: It states here: "Provide long spout, gravity flow or forced feed oil cans to enable the oiler to stand in the clear of the moving machinery."

MR. BARR: When a small hand can is used the snout should be curved.

MR. McCLELLAN: Either that or a flexible tube.

CHAIRMAN TEFFT: Very well, I will put something in there about that.

MR. McCLELLAN: On page 15, under Portable Electric Equipment, the notation should be made that such equipment should be looked after by the electrical shop.

MR. McCLELLAN: Under Platform Loading the statement is made: "Provide proper clearance for railroad cars," but no reference is made to the loading of the cars.

MR. BRAINARD: I think we should call attention to the fact that clearances should be in accordance with statutory regulations.

MR. McCLELLAN: The Interstate Commerce Commission Act requires that certain clearances between the cars and the platforms must be provided.

What I have in mind is runways from the cars to the platforms.

MR. BRAINARD: I think the Accident and Fire Prevention Committee ought to take that up.

CHAIRMAN TEFFT: Under Railroads had we better mention the color of the flag? They usually use a blue flag.

MR. BRAINARD: Might we not suggest the blue flag which fastens to the track, rather than the one you stick in the tie, because the latter is likely to be blown over by the wind, or it might not be set right so it can be seen. And again, nobody should move that flag but the person who has authority to do it.

MR. DAEWS: Should we not also say to be equipped with a lantern for the night?

CHAIRMAN TEFFT: Yes, we certainly should do that. The lantern should be blue, of course, for the night work.

MR. McCLELLAN: I wonder if anything more should be said with regard to Rail Switches for Overhead Rails.

At one plant where a switch broke allowing a heavy load to drop, we had to install steel switches.

CHAIRMAN TEFFT: How would you reword the information given?

MR. McCLELLAN: I think it is something for the Accident Fire Prevention Committee to work out.

MR. BARR: I think we might also insert there something about the inspection of overhead switches. Lots of times they become loose in pushing cars over the rail. I think the committee can draft something on that.

CHAIRMAN TEFFT: I don't think we need to dwell on Prone Method given on page 16 except to insert the heading Resuscitation. Everybody seems to be familiar with it.

Under Revolving Knives it has been suggested that we put in the following: "Or sheet metal guard with small screened opening to show position of knife."

MR. McCLELLAN: Yes. That would be all right.

CHAIRMAN TEFFT: Gentlemen, this room is required for a luncheon and we will have to give up the room now.

MR. McCLELLAN: I suggest that you mark the page where we stopped, and if it meets with the approval of the people here, let the Accident and Fire Prevention Committee go over the balance of the tentative code, at the time when they put in these new insertions we have talked about here today.

MR. BRAINARD: With the understanding that those here who have copies of the tentative code go over it later, and send any suggestions or criticisms to the Institute of American Meat Packers to be turned over to the Committee, and these ideas incorporated into the final code.

CHAIRMAN TEFFT: I hope that is understood by all. We will be glad to have the suggestions. I think we have had a very interesting and profitable session here this morning, and I hope you gentlemen feel the same way about.

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B. D. ROGERS, Bird and Son, East Walpole, Mass.

F. H. ROSEBUSH, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

F. H. SCANLON, Powell River Company, Ltd., Powell River, B. C., Canada.

ARTHUR E. WINSLOW, Hollingsworth and Whitney Company, Waterville, Maine.

Executive Committee—Officers and

KENNETH L. FAIST, The Champion Coated Paper Company, Hamilton, Ohio.
 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.

Retiring Officers

General Chairman—SAMUEL PRUYN, Finch, Pruyne and Co., Inc., Glens Falls, N. Y.
Secretary—N. F. BARTLETT, Hollingsworth and Vose Company, Boston, Mass. **Vice-Chairman for Canada**—A. P. COSTIGANE, Ontario Pulp and Paper Makers' Safety Association, Toronto, Ont., Canada. **Vice-Chairman for South**—G. W. PHILLIPS, The Champion Fibre Company, Canton, N. C. **Vice-Chairman for Extreme South**—W. H. JENNINGS, Bogalusa Paper Company, Inc., Bogalusa, La. **Vice-Chairman for Middle West**—F. H. ROSEBUSH, Nekoosa-Edwards Paper Co., Port Edwards, Wis. **Vice-Chairman for East**—B. D. ROGERS, Bird and Son, East Walpole, Mass. **Vice-Chairman for Paper Box Manufacturers**—H. C. SACKETT, Alton Box Board and Paper Company, Alton, Ill. **News-Letter Editor**—W. J. BRENNAN, St. Croix Paper Company, Woodland, Maine. **Chairman Health Research Committee**—J. J. PLZAK, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis. **Chairman Poster and Slide Committee**—A. UMBERHAM, Fort Howard Paper Co., Green Bay, Wis. **Chairman Contest Committee**—A. SCOTT DOWD, The Paper Industry, Chicago, Ill. **Chairman Engineering Committee**—D. D. TRINKFIELD, The Sorg-Oglesby-Smith Paper Company, Middletown, Ohio. **Regional Directors—Maine**—ALVIN RECORD, International Paper Company, Chisholm, Maine. **Massachusetts**—A. S. WILSON, American Writing Paper Company, Holyoke, Mass. **Michigan**—C. E. TORRANCE, Bryant Paper Co., Kalamazoo, Mich. **New Hampshire**—J. J. TELLINGTON, Brown Company, Berlin, N. H. **New York**—R. S. TURNER, West Virginia Pulp and Paper Co., Mechanicsville, N. Y. **Pennsylvania**—EMILIE I. RAUB, Dill and Collins Company, Philadelphia, Pa. **Ohio**—ERNEST AUGUSTUS, The Mead Corporation, Chillicothe, Ohio. **Wisconsin Valley**—F. W. BRAUN, Employer's Mutual Liability Insurance Co., Wausau, Wis.

Tuesday Morning Session

September 30, 1930

SAMUEL PRUYN, Chairman

Finch, Pruyne & Company, Inc., Glens Falls, N. Y.

The first session of the Paper and Pulp Section of the Nineteenth Annual Safety Congress convened with Mr. Samuel Pruyne, Finch, Pruyne & Co., Inc., Glens Falls, N. Y., presiding.

CHAIRMAN PRUYN: I was asked by Mr. W. H. Cameron to make some announcement regarding the Membership Campaign conducted by the Council during the past year. You know, you were all asked to help out in it. A lot of form letters were sent out, both by the Council and by the chairmen of the various Sections, and the net result was an increase in membership of 877 for the whole Council, and a total increase in income of about \$22,000.

Our Section showed a very small net increase, but we secured 40 new members,

the difference being made up by cancellations. Some mills cancelled because of consolidation with other mills.

We have had plenty of literature from the Council, and we have had an excellent News Letter sent to us every month, and anybody reading this material is very well informed on the progress the Section has made.

Last year I was so very much impressed with the work of Bill Peacock that I asked for a vote of thanks. I am going to ask for the same vote from this organization for Walt Brennan, who served for the past year as News Editor.

W. J. PEACOCK (Northern Paper Mills, Green Bay, Wis.): I'd like to have that contain the heartfelt thanks of the chairman of the Publicity Committee.

CHAIRMAN PRUYN: Motion made and seconded. All in favor signify by saying "Aye". Motion carried. The first thing on the formal program today is the reports of the Regional Directors.

Report from Maine Regional Section

By **ALVIN F. RECORD**
Regional Director

As Maine's Regional Director, I am very pleased to report "Continued Progress" from this section.

On January 22nd of this year was held our Second Statewide Safety Conference. Like the first, this was held in the State House at Augusta. The following organizations through their efforts and co-operation were responsible for this conference:

Maine Department of Labor and Industry.

Associated Industries of Maine.

Governor's State Safety Committee—Industrial Group.

Paper & Pulp Section, National Safety Council.

American Society of Safety Engineers.

We had at this conference some 125 registrations representing sixty-two firms and organizations scattered throughout the state. Considering this meeting was held in mid-winter when roads were unsatisfactory for auto travel, we were agreeably surprised at this registration.

This conference was a one day affair and the subjects covered were of a general nature applicable to all industries. Interesting talks and papers were presented by Mr. Julian Harvey of the Council, Mr. Morris of the Liberty Mutual Insurance Company, Mr. Noyes, Central Maine Power Co., Dr. James C. Graves, director industrial surgery, Travelers Insurance Company, and our own "Bill" Brennan, News-Letter editor for our section.

We believe much has been accomplished through the two conferences which we have held. In my estimation and others who are in even a better position to judge, the results accomplished will be far reaching. We have definitely interested a large group of men, numbered among whom, are many of the large employers of labor in the state and men of influence connected with business organizations. Our labor Commissioner reports that he can positively see a marked difference in his visits around the state, and that safety is growing rapidly.

A Legislative Committee has been appointed from the Governor's Safety Council to add to the department of labor a Safety Engineer to work among the various industries to co-ordinate and supplement efforts already being made and to encourage new ones. It is the intention of this committee to work up a set of safety codes which will later be incorporated in our Labor Laws.

Also as a direct result of these meetings have been added several good memberships to the council.

The general reaction throughout the state regarding these activities is excellent. In fact there is today a marked insistence on the part of those who have attended our past conferences to have another this fall, preferably in November before auto travel becomes a problem.

I think this section can take quite a bit of pride in its part in these meetings. The co-operation of the Council through Mr. Burns and Mr. Harvey has helped greatly in making these successful.

It is my hope and expectation to see Safety come into its own in our state in the next few years. The hardest part is over. Interest is growing. All is serene on the Maine front.

JAMES MCGIVNEY (Brown Company, Berlin, N. H.): Mr. Tellington did not attend the Convention, and has asked me to report for him.

As far as conferences go, the State Board of Labor Bureau has reported a slight decrease in accidents this past year in the State, and the Brown Company, on top of the 50 per cent decrease last year, enjoyed a 25 per cent decrease this year; that is, up to August 12th, and on that date the most serious accident the Brown Company has ever experienced since 1868, when the company was started, occurred there, and because of its unusual character and tragic results I consider it a painful duty to say just a word about it.

On that day, a vertical strap of the bottom course of a digester failed, causing it to explode, and two men were instantly killed at the time, and eight others were seriously injured. On the following morning another man repairing a steam pipe was seriously burned, and died ten hours later.

An immediate investigation was started, and it was found that the steam charts and temperature charts, were normal, and that the digester had been inspected about a month before. The company retained two eminent metallurgists, and they worked in conjunction with the Research Staff and the Engineering Staff of the company. In various tests they found that the strap was of poor quality, had weakened, and that was the main cause of the digester failure.

About fourteen years ago there was a similar accident in Eastern Canada, from exactly the same cause, and I understand that since that time all digesters are now of the double strap variety; that is, they are made of double strap instead of a single strap, putting a strap on the inside as well as on the outside, to hold the sections together.

CHAIRMAN PRUYN: Is that just since your accident?

MR. MCGIVNEY: Since fourteen years ago, but the digester that exploded was installed in 1906; and, incidentally, I understand a large majority of the digesters in the country are of the single strap kind. The shell of the digester was in very good shape. The only weakened part was around the strap, so the company plans to remove all single strap digesters and install double strap ones, and a complete report of the explosion will be out soon, and should be of special interest to this Section, and no doubt it can be obtained through the National Safety Council when it is brought out.

CHAIRMAN PRUYN: That is very interesting, and I am sure that report contains very pertinent information for many of us here who have digesters.

W. F. ASHE (Thilmany Pulp & Paper Co., Kaukauna, Wis.): It is really hardly necessary for me to make a Fox River Valley report. Our Wild Irish Rose, over here, Walt Brennan, gave a very complete report in his News Letter of the Fox River Valley activity. We had, on June 4th, our usual Annual Safety Council Meet at Green Bay. The chairman of the Pulp & Paper Section was Mr. H. D. Banta, of Green Bay, and I hope his name is going to be presented to the Nominating Committee as Regional Director for Fox River Valley this next year.

I think unquestionably we had the best safety conference in 1930 that we have

ever had. Not quite so large as usual. Of course we include not only the Pulp & Paper Section but also we have the Woodworking, the Metalworking, and Public Safety Sections. But in the Pulp & Paper Section we had a registration of 300. That means that all the mills in the Valley simply stripped their mills of foremen on that day and sent them all to Green Bay. Our own mill, I know, did that. We had thirty men there, and from the registration from other mills I am certain they hadn't many left in their factories.

Our foremen, when they came back from the conference, told me that they had never been to a conference where they got so much concrete information that was valuable to them immediately. A number of suggestions made there, a number of ideas the fellows got, were put into immediate effect, and were of real value.

Fox River Valley has had, now, six Annual Safety Conferences, and we expect to have about sixty more.

R. H. SCANLON (Powell River Co., Ltd., Powell River, B. C., Canada): There are about 61 pulp and paper mills in British Columbia, Washington, Oregon, and California, and of the 61, a year ago 24 were members of the Council. After you boys all wished this job of Regional Director on me last year I persuaded my Company to stage a one-day Safety Meet at Powell River, which was done on February 12th of this year.

We invited representatives of every pulp and paper mill on the Pacific Coast, from British Columbia to California, inclusive, to attend this meeting, and I want to say that distances out there between the mills are somewhat greater than between your mills in the east; and out of the 60 we did get 20 representatives to meet with us at Powell River, in a day of safety.

It was a great meeting, and I organized a sub-committee to handle safety matters on the Coast. We had a Membership Committee, for instance, and one or two others.

The results of the work of the Membership Committee were three new members. We got one out of British Columbia, the Westminster Paper Co., and two out of Washington, the Puget Sound, at Bellingham, and Shaeffer Box Company, at Tacoma, Wash. These are three new members in addition to the previous number of 24. We have quite a few prospects, as you may well guess, and our company, the Powell River Company, has invited the delegates to again convene with us next Spring some time, and I hope that that meeting will add more stimulus to the Safety work on the Pacific Coast.

CHAIRMAN PRUYN: That is fine. That is the first report we have ever had from the Far West.

J. J. PLZAK (Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.):

For the benefit of those who probably were not present last year when I made my report on Chrysoidine Peach Color Dye, I will just review it briefly.

Chrysoidine, as you know, is an aniline dye, one of the aniline compounds, and as we all know continued and prolonged contact with aniline will cause anemia. It was for this reason that the topic, or that the research work in chrysoidine was chosen by me.

This is the third year, and the last year of the work. The report and research work is now complete.

You will recall that the experiments that were conducted were undertaken first on white rats, then on guinea pigs, and then, later, on a human being himself. You may wonder about the latter, but that was a very simple matter, because the human being was handling the dye, and therefore it was very easy to have your test made on the human.

Another year of experimentation on white rats and guinea pigs did not reveal anything new. It still showed that chrysoidine dye was excreted by the kidneys, and

that it did stain the skin, and after the man handling the dye was off the use of the dye for that particular run for two weeks or so, the stain disappeared.

As far as the medical examination of the human being is concerned, that was somewhat the same as last year. I won't burden you with that long report again, but finally, after being off the dye about nine months, our company discontinued the making of peach colored paper, and therefore we had no further use for chrysoidine, and with no other companies sending me reports, I was unable to continue the work so far as human beings were concerned.

However, the experiments were continued on white rats and guinea pigs.

When the men had been off the dye for nine months, I had the three men handling it checked up, and found that they were normal and that the variation in blood pressure—you will recall there was a slight increase in blood pressure as shown in last year's experiments—that the blood pressure was normal, and practically the same as during the time that they were handling the dye, so I am willing to go on record now as saying that insofar as my three years of research work on Chrysoidine goes, that it does not affect the worker or his health, outside of the fact that the dye itself is excreted by the kidneys, which is the function of the kidneys.

How many people here are making peach colored paper?

(Four hands were raised.)

In what quantities? That is, does one paper machine make it throughout the year? R. H. SCANLON (Powell River Co., Ltd., Powell River, B. C., Canada): So far as we are concerned, we only make it occasionally.

Mr. PLZAK: That is usually the way. Only two or three weeks at a time.

Report of the Committee on Health Research

By J. J. PLZAK
Chairman

You are all familiar with the work that is being done by the Industrial Health Section of the National Safety Council, and you all, no doubt, are familiar with Dr. C. O. Sappington, who is the Director of the Industrial Health Division.

For your information I have compiled some statistics that may amaze you. Now these come from our own mills, four mills, Wisconsin Rapids Mills, Barling Mills, Stevens Point Mills, and Rapidon Mills. I am not going into the details of each month as I have it outlined here, but I shall give you the total for the year 1928, for the number of days lost due to sickness by men in our mills.

In 1928 we had an average of 985 workmen working in these four mills, and they lost a total of 4,452 days.

In 1929 we had a total of 987 men working, and they lost a total of 4,478 days.

For the first six months of 1930, we had an average of 1,115 men working, and they have lost a total of 2,050 days due to ill health.

Now, I wouldn't like to give our accident statistics, because you might feel that I was boastful about them, but I will say that we are losing, in our mills, ten days due to sickness to every day lost due to accident; gentlemen, it is high time that we as industrialists should do something about the health of our workers, regardless of whether it is from our own plants or whether it is insofar as their own physical defects are concerned.

In order to help this work along in the Industrial Health Division we have outlined what is known as a "Health Work Plan", which can be put, understand, on a part-time basis. When we talk about health work—and I mean when the Industrial Health Division talks—I will quote them rather than myself at the present time—we talk about it on a part-time basis, and we don't want you to picture a big clinic

hospital in your plants with a doctor in charge and two or three nurses. What we mean is that you call in a doctor probably once or twice or three times a week, for an hour a day, and have him examine your men; possibly have a nurse hired for full time work.

The minimum requirements for this work are four; first, the health information for employees, through educational means, your plant publication, the National Safety Council material, posters, and many other forms and propaganda that can be used in circulating health information; second, physical examinations, that, of course, to be conducted by the part-time doctor; third, first aid to illness, that is, dispensary service, which would be of the minor type—for example a man complains of a headache in the morning, and you have a first aid station; the nurse, under the doctor's supervision, understand that I want that very emphatic, the nurse under the doctor's supervision probably thinks that he has a cold, and the doctor treats him for a cold that is coming on, and possibly 99 times out of 100 he is cured, whereas if you didn't apply first aid for illness he might come down with a cold or pneumonia or any of the other diseases; fourth, referring the sick patient to the physician and checking-up system. That is, the patient comes in and probably indicates by his symptoms some disease, and the doctor examining him refers him to his own family physician, with a complete diagnosis of what he finds in his case. After the family physician has diagnosed the case, and after the family physician has treated the case, then the company doctor, the examining physician, asks that this man return for a check-up in thirty days, or sixty days, or whatever the case may be.

That is the outline of health work on a part-time basis, and I really wish that we as a Section would do more along the industrial health way. And those of you who have any questions whatsoever on a system, please feel at liberty to write or call on Dr. Sappington. He will be more than glad to help you out.

CHAIRMAN PROVIN: The next on the program is a report by the Committee on Paid Secretary.

Report on Full-Time Secretary Progress

By W. J. BRENNAN
St. Croix Paper Co., Woodland, Maine

Upon the motion of Mr. John Lundrigan at the Chicago Congress of last year the Pulp & Paper Section again considered the matter of a full-time secretary. Following brief discussion the chairman appointed a committee consisting of Ernest Augustus, M. K. Hoyman and W. J. Brennan to study the proposition and to report on ways and means of raising the requisite \$10,000 annually. This is a report of committee progress.

Before adjournment at Chicago several informal discussions were held by the committee and the matter of financing considered from several angles. At the moment an assessment on the "per man employed" basis seemed most feasible.

The full-time secretary question was next discussed at the Executive Committee sessions, National Safety Council, held in New York last fall. The consensus of opinion seemed to be that a great portion if not all the funds would necessarily have to come from the American Paper & Pulp Association and kindred organizations. In view of this plans were made to enlist the Section and particularly the Regional Directors in a drive upon regional paper associations and managers with the idea of building up a favorable sentiment against the time when the matter would be submitted to the National Association. The News-Letter gave considerable space to this and urged that speakers get before trade meetings, personal calls be made on executives and that each Regional Director be responsible for putting the idea over in his own territory.

The Section is indebted to W. Dean Keefer, chief engineer, National Safety Council, for having volunteered to interview Mr. Jesse H. Neal, general manager, American Paper & Pulp Association. In an informal way and without any specific proposition to present, Mr. Keefer spent nearly two hours with Mr. Neal and enlightened him considerably as to our aims, needs and the functions of the Council. Mr. Neal was interested, agreed to discuss the matter with members of the executive board and later inquired of a Section having a full-time secretary as to his value to them. The ice has been broken through the commendable enthusiasm of Mr. Keefer. We are indebted to him.

A valuable suggestion of Mr. Keefer's should be acted upon by this assembly. His suggestion is that a contact be made with the members of the A. P. P. A. Executive Board, either by individuals or by a committee and in that way make it easier for Mr. Neal to sell the idea to them. Paving the way in this fashion will certainly make progress easier in the future. A few minutes spent with Mr. Neal when members are in New York will serve to keep the idea fresh in his mind and impress him with our seriousness.

It would seem that the proposition at present resolves itself to the fact that a general enthusiasm must be created throughout the paper trade for a full-time secretary and that the most prominent men in the industry must support the idea before the American Paper & Pulp Association. The committee cautions against a hasty action or presentation of the idea without the requisite background of enthusiasm. A refusal due to a poorly presented case or half-hearted support from the trade majority will postpone, if not completely kill, our chances indefinitely. All our guns must be brought to bear and the matter introduced by an outstanding figure in the industry if we are to succeed.

There is a distinct undercurrent of feeling throughout the Section that the National Safety Council should be considered when recruiting funds, some feeling that a specific service would be more to the point than the general assistance now rendered. Our fees to the Council total \$11,000 annually and come from 208 sources. It is not impossible that trade publications would consider a donation in view of the return they would receive from this news-gathering source.

It is our opinion that nothing will come out of the proposition if the Section as a whole does not get interested in this matter and do missionary work for the cause. The response to News-Letter appeals has been practically nil and no information is available even after a year of campaigning as to the attitude of the majority of mills. As we see it, the matter hinges upon widespread interest. The A. P. P. A. cannot refuse if an overwhelming sentiment demands it. This sentiment must be created by the hard work of each individual.

We, as a committee, hope that a radical change in the general interest in this matter characterize another year's work on this important subject.

CHAIRMAN PRUYN: We have 233 members in the Paper & Pulp Section of the National Safety Council. In that 233, we probably have at least 185 or 190 paper companies, and I think that every one of us who is affiliated with the American Paper & Pulp Association should use his best efforts with the executives of our various companies, to at least get their reaction on it, and have them use their best efforts to put this thing over.

F. H. ROSEBUSH (Nekoosa-Edwards Paper Co., Fort Edwards, Wis.): Mr. Chairman, the thought that has been running through my mind is to what extent we can interest the American Paper & Pulp Association in having a man from this Section; whether the question is going to occur to them that they may, perhaps, be spending a lot of money to help us out, and what logical reason are we going to put up to them that they should spend this money to help this Section out, unless the representation in the American Paper & Pulp Association and the representation in this Section is somewhat parallel?

W. J. PLACOCK (Northern Paper Mills, Great Bay, Wis.): I don't think we will get anywhere until this Section has some very definite plan of its own, and it seems to me, from the discussion that we have had heretofore, that we are not entirely definite in our own minds as to how we want to go at this. I took this matter up with our own company, and I think that the point that Mr. Brennan raised there, about the ground not being properly prepared for this, is very true. I think there's got to be enthusiasm before we can either get the American Paper & Pulp Association interested, if at all, or the members represented in this Section.

CHAIRMAN PRUYN: It seems a very close estimate will have to be made of the cost of a full-time secretary, salary, traveling expenses, etc., and then the Committee will have to outline the exact benefits that can be derived from such a secretary.

I think the new officers will continue this Committee, and get somewhere this year.

MR. ROSEBUSH: Personally, I can't see how we can ask the National Council to put the money up for a secretary for this Section, nor can I conceive of their lowering any dues for us. I don't believe they are making any money on this Section, and I think that in line with what Mr. Gleason has said, what we can ask the National Safety Council for is for advice, to point out how we should go at this, and to give us some help.

But it seems to me that the money for this paid secretary has got to come through the efforts of this Section. I can't see any other source for it. If we can interest mills who are not now members, by proving to them that if we get a paid secretary we will have something to offer them, we may get donations from mills who are not now members, and, as has been stated here, incidentally get those mills as members. But it seems to me it is our job, and we have to face it right here.

CHAIRMAN PRUYN: The next thing on the program is an address by Mr. Fordyce P. Stanley, who is vice-president of the Glens Falls Indemnity Company.

Address

By FORDYCE P. STANLEY

Vice-President, Glens Falls Indemnity Co., Glens Falls, N. Y.

This idea of safety, to my mind, after studying it about fifteen years, has begun to produce results. Not so many years ago I remember when safety work in any industrial organization was a necessary evil. In the early days we had no one who took any great active interest in safety work, and I remember day after day, when I attempted to sell a safety idea to the business administrators of an industrial organization, they didn't believe it. They had men working. If they were fools enough to hurt themselves, why let them suffer! That was about the attitude, and you know it.

I think probably the business in which I am engaged caused industrial leaders to give more thought to safety work than anything else. When you strike into the coffers of any organization and can prove to a man that he is losing money by failing to take recognition of the condition that exists, he is quite apt to listen to you.

In the olden days, there had never been devised any way of crediting or debiting an insurable risk from an experience standpoint and I believe that is where we fell down in our business, because there was no great incentive for the industrial man to protect life and limb.

If you wanted to go back still further into the history of this business, you could readily appreciate his attitude.

There was a condition brought to him over which he had no control, and, in fact, one which he fought with every ounce of energy he had. In the early days, industry

amounted to very little. It was more of a family affair, where all banded together and did work under a common leader. Things progressed nicely on that basis, because it was a family affair.

Now that went along very well for a number of years, until the advent of mechanical equipment in industry. Naturally, with the fast-moving machines, with operators unaccustomed to their operation, there began to mount up a large number of industrial accidents.

The employer of labor in those days didn't feel that it was any of his business to be greatly concerned with industrial accidents, because they would happen; but the employee realized, and reasoned with himself and others with whom he was associated in industry, "Here is a machine, a piece of mechanical equipment in the plant, which, if it breaks down or wears out, the employer of labor is ready to spend no small amount of money to put again in operation. Here I am, a human being, and if, because of the high speed with which this machine travels, I should lose an arm, a leg, an eye, etc., I am thrown out on the street and caused to suffer without any compensation."

Well, that condition prevailed for quite a while, until there began to float about (and in this, gentlemen, I am back farther than industry in the United States, right at this moment—I am speaking largely of England), that condition prevailed for quite a while, until there began roaming around the streets nothing but human derelicts, charity cases, mendicants, with no means of livelihood, because industry had crippled them.

It was not a good condition. Our standard of living in this country wouldn't permit us to carry on that way very long, and regardless of the standard of living, in that country of this, common sense taught the employee that it was up to him to make some organized effort to bring about a condition that would change all this, and he did. We had the advent of organized labor.

You had the first organization of your labor union in England, and with it came a change in employment conditions. By this organization means were brought about eventually, much against the will of the employer, whereby he should give some thought to accidents in industry.

He had something forced on him that he never wanted to come. I am not now speaking of organized labor. I am speaking of its results. He had a condition brought to him which forced him to give thought and recognition to the employee who was injured during his course of work, and he knew that would cost him money.

The employer of labor decided that there was but one way to handle this thing, as long as he was going to be held responsible for accidents, and that was by legislation, so he was able to have passed—and the first Act of its kind originated in England, too—the Employers' Liability Act.

The first Employers' Liability Act in the United States was adopted in the State of Alabama. Now think that over—the one State in this Union that had less industry than any other State was the first State to adopt some type of compensation for the employee.

The Employers' Liability Act was going to cure all the evils of industry! There wasn't any question about it. It looked good. But you know the results of the Employers' Liability Act were almost nil. It resulted in nothing but trial after trial in the courts, because there was nothing in the Act that said that the employer of labor must pay; and with the old Common Law defenses there was probably one case out of about 800 to 900 that really was clearcut, where the Common Law defenses could not be used, and where the employer was forced to pay without legal action.

So that didn't secure results, and what happened? Organized labor again said

"This is a farce. Now we have got to have something better than this", and then they brought on the Compensation Act; and that again, mind you, didn't originate in the United States. We just followed Continental Europe, that is all. Compensation insurance had existed there well on to twenty years prior to its adoption in the United States.

The first State to adopt the Compensation Act in the United States was New York in 1911, and if you remember it was declared unconstitutional, because it took a man's rights away without due processes of law. In the year following, the first to pass an acceptable Compensation Act was the State of New Jersey.

Today, with the exception of three Southern States and two of the Middle Western States, every State in the Union enjoys a Compensation Act. But the employer of labor didn't enjoy it, because it was compulsory. There were no Common Law defenses. The Law said "You must buy workmen's compensation." That is practically what it said. There were alternatives that if he didn't buy he could do certain other things. I mean by that, he either had to insure or carry his own risk; but it didn't relieve him from payments stipulated by law.

He said "This thing is going to increase the cost of production. We can't afford to pay this money out. We have got to get it back somehow. Sure, we'll charge it into our product", but every time you put an overhead cost on a product it raises the cost of your product, but not in the same proportion, mind you, to what it costs you. Bear that in mind.

So he never had any thought that this thing was a good idea. He didn't believe in it; and why should he be bothering about safety first? He had to pay it anyway. The Law said: "If a man is injured, you have got to pay it."

Well, it didn't take us long, in the business of insurance, to realize that if we were ever going to break even on this thing we had to reduce accidents. We had a continually mounting frequency from an accident standpoint. The rate levels we were forced to charge for the business could never catch up with the business, because the experience was always from 18 to 36 months behind. We spent about \$1.50 for every dollar we took in. It was not a profitable business. We were governed by States in the making of our rates, so there was only one way that we could survive.

Mind you, I am not trying to take credit for the insurance companies for the results obtained by safety work. Don't misunderstand me, because all we did was for the sake of self-preservation. That is all. I will take credit for the companies from the standpoint that they were instrumental in forcing it. We merely told the employer "If you don't do certain things, we will not carry your compensation, and if we will not carry it, probably no other company will because of its bad experience". He didn't want to carry it himself, and the majority of employers of labor aren't large enough to carry their own compensation risks.

So we brought about a condition which resulted in this, "If you improve the working conditions of the plant you can get a credit. If your experience is bad, however, you will get a debit."

The real task began when an attempt was made to prove how a saving could be made in both man-power and dollars. It was a hard problem to get men to wear gaiters, goggles, etc., in the pouring of molten metal. They laughed at us. Traditions, customs, and beliefs of years gone by were so thoroughly inbred in the minds of the average employee that he couldn't believe in this idea of making a "silly" out of himself, to be ridiculed by his fellow employees.

Just think what you as safety men have been through. Just think of the necessary education. You had to start with that man as you would a child, and teach him the fundamentals of safety; not that he was doing anything for you, because you never got to first base on that; not that he was helping you, but that he was helping himself and his family to keep well and healthy. Now of course from that simple

beginning there has been built up the present safety spirit in industry. However, I think you should keep in mind that within the next ten or fifteen years the little tot that is running around the house today is himself going to be in industry; and it is quite probable to assume that he will follow in the footsteps of his father, and if his father is employed by your organization, no doubt the son will eventually become interested in the same type of work.

Now think of the great amount of effort to be saved if you could take that child and imbue him with the fundamental principles of safety in everyday life. We are devoting a great deal of our time in our business in an attempt to educate the child in school to practice the principles of safety, and it is almost an insurmountable task. To begin with, we haven't organizations that are great enough to cover the territory, but I do believe that you men who are looked up to in your communities, because your work is known, could take upon yourself a systematic campaign of safety in the public schools, by lectures, by pictures of your plant, showing what you have done for the protection of life and limb, and then teach the children the necessity of practicing safety first in school, on the way to school and back, and in the home.

You are the men who must do this type of work. I know you probably will get very little credit for it, and you will be damned at times, but what do you care if, in the final analysis, you can accomplish results?

There is so much to it, men, that you could discuss it for hours. However, you have done more than any one ever expected could be done, fifteen years ago, but you haven't gone far enough in following the practice of safety work back into the home. I believe that if we could start safety work all over, we would start back in the home and work into the factory; and I think our ultimate results would have been greater, because if you can get a mind young, ready to absorb, in its embryonic state, you can sell it an idea and have the idea stick much better than you can by talking the man past middle age, who already has become set in his manner, has ideas of his own, and attempt to teach him safety, when all his life he never practices it.

You have probably heard this little axiom or slogan "an accident prevented is a benefaction; a claim compensated is an apology". It was originated by a very dear friend of mine in the insurance business, a man who devoted his life to this type of business; and is one which I think we could all well afford to keep in mind. Think it over.

Gentlemen, I congratulate you in your work. I am proud to have just had the opportunity to be with you a few minutes. I am proud to be with men who are doing the type of work you are doing, and securing the results you are securing; and with all due respect to the clergy, they are doing no greater work in the world today than the man, even though he is compensated for it, who day in and day out is looking after the welfare of his fellow men.

CHAIRMAN PRUYN: We have another address this morning. Through the efforts of Ken Faist, we are very fortunate in having with us Dr. Louis H. Frechtling, who is director of the Department of Industrial Relations, The Champion Coated Paper Company, Hamilton, Ohio.

Medical and Nursing Service in a Paper Mill

By Dr. LOUIS H. FRECHTLING

Director, Department of Industrial Relations,
The Champion Coated Paper Company, Hamilton, O.

When the craftsman of yesterday laid down his hand tools and closed up his home shop to go to the mill and the factory, his life became more complicated, and the problems growing out of the grouping of individuals for industrial endeavor, likewise multiplied. One of these problems was the group medical problem. For years it

was handled with only here or there a little more thought than was necessary to take care of certain emergencies that arose from time to time. In some of our mills we are operating the same way today.

Emergencies, in which some worker is injured, or the group is threatened with a contagious or infectious disease, are met with activity that extends over as much time as is needed to cover that emergency, and then the plant is back into the same routine as before the emergency arose.

In these emergencies, some physician from the community is called in to handle the one then existing, and, this carried to completion, his services then cease until some new occasion arises. It may be argued that such service is sufficient as it takes care of the existent need. But is that true? Does not industry demand something more? Does it not demand a healthful, physically and mentally normal working force? Is not the employee justified in demanding a healthful, sanitary working place, uncontaminated by disease and fellow employees who, through physical defects, cannot carry on the work? Do not business principles and a spirit of humanitarianism demand the conservation of life and limb of your employees?

We may well ask ourselves the question—"Why have medical and nursing service in a paper mill?" We can answer it briefly by saying that through those agencies we can do more to attain those ends enumerated above, as well as others, than through any other agency.

In approaching the subject it is recognized that it is much easier to organize a medical and nursing service in a large mill than in a small one that can neither use nor support a full time doctor or nurse. However, there are certain underlying principles and fundamentals that can be discussed profitably in the time at our disposal.

We venture this statement at this point, that the time is not far distant when every industry will have some form of medical service. Smaller mills are going to form into groups and have some trained individual who will give full time to these groups and assist them in caring for their medical problems. The larger mills will find it profitable, if they have not already done so, to have someone give him full time and attention to the medical problems which so vitally affect the success of any industry.

After management has determined to furnish medical and nursing service for the mills, the next important step is the selection of the proper individual as the directing head, who should be a physician that has been broadly trained. He or she must be more than a good surgeon, which to many seems to be the major requirement. Surgery will not make up more than one third of all the work. He must also be an internist, a diagnostician, an expert on sanitation, an all around medical utility man. His work will have ever increasing ramifications and he must be able to meet the demands, whatever they may be. He must have in him the humanitarian spirit and must see all sides of any problem, not permitting his eyes to grow dulled to any one side. He must have a knowledge of social science and economics, for if he conducts his work well he will be a great influence on the social structure, not only in the particular plant in which he serves but out into the community beyond, in an ever increasing radius. He will in time become, not a doctor to the ills of the individual, but to the ills of society. To many of you this may seem almost utopian, idealistic. I would not have you think that there is any one medical service that is functioning one hundred percent in this fashion, but I would have you know that there are numerous medical services and nursing services throughout industry that are bringing in to factories and mills more and more humanitarian interest on the part of all parties in industry, and a keener understanding on the part of each to the individual problems of the other.

The physical equipment of a medical department must be briefly disposed of in such a paper as this. Suffice it to say that the amount of space required will depend on the activities engaged in and the number of employees served. The department should be located as centrally as possible so that employees from all departments

may come and go with the least loss of time. The ventilation should be ample as should the natural and artificial lighting. Equipment used daily should be so placed as to call for the expenditure of the minimum number of steps on the part of those who are rendering the service.

We may now ask ourselves—"Of what should medical and nursing service in a paper mill consist?" The services may be divided into those which are remedial, the care of surgical and medical cases—and secondly, those which are preventable. Under the first heading we have the care of accidental injuries. Whatever we may say, this is the primary function of all industrial-medical departments, and is the only activity these departments have in common in large and small plants. However, in the well functioning programs, the tail "prevention" is wagging the dog.

An accident occurring, we are immediately faced with a number of problems. First, "How can we aid recovery in the quickest possible time?" Secondly, "How can we prevent the recurrence of the same or similar accidents?" Thirdly, "How can we prevent any permanent liability to the injured employee?" And lastly, "How can we avoid a fatality occurring in the injured employee's case?"

The welfare of the patient, the protection of the other employees and the interests of the employer all demand that the very best thought be given to these questions.

The successful medical service will so establish itself that the employees will gladly seek such service as they may require. It cannot be too strongly impressed upon the minds of the employees and employer, that even the ordinarily considered minor injury, the pin prick, the slight scratch, require immediate attention. Permitting them to go untreated for a day or more often results in serious infection entailing great suffering and a loss of time and money.

Often first aid outfits are placed at different locations throughout a plant. Such a procedure is full of possible dangers. If such outfits are used, it should be insisted upon that the employee present himself or herself as early as possible to someone who is competent to judge whether the treatment used is sufficient. Often a treatment to a wound from a first aid outfit gives a false sense of security to the employee and later results in serious infections. We strongly recommend that no first aid outfit be placed for the promiscuous use of employees. Where they are installed, they should only be used under competent supervision.

The medical department should also be equipped to care for acute medical conditions occurring in the mills. Much absenteeism can often be avoided by the early attention to acute ills.

The great function of the medical and nursing service is along the lines of prophylaxis or the prevention of injuries and disease conditions, and perhaps no more valuable means are available to gain this end than by physical examination.

When a man or woman comes into our mills to seek work, they do so because they need a job and have the hope that we may be able to take care of that need. Yet not one of them would wish to have some preexistent defect aggravated by some particular kind of work. Thus the medical examination at the time of employment assists in taking care of the interests of all parties concerned on the job. The new employee, the fellow employee and the employer. In this way we

- (a) Prevent those with contagious diseases from mingling with healthy employees.
- (b) Prevent those who have serious diseased conditions from going to work, for their own protection.
- (c) Choose the proper kind of work for those who have chronic diseases or defects.

I know there is still considerable feeling that physical examinations are made to the sole advantage of the employer. There may be some grounds for such feeling in certain cases, but by far the greater number of organizations in which a complete physical examination is one of the requisites to employment, the interest of all the parties—new employee, old employee and the employer are considered.

No examination that is made can be too complete, and we believe that there is no

better time for making the first examination than before the applicant for a position is formally employed. If it is necessary to reject the applicant, he may be eliminated immediately and thus not in any way jeopardize the health and well being of other employees with whom he comes in contact.

You may be interested in knowing just what class of applicants are rejected in the majority of plants having an entrance examination:—

- 1—Applicants having one eye, or who have less than half vision in each eye.
- 2—All cases of infectious or contagious diseases such as tuberculosis, scabies, trachoma and venereal infections.
- 3—All cases of hernia in which the same cannot be held in place with a proper fitting truss.
- 4—All cases in which there is a heart disease which has gone beyond the point where the heart can no longer carry on its work properly.
- 5—All cases in which the blood pressure is excessive.
- 6—All cases in which there is exaggerated varicose veins or ulcers.

As is readily seen, not all of these conditions are chronic and it is possible for the applicant after he has been cleared of the disqualifying condition to return for reexamination and potential employment. In all cases there should be periodic examinations of those employees who are sub-standard.

We would also recommend that each employee, regardless of whether he is sub-standard or not, present himself for reexamination at least once each year with the following thoughts in mind:—

- First—To ascertain the state of his or her health and to seek advice concerning such care as the state of health may require.
- Second—To discover disease conditions while still in the stage where they may be cured.

Employees will also consult the medical department for guidance in securing necessary and competent medical service to take care of diseased conditions in either themselves or those dependent upon them.

Other phases of the work have to do with plant hygiene and plant sanitation. Under these heads we have ventilations, seeing that the workmen are supplied with the requisite amount of air of the proper temperature and humidity, removing dust hazards, that the lighting is ample to take care of the needs of the particular operation, that the drinking water is of the proper temperature and safe to drink, that the toilet facilities are kept clean and healthful and that the cuspidors are clean and disinfected.

To be of real value, the department must embrace a program of instruction to the employees on matters pertaining to health and personal hygiene. Exercise and recreation, housing conditions and home environment, personal habits, diet and rest must all be presented. This can be done through personal interviews, bulletins, talks and articles appearing in the plant publication, if there is one, or on a mimeographed sheet. Efforts of this kind have an influence in most cases, far beyond what may be expected.

What has been said here, has for the most part had to do with medical service, but little regarding nursing service. Some one has said, that "the nurse is the right hand of the physician." This is certainly true in the field of industrial medicine.

The day that saw the passing of the old company doctor also saw the passing of "the nice motherly woman" who served as a plant nurse. Today the industrial nurse is a well equipped and experienced individual. To her is given the duty of preparing all dressings, the getting of all records and the keeping of special ones. She assists in all work and examinations and gives special treatments under the direction of the physician.

In some mills the nurse is used as a visiting nurse—that is, she calls upon the employees at their homes either at their request or the request of the management when an employee does not report for work after a certain period, varying with

the individual mill. Under such conditions the nurse can be of value in sending nursing service to the employee or those members of his family requiring the services. She can also give instructions on personal hygiene and home sanitation, on the care of infants and children, and the like. Her services have become almost as varied as that of the industrial physician.

Finally, to be successful, medical and nursing service must have the cooperation of all parties in industry. This it will have, if it has the humanizing element guiding it, if it is above sordidness and stinting. It cannot be paternalistic but must be in the broadest sense fraternalistic, gaining its ends, not by threats either open or inferred, but by its educational work, the why and the way. So administered, these services will do much in bringing about that something so earnestly longed for, a healthy, contented, safe group of workers, laboring at their respective jobs, be they office or mill.

CHAIRMAN PRUYN: Dr. Frechtling, in physical examinations you say you eliminate a man who has a loss of sight in one eye, total loss in one eye. That is not considered total disability, and I was wondering what is going to become of that sort of a man. We can't restore the sight of that eye, and that man must have a place in industry somewhere. The same with high blood pressure and other things of like nature. I wondered whether, in your organization, you didn't seek them out and find suitable jobs for them.

DR. FRECHTLING: In the first place, understand that no examination is retroactive. That is, the man who may have been in our organization with a single eye, or vision in but one eye, is retained. The new man that comes in to industry, or is attempting, rather, to come into industry, who has one eye, is another problem. In fact, he is quite a problem in industry. There are a great many of the States which are giving this subject more than casual attention. The one-eyed man in industry has become almost an outlaw in those cases where there is a physical examination. That is due, perhaps, to the attitude on cases of many of the Industrial Compensation Boards, where a man is said to be taken as he is. In other words, if you take a man who has vision in but one eye, and he loses the vision in his good eye, you are immediately penalized with a complete loss of working ability. That is, at least, in most of our paper mills. There are things that a blind man can do, but around most industrial organizations those positions do not exist.

Of course the man with the high blood pressure becomes what I termed a "potential employee". He can go out, and if that condition is one which will respond to treatment, he can go out and be treated and come back, and if everything is found to be all right, and the job is open, he will be given that job, and that case should be handled with thought. That man or that woman should not be placed at any work which might possibly bring about that increase in blood pressure.

CHAIRMAN PRUYN: There is one more point on which I'd like to get specific information, and that is drinking water temperature for a boiler house.

DR. FRECHTLING: I think the thing that most of us think of when we think of drinking water is having that water just as cold as we can possibly get it; but if that temperature is down around 60 or 65, I think it will be found agreeable, and sometimes when you have those cases among your workers where there is great thirst, in extreme heat and the like, the addition of just a small amount of common ordinary table salt to the water seems to relieve the thirst much more readily than just plain water.

CHAIRMAN PRUYN: How can you get salt into a regular system?

DR. FRECHTLING: Of course you can't do that. You will have to spread that information, and get the individual worker to place the salt in it himself.

W. J. PEACOCK (Northern Paper Mills, Great Bay, Wis.): I'd like to ask the doctor, are you using yet, in your plant, the ultra-violet ray?

DR. FRECHTLING: The ultra-violet ray, gentlemen, for those of you who may not be conversant with it, is an electric arc, mercury arc that is passed through fused quartz. Fused quartz is the only substance we know of, at the present time, that will permit anything like a fairly high percentage of the ultra-violet rays of a spectrum to pass through it, and this is used in two ways.

One is the so-called ultra-violet lamp, in which the Alpine was the first produced, made by the Hanovia Chemical Corporation, and is an air-cooled lamp; and later they brought out a water-cooled lamp, which is known as the Krohmyer. Now the Krohmyer Lamp is a water-cooled lamp. This lamp is used over certain areas for the matter of disinfection, and is used for just short periods. Various types of quartz applicators are inserted into the handle of the lamp. You can often abort boils, for instance, by the use of the Krohmyer Lamp, and you can effectually sterilize any tissue that has been denuded or that has been opened, by the use of this lamp.

On the other hand, the use of the Alpine Lamp, or the air-cooled ultra-violet lamp, is more particularly for the building up of body resistance and building up in the blood stream the calcium content of the tissues that have much to do with building up a resistance in the tissue. The air-cooled lamp has its value in the treatment of conditions in which children are illy-nourished, and in tuberculosis.

These agencies are just a part of physio-therapy, which has quite a place in the industrial medical plant. Besides the ultra-violet lamps, we have the use of massage, and the use of the infra-red lamp, which is the other side of the spectrum, the chemical rays being the ultra-violet and the physical rays being the infra-red, and then we also have an agency that we use with quite a bit of success, known as diathermy, in which there is built up within the tissue heat. In the ordinary carbon arc lamp you get a certain amount, but a very small amount of the ultra-violet. That is the ray that, if any of you have ever had occasion to look at the ordinary carbon arc, after a few hours you feel as though somebody had come along and thrown a handful of sand into your eyes and your eyes became very red. Now there is a small amount of ultra-violet in the ordinary carbon arc, but not enough to do any good.

CHAIRMAN PRUYN: Is it not true that you should use the Alpine or Quartz lamp only under the direction of a physician?

DR. FRECHTLING: Any of the quartz lamps should be used only under the guidance of a physician. There are some of them that are made for home use, and their efficiency is correspondingly small.

JAMES MCGIVREY (Brown Company, Berlin, N. H.): Have you had occasion to use the ultra-violet ray for extensive second degree burns?

DR. FRECHTLING: Yes, we have, and with some excellent results. The ultra-violet lamp, gentlemen, is about the only agency that we know of at the present time that effectually counteracts the old X-ray burn, and it seems to do that very well. Our results with both chemical and thermal burns in the use of the ultra-violet rays have been very satisfactory. We usually precede the treatment with the ultra violet with the infra-red.

Your ultra-violet ray does not penetrate very deeply, and what you do with your infra-red is to dilate the cutaneous blood vessels in the skin, and then, by using your ultra-violet, you seemingly get better results.

MR. MCGIVREY: Following the digester explosion, there were eleven men seriously burned by gas and steam, and it was the first opportunity they had to try out the ultra-violet lamp for a real test, and they had very satisfactory results.

F. H. ROSENBUCH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): In asking employees to take a yearly physical examination, suppose you had nothing to offer them in the way of corrections for ailments; after having found those physical conditions, would you still continue to have yearly or periodical physical examinations?

What is in my mind is that many employees think that you are trying to get something on them, and that if you have them examined and then have nothing to offer them to overcome their ailments, that you are simply getting the information that you are going to use later in letting them out of the plant, and I suspect it would create a feeling among employees of resentment toward physical examinations. I would like to know what the opinion and experience of the doctor and others is in regard to that.

CHAIRMAN PRUYN: I think you have to build up some sort of a system to take care of curable diseases, or in the case of hernias, that require an operation, either the company assuming part of the cost, or at least assisting the employee in the financing of the cost, at small weekly deductions from his pay. Mr. Lundrigan has something to say about that, taking out of the wages as low as 10c a week.

JOHN LUNDRIGAN (International Paper Co., New York): No fixed amount. Our rule authorizes all plant managers to guarantee the financing of any physical ills that require medical treatment in the case of an employee that he would ordinarily have hired if that disability hadn't developed. We let the employee personally write his own ticket as to the amount to be taken out of his wages. The company is supposed to be eventually reimbursed.

MR. ROSEBUSH: What about the small plant that has no facilities of meeting the condition?

MR. LUNDRIGAN: I agree with Mr. Rosebush, and I think I agree with the doctor. If I remember the doctor's statement on the subject of reexamination, it would be in the case of certain standing employees. One of our great difficulties is to impress the mill with the importance of doing their part in seeing that this recommended treatment is actually applied, because in most instances, where the disability is of a minor character, and the examining physician states that it will yield to treatment, and recommends the treatment, the employee is permitted to go to work. In the case of, for instance, infectious disease or eye trouble that proper optical lenses will cure, under our system we purchase the necessary equipment for the employee, and put him to work.

CHAIRMAN PRUYN: I think you have to sell the idea to the employee. The big job is to put it over, and right at the start you can find three or four employees with certain deficiencies, and correct those, and that will help along toward selling the other employees. But there are a lot of things that we find out. An employee needs glasses and doesn't know it. That is a very easy matter to take care of. There are other things, such as employees with very poor teeth. Many of them continue along that way because they don't realize that they are not properly masticating their food, and a little later they get high blood pressure, which comes before indigestion, and the majority will go along that way for ten or fifteen years, until it is necessary that they have the balance of their teeth pulled, very often, and have false teeth made for them.

We had a physical examiner, a state physician, who was sent around to examine industries and report to the State the conditions. He made recommendations, and many of the employees followed them out, and were better physically when they got all through, so much so that since that time we had it followed up by other employees coming to us. He wanted to help one group that we picked out, and other employees came and said "Why can't we get this examination?"

I think right at the start there is going to be a lot of dissatisfaction if it is adopted, but it will sell itself if you actually do something for each employee.

MR. LUNDRIGAN: The one disability enumerated by the doctor on which he insists upon operating is that of hernia. A good part of our business is located in New York, and it is simply wasting your time talking about avoiding compensation on account of a hernia disability. Therefore, while we have drawn the line and

said "This does not apply to men already on the payroll", we don't take into our employ a new man with any specific hernia or actual hernia condition, until he first undergoes an operation for that hernia. If it is so aggravated or developed that it won't yield to operation, he simply isn't eligible for our employ.

CHAIRMAN PRUYN: Very often those hernias will be corrected by trusses.

MR. LUNDRIGAN: In Wisconsin we found it pretty easy to get out of paying a hernia disability, provided you could establish that the hernia existed at the time the employee was hired and that it wasn't bothering him at the time.

MR. ROSEBUSH: The doctor spoke, in his paper, about holding out the man with contagious diseases until those were cured.

We'll say that at 4 o'clock in the afternoon the employment department gets a call for six men for the next morning at 7 o'clock, to go into the Wood Room. You send out and six men come in, and you examine them, but can you get all the data you want on contagious diseases before those men go to work, or do you let them come to work and check up afterwards? For instance, with venereal diseases?

DR. FRECHTLING: All the venereal ones, you can get apparently.

CHAIRMAN PRUYN: It seems to me you have to make one or two decisions, either to delay the delivering of those men at that particular time they are wanted, until they can secure physical examinations from the plant physician, or you must have a policy that new men hired do not undergo an examination except in the first days of their employment. In the second case you are not absolutely sure.

MR. LUNDRIGAN: We are met constantly with the proposition of having to hire a man who didn't have time to undergo physical examination; so our rule reads that this examination must be within twelve days, six days before and six days after employment, because you do have times when an employed man is disabled. Now you say to him "Of course, if you are employed here permanently you are going to have to undergo a medical examination, and the next day he is examined and if rejected you have simply jeopardized your whole force."

DR. FRECHTLING: May I just say one word in regard to the question Mr. Rosebush asked, as to re-examinations in the case of the sub-standard man? Our endeavor is then to find out whether the particular work he is doing is a cause, or whether his trouble is aggravated by his work. We do include a campaign of education, and through that educational campaign we find that many of them are responding. When we find such an individual, the basis of this work is simply keeping faith. We have got to keep faith with our men.

I can cite a specific instance, in which one of our men came to us, a machine tender. He said "I have been off, as you know, on two different occasions within the last few months, because of trouble with my legs. I have seen two or three physicians, but they do not seem to be able to give me any help. I want you to go over me and find out just what is wrong." We went over this man from top to toe, and the last thing we did was to make some impressions of his feet, and we found that he was flat-footed. There was the answer to his trouble with his legs!

There was only one thing that could be done about his treatment, and that was to put him on another job. We put him on another job, and that fellow has come along, now, to where he is in charge of one of the large shipping departments, and he has his health, and is working every day.

G. W. PHILLIPS (The Champion Fibre Co., Canton, N. C.): Dr. Frechtling said something about chemical burns. I wonder if any of the members of the Section are troubled with dermatitis caused by the action of chemicals such as caustics, alkalis, and acids upon the skin. We have had a great deal of trouble in the last few years, and I am just wondering, if you don't have it, what preventative measures you use.

W. J. BRENNAN (St. Croix Paper Co., Woodland, Me.): Our chief dermatitis condition results from hemlock bark, as discussed by Friend Plzak last year, which

we treat with the lamps, and upon getting a recovery we attempt to use some sort of a cream, or super-impose some sort of a water-proofing compound over the area as soon as the tissue is proper to receive it. Upon the next case coming back to us from the Medical Department, I am going to use the G. E. Cream. They developed a cream in their laboratory for their own use, to meet a peculiar need, I assume the handling of kerosene and gasoline in the washing of castings. They had this condition of dermatitis, and developed this cream, which I suppose has a basis of wax, not soluble in any of the usual things, yet easily removed. So we are prepared to treat the next case with this protective coat of G. E. Cream, now on the market, after the Medical Department turns it back to us.

CHAIRMAN PRUYN: I'd now like the Report of the Nominating Committee.

K. L. FAIST (The Champion Coated Paper Co., Hamilton, Ohio): Before I read the Report of the Nominating Committee, I want to say that you will note there are several vacancies. The committee suggests that you make any suggestions you may have to the incoming General Chairman.

Report of the Nominating Committee

General Chairman—W. J. BRENNAN, St. Croix Paper Company, Woodland, Maine.

Vice-Chairmen—

A. S. COOK, Price Brothers and Company, Kenogami, P. Q., Canada.

W. A. GLEASON, Hammermill Paper Company, Erie, Pa.

M. G. HOYMAN, Kimberly-Clark Corporation, Neenah, Wis.

W. H. JENNINGS, Bogalusa 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.

Membership Committee Chairman—N. F. BARTLETT, Hollingsworth and Vose Company, Boston, Mass.

Publicity Committee Chairman—H. D. BANTA, Hoberg Paper and Fibre Company, Green Bay, Wis.

Statistics Committee Chairman—E. E. GRANT, The Crystal Tissue Company, Middletown, Ohio.

Program Committee Chairman—W. A. GLEASON, Hammermill Paper Company, Erie, Pa.

Poster Committee Chairman—D. C. HUNTER, Oxford Miami Paper Co., West Carrollton, Ohio.

Health Committee Chairman—DR. LEWIS FRECHTLING, The Champion Coated Paper Company, Hamilton, Ohio.

Contest Committee Chairman—A. SCOTT DOWD, The Paper Industry, Chicago, Ill.

Engineering Committee Chairman—J. J. PLZAK, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis.

Regional Directors—

H. D. BANTA, Hoberg Paper and Fibre Company, Green Bay, Wis.

W. J. CAMPBELL, Northwest Paper Company, Cloquet, Minn.

E. E. GRANT, The Crystal Tissue Company, Middletown, Ohio.

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. ROZEK, Bird and Son, East Walpole, Mass.

F. H. ROSEBUSH, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

F. H. SCANLON, Powell River Company, Ltd., Powell River, B. C., Canada.

ARTHUR E. WINSLOW, Hollingsworth and Whitney Company, Waterville, Maine.

Executive Committee:—Officers and

KENNETH L. FAIST, The Champion Coated Paper Company, Hamilton, Ohio.

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, Rhinelander Paper Company, Rhinelander, Wis.

MR. LUNDRIGAN: I move that the nominations be closed.

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): Second the Motion.

CHAIRMAN PRUYN: You have heard it moved and seconded that the report of the Nominating Committee be accepted, and that the nominations be closed. All in favor will please signify by the usual sign, Aye. Contrary minded, No. It is a vote, and the nominees as reported by the Nominating Committee are hereby elected to serve for the ensuing year.

ADJOURNMENT

Wednesday Luncheon Session
October 1, 1930

WALTER J. BRENNAN, Chairman
St. Croix Paper Company, Woodland, Me.

The luncheon session of the Paper and Pulp Section convened with Chairman Walter J. Brennan, St. Croix Paper Co., Woodland, Maine, presiding.

CHAIRMAN BRENNAN: You all know that the great moment has arrived. Throughout the first six months of the year we have one eye on our mills and one eye on this great occasion, which comes once a year, when some hard-working soul receives recognition for his work.

Before introducing Mr. Dowd, chairman of the Contest Committee, who will present the Award, I wish to read a letter which comes to us from a man who occupies a peculiar position in our Section. He has no official capacity, yet he is as much a part of the Paper & Pulp Section as a foundation is a part of the building; not only through the service that he renders us, but by that good will, that spirit and that enthusiasm that makes things go in affairs of this sort.

I am referring to Edward B. Fritz. In fact, a meeting can hardly be thought of as complete without that kindly gentleman present. He is not able to be here, and that is our loss. I will read his letter.

"To the members of the paper and pulp section of the National Safety Council—Greetings:

"It is with a great sense of disappointment and regret that I find that I shall be unable to be with you personally at the 1930 meeting at Pittsburgh. I had planned for a long time that this was going to be one of my real pleasures during this year, but I find that circumstances beyond my control will prevent my being with you, as I had hoped to personally present the major trophy to the winning mill.

"I am sure that Mr. Dowd can make this presentation better than I would and I have therefore delegated this pleasure to him.

"The subject of Safety is one of the most important to manufacturing plants such as paper or pulp mills. There are so many possible chances for accidents, which means the loss of life or limb, or at least the loss of time or suffering by men and their families. If we believe in the Golden Rule, we certainly must be interested in the subject of Safety, and every man in every mill should do everything possible, within his power, to help his brother man to keep from being injured, and causing suffering to himself and others.

"This is the human side of Safety and it pays tremendous dividends to every manufacturing plant. The other side is the financial side of the question, which, while important, is secondary to the human side, but particularly in such times as we have been experiencing it is possible for a mill where every man has in mind the question of Safety for himself and his fellow man to have their costs considerably reduced from a mill where this question does not seem of so much importance.

"We of The Paper Industry, believe in safety in the mills. We are getting real enjoyment from watching the score and noting that each year many mills show a record of fewer accidents than in former years. We are getting more fun out of it than most of the members or men who devote their time to safety and each year we look forward to seeing a reduced record of accidents and suffering, as well as loss of money.

"We get more real pleasure out of presenting this trophy than any mill could get from receiving it, for we believe in its presentation and with efforts of the mills to secure it, there is a lessening of accidents and this is the one thing we desire most.

"It is our hope that this section may grow and thrive, until every mill in this country is listed as a member and until all mills have come through the year without recording accidents or suffering to any of its employees, or loss to its company.

"With sincere best wishes for the future of the paper and pulp section, I am

Most cordially yours
THE PAPER INDUSTRY
E. B. FRITZ
Publisher.

Continuing with the program, we come to the notation "Data on the Contest", by A. Scott Dowd, chairman, Contest Committee.

Mr. Dowd is a familiar figure to most of us, but to the few new-comers here I think it proper and appropriate to introduce Mr. Dowd as editor of *The Paper Industry Magazine*, the pioneer magazine in the cause of paper and pulp safety, a magazine which goes out of its way to further the purpose of this Council, and the basic reason for safety. The Section, I don't think, fully appreciates our obligation to that magazine. They are always willing and, regardless of the expense involved, see fit to cover these things; never have refused a request, and have built themselves into our organization so that we can not dispense with their services.

Without further remarks, except a word of gratitude to Mr. Fritz, Mr. Dowd, and his paper, I will introduce A. Scott Dowd, who will give you this year's material.

A. SCOTT DOWD (The Paper Industry, Chicago, Ill.): I wish to respond to the note of gratitude for the very kind introduction which your Chairman has made. It is a pleasure to participate in these affairs. Our paper does everything that we can think of to further the cause of safety. We have an organization that is at your service to promote your very best interests. We have an Associate Editor of our magazine located in New York City. It is my very good fortune to have him present with me here today, and I can speak for you that it is the good fortune of the Section to have Mr. Thomas J. Keenan with us today, because he is the gentleman who will write the story of our meeting.

I will ask Mr. Keenan to rise and let me introduce him to those of you who might not know him. Tom Keenan!

THOMAS J. KEENAN (The Paper Industry, New York City): Thank you, Mr. Dowd. It is very generous of you!

Data on the Contest

By A. SCOTT DOWD

Chairman, Contest Committee; Editor, "The Paper Industry", Chicago, Ill.

It has been said that ninety-five per cent of the things we hear are forgotten; seventy per cent of the things we read pass from our memories, but less than five per cent of the things we actually do are ever forgotten.

This leads us to believe that the growing success of the safety movement in our pulp and paper industry is due to the fact that the members of this Paper and Pulp Section of the National Safety Council are striving year after year through manual and mental efforts in their respective mills to lower their accident records by trying to improve upon their past experiences.

The annual contests between mill members of this section during the past five periods have unmistakably provided means and inspiration for making honest and intense efforts to reduce accidents. There is little doubt either but that the influence spread by these hundred and twenty active participants in our annual contests has reached into all paper and pulp mills throughout the land to the end that Safety is

now recognized as a most desirable and important spoke in the wheel of our business structure.

Before touching particularly on the records of the mills which have been engaged in the 1930 contest, let us consider a few facts concerning the accident experience during 1929 of all members of the Paper and Pulp Section. Those of you who have read the National Safety Council's publication, "Industrial Accident Statistics," 1930 edition, have noticed that the paper industry has again improved its accident record during the year 1929.

Lost time accidents in the Paper and Pulp Section, represented by the experience of 111 plants that have reported to the Council in each of the last three years, were 24.07 per million hours worked in 1929 compared with 24.73 in 1928, and 30.27 in 1927. The severity rate also has declined and was 21 per cent less than in 1928 and 11 per cent less than in 1927. This is a record of which we can be proud, for our improvement in safety was outstanding in comparison with the experience of industry as a whole, shown in the following:

The records of about 1,100 plants in all industries reporting in each year from 1927 to 1929 show a reduction in the frequency rate of 11 per cent; our plants represented by the 111 establishments, have achieved a drop of 20 per cent during the same period. The severity rate for industry as a whole has increased from 1.92 to 2.02, but in our section, severity has been reduced from 1.99 to 1.78 or 11 per cent. The experience of industry as a whole also shows that the fatality rate increased in 1928 over 1927, and that the rate for permanent partial disabilities increased during 1929 over 1928. But through your efforts, our industry has been able to show lower rates for serious accidents during 1929 than for any previous period.

The interest which the members of this section are taking in their accident problems is shown by the increase in the number of reporting establishments for 1929 in comparison with previous years—a gain of 29 per cent over the year 1928.

The frequency rate for all plants in the Paper and Pulp Section reporting for 1929 was 28.43 and the severity rate was 1.77. This compares with an average frequency rate of 25.53 for all industries represented in the Council's statistical publication. We, therefore, had about three more accidents per million hours worked in our industry than is indicated for industry as a whole. On the other hand, our severity rate of 1.77 is 21 per cent less than the average severity of 2.23 for all industries. Among the 27 industries listed in "Industrial Accident Statistics," 1930 edition, we rank seventeenth, on the basis of frequency. In other words, accidents in our industry are somewhat more numerous than in most. These comparisons emphasize the need for continuing our safety efforts which have successfully brought reductions in the past.

Let us now examine the accident situation in various phases of our own industry. Paper box and container manufacturing plants had an average frequency rate during 1929 of 37.76; paper goods establishments a rate of only 14.71, and paper and pulp mills, a rate of 29.42. I have already said that the average rate for the entire industry was 28.43 for the 215 reporting plants. Hazards, of course, in these different divisions of our industry vary, but 26 per cent of all reporting plants had frequency rates less than 14.99, or almost half the average rate for the entire industry. Plants from every division of our industry are represented in a group of 14 with frequency rates less than 5.0. These plants, ranging in size from 25 to over 1000 employees, have demonstrated real achievement in safety. They have set a mark for the rest of the industry to shoot at, whether engaged in making paper boxes, envelopes and stationery, or newsprint.

Referring now to the fifth annual Safety Contest of mill members of the Paper and Pulp Section, let us consider some of the outstanding facts in connection with this. Mimeographed copies of the final ranking of all contestants as of June 30, 1930, are in your hands. There were 124 mills registered in 1930, compared with 123 the

year before; 122 in 1928 and 119 mills in 1927. A number of the mills failed to send in their monthly reports and they were consequently withdrawn from the Contest in compliance with the rules, leaving a net number of 98 mills in the combined three groups that finished the contest.

The total number of persons and man hours worked in the 1930 Contest averaged 1310 hours per person, compared with 1348 in each of the two previous annual contests, and 1296 in the year 1927.

There has been a steady decrease in the number of accidents in contesting mills in the past four years; also in the amount of lost time. Frequency rates of the contesting mills by years are as follows:

1927—33.514
1928—28.422—37.9% decrease
1929—26.337—26.7% "
1930—20.826—20.9% "

The severity rates by years are as follows:

1927—.649
1928—.553—26.8% decrease
1929—.504—14.1% "
1930—.475—5.8% "

It is noteworthy that frequency and severity rates made by those competing in the contest were lower than those summarized from the reports of all pulp and paper mills in the section. In the year 1929, this comparison shows:

	Frequency	Severity
All mills (full year, 1929).....	29.42	2.89
Mills in 1929 Contest (6 months).....	26.337	.504

This is an indication of the fact that it pays to create and intensify interest in the prevention of accidents.

The number of mills in the 1930 Contest that had frequency and severity rates below average was less than in any previous year, but in 1930 there were 11 mills that completed the contest without a lost time accident as compared with six mills in 1929, eight mills in 1928 and six mills in 1927. We are making excellent progress but it is also evident that there is still plenty of room for improvement.

There is now substantial proof in the records to show that these contests in the Paper and Pulp Section are a great inspiration and stimulant for the reduction of accidents. At the last Congress, it was suggested that the terms of these contests should be extended from six months to one year, beginning with July and ending on June 30th of the following year. I therefore present this to you again at this time in connection with same recommend that we hold one more six month's contest ending June 30th of next year in order that trophies can be awarded at the 1931 Congress; understanding therewith that immediately following the close of this next contest, the 1932 Contest will begin on July first for a period of twelve months.

The Paper Industry magazine is grateful for the privilege it enjoys of taking an active interest in the affairs of this Paper and Pulp Section. The friendships that have been established, the splendid co-operation it receives from the National Safety Council and the members of this section, and the thrill and satisfaction it receives in the realization of progressive accomplishment born of a good idea, combine in making our association with you a great pleasure.

CHAIRMAN BRENNAN: Sections are not always favored by having with them a man in the capacity of the next speaker. The fact that we have made outstanding results, shown outstanding success in our work, has given us a status with the Council that demands, perhaps, the best they have to offer.

The Western Electric Company is as familiar to you as any other of the great ten corporations of the country, and from that organization we have the Superintendent of Public Relations, who will present three trophies this afternoon, Mr. C. W.

Bergquist, Vice President of the National Safety Council, and superintendent of Public Relations of the Western Electric Company, who has favored us with his presence, and will proceed with the business.

National Safety Council Trophies

By C. W. BERGQUIST
Vice-President, National Safety Council, Chicago

I am glad to be here, and I greatly appreciate your warm welcome. I know comparatively little about the paper industry. I am almost ashamed to say that, because in my business paper constitutes a very large percentage of the raw material, which we use in the manufacture of telephones.

As I have been going about, from room to room, in these several hotels, during the past four days, I have been impressed by the diversity of industrial representation. I have been impressed by the independence of one industry and the other. Few people realize that there is paper in the telephone. I suppose the average man on the street would never dream that the Western Electric Company is the buyer of hundreds of thousands of tons of paper, and that practically every bit of the cable and the wire carrying your voice from your office or your home to another point would be impossible of manufacture if it were not for the product which you make and sell to us.

A very gratifying bit of information comes to me, showing that the average severity rate in your industry is only .475. That is indeed an excellent record, and I am glad to be associated with the National Safety Council when there are people such as you, who give of your time, give of your intelligence and your application to the reduction of accidents.

All of this makes for economy of operation in every business that is associated with you. If it were not for the fact that you paid attention to the accident rate in your industry, we would pay you more for paper, and consequently we'd have to charge, through the Bell operating companies, a higher rate for your communication service.

Our chairman tells me that it becomes my privilege to present three trophies, one in each class, there being three classes, A, B, and C. You are familiar with the classification, which provides that plants employing more than 500 employees are in Class A; Class B includes those of 200 and up to 500 employees; but Class C includes those who employ under 200 people.

The Kimberly-Clark Company, of Appleton, Wisconsin, receives the trophy in Class A.

Mr. Van Lowe, it gives me pleasure to present this trophy on behalf of your company for winning first place in the Contest, Class A.

FRED VAN LOWE (Manager, Kimberly-Clark Paper Co., Appleton, Wis.): I'd like to say this, first, that the people really responsible for this remarkable record sent two delegates here in the hopes of receiving this trophy. I'd like to introduce them and hand this trophy to them. Miss Sigma Evanson and Mr. Howard Adlerhold. About half of our employees are of the fair sex, therefore we have the fairest of the fair with us today.

MR. BERGQUIST: The award in Group B goes to the Crystal Tissue Co., of Middletown, Ohio.

CHAIRMAN BRENNAN: No more had E. E. Grant arrived here than he was called home on a sad errand. Before leaving he expressed his regret, and delegated Mr. Pippert, of Charter Bros. Machine Company, to do the honors. It was a most un-

fortunate situation, because Crystal Tissue had risen from the bottom to the winning class.

MR. BERGQUIST: Allow me to congratulate you, sir, for the National Safety Council, as a representative of the Crystal Tissue Company.

CHARLES H. PIPPERT (Charter Bros. Machine Co., Middletown, Ohio): I appreciate the fact very much that this is going back to a paper city, called "A city with a soul", and I am mighty proud to feel that I can convey this tablet back to our representative, or our nearest neighbor, Mr. E. E. Grant, Safety Director, The Crystal Tissue Co.

MR. BERGQUIST: Port Huron Sulphite & Paper Co., of Port Huron, Mich., takes the prize in Group C.

Mr. Hastings, it gives me pleasure to present this trophy to you, sir, on behalf of the National Safety Council.

J. J. HASTINGS (Port Huron Sulphite & Paper Co., Port Huron, Mich.): I assure you, in the name of the Port Huron Sulphite & Paper Co., that the employees surely appreciate this honor. For a long, long while we have been doing things up there, and we have already started the campaign of 1931. Thank you.

MR. BERGQUIST: I just want to say this, that I know that the Managing Director and the Officers of the National Safety Council feel that it is a privilege indeed to make these awards. The work which they do, especially the national group in Chicago, gets its inspiration from efforts such as we have heard about today, and just as long as you people cooperate and do for yourselves what we are trying to encourage you to do, those of us who are giving our time gratis, as well as the paid organization, will feel amply repaid for the effort.

In addition to those awards, there have always been certificates; certificates have some meaning, as well as the first prizes. We must have that competition; some one must be second, some one must be third, and some one must be last.

The Council sees 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.

We shall now present the certificates in an informal way, and the representatives, as called, will please step forward and take these certificates.

The Champion Coated Paper Co., Paper Mill No. 2, Hamilton, Ohio.

Kimberly-Clark Corporation, Kimberly Mill, Kimberly, Wis.

St. Croix Paper Co., Woodland, Maine.

Container Corporation of America, Ogden Division (from my home town, Chicago).

International Paper Co., Webster Mill, Orono, Maine.

Bird & Son, Inc., Phillipsdale, R. I.

Marinette & Menominee Paper Co., Menominee Mill, Menominee, Mich.

The Upson Company, Lockport, N. Y.

International Paper Co., Livermore Mill, Livermore Falls, Maine.

The United States Gypsum Co., North Kansas City Mill, North Kansas City, Mo.

International Paper Co., Riley Mill, Riley, Maine.

JOHN LUNDRIAN (International Paper Co., New York City): This mill has set us all a wonderful example and a tremendous precedent. Their last lost-time accident was on the 17th of March, 1926.

MR. BERGQUIST: That is a most excellent record; an unusual record!

United States Gypsum Co., Gypsum Mills, Gypsum, Ohio.

Continental Paper & Bag Corporation, Greenwich, N. Y.

CHAIRMAN BRENNAN: And now we come to the climax of this occasion. As you know, in addition to the awards already passed out, there is that major award given by The Paper Industry Magazine, and usually presented by Edward G. Fritz. It can be considered a recognition of a performance that is the ultimate for the year.

To the mill receiving this award, this gathering can extend nothing but their

highest praise. The industry as a whole must necessarily look up to them. They make themselves a leader and a national figure.

In lieu of Mr. Fritz, who can not be here, we have A. Scott Dowd, Editor of The Paper Industry, to do the honors, and to culminate this occasion with the grand award. Mr. Dowd.

Award of Major Trophy

By A. SCOTT DOWD
Editor "The Paper Industry" Chicago, Ill.

Rule 12 of the Contest reads: "When the winner of each group has been definitely decided, the judges will award by a majority vote to the one of these three, having in their opinion, established the best record based on frequency and severity, man-hours worked, physical conditions and any other contributing factor, the grand prize donated by THE PAPER INDUSTRY of Chicago." There are five judges of this contest whose names are listed in Rule 15.

Letters were accordingly received from the Kimberly-Clark Corporation, whose Badger-Globe mill won the Group A trophy with a record of one accident involving five days' lost time; The Crystal Tissue Company, which won the Group B trophy with a perfect score of no accidents, and the Port Huron Sulphite & Paper Co., whose pulp mill also made a perfect score with no accidents.

Each of these letters exhibited splendidly organized systems for maintaining interest in Safety. The character of the hazards is quite different in each—one having a number of tissue papermaking machines and a converting plant; another having a larger number of paper-making machines, and the other having the hazards incident to a wood room and a sulphite pulp mill.

These conditions were studied by the judges and their decisions were in due time forwarded to the National Safety Council. Mr. George E. Burns, secretary of the Contest Committee, has authorized me to announce that the mill which has received the majority of the votes cast and is thereby declared the winner of the major trophy of the 1930 Contest, is the Crystal Tissue Company, Middletown, Ohio.

Mr. Pippert, I shall have to ask you to convey this message to the Crystal Tissue Company, and compliment them on their achievement in safety. Please convey the congratulations of The Paper Industry for this magnificent achievement, and tell them it is our hope that this will hang on their walls as a lasting inspiration for continuing their excellent work in safety; and, as they put it here, as an inspiration in their crusade against accidents. We have a picture of a crusader on here, gentlemen, and I thought it was most appropriate, because we are all engaged in a crusade against accidents, and I think this should be a lasting inspiration and a memento of that thought, and I hope it will act in that way at their mill.

CHARLES H. PIPPERT (Charter Bros. Machine Co., Middletown, Ohio): I thank you. Mr. Chairman, there is just one thing I want to say. We have just started in this safety work, about a year ago, but I only hope I can come back next year and carry all of them away!

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): The one personality today that is missed is none other than Mr. Fritz. For several years,—this is my sixth,—we who have attended the Congress have always found that distinguished gentleman with a smile and a kind word. Now conditions have presented themselves whereby he can not be present.

Now gentlemen, would it be consistent if we did not, as a body of men, send a telegram to Mr. Fritz, expressing our regrets that he was unable to be present with us today, and thanking him for the many courtesies which he has extended to us?

I am offering that for my own self, on my own initiative, and I'd also like to say this, to save time, if you find it consistent.

A young man was here Sunday night, with high ambitions of receiving this trophy from the hands of our distinguished guest of the Western Electric Company, the vice-president of the National Safety Council. He received a telegram which necessitated his absence from this meeting, but I know full well that Earl Grant's heart is with us today. Why not, as human beings, as brothers working for that common cause, send that young man a telegram congratulating him, from the boys of the Paper & Pulp Section, on his victory, that he has attained in the Safety Contest?

Gentlemen, I mean it, and it is up to us to try to render something while we are living to those who will receive a kind word.

CHAIRMAN BRENNAN: I will take it upon myself to delegate Mr. Bartlett to attend to those matters, please, in behalf of the Section.

ADJOURNMENT

Wednesday Afternoon Session
October 1, 1930

WALTER J. BRENNAN, Chairman
St. Croix Paper Company, Woodland, Me.

The third session of the Paper and Pulp Section convened with Chairman Walter J. Brennan, St. Croix Paper Co., Woodland, Maine, presiding.

CHAIRMAN BRENNAN: I have been talking a great deal all day, and so I might as well go on with the good work by reading a paper and introducing myself.

Achieving Built-in Safety

By WALTER J. BRENNAN
Safety Director, St. Croix Paper Company, Woodland, Maine

Safety is a mental habit. The ultimate in safety is that happy condition when, regardless of supervision, warnings or safety devices, the individual and the group precede every act with a thought of the hazards involved. This state of safety consciousness I call "built-in" safety.

For after all the only kind of safety that really brings about a steady decline in accident numbers and costs is that kind emanating from an automatic brain functioning. Spasmodic bursts of record-breaking can be brought about by drives, contests and by high-pressure tactics, but invariably the pendulum swings nearly as far the opposite way when high-pressure ceases. This ebb tide of safety has a most pernicious influence upon both men and management.

Psychology deals with human thoughts and actions. Does not the scope of safety involve the same? Because no outstanding results will ever be had by the safety director who neglects this angle of his work we must necessarily be practical psychologists. For like the horse who can be driven to water but not made to drink, safety cannot be driven down the throats of men, but must be carefully offered them. Men must be "sold" on safety to sweat and suffer for its furtherance. If not touched by its humanitarian aspects they must be made to realize its economic features. They must one and all champion your cause, and feel that it is the greatest single blessing to come into their industrial life.

To attain this psychological ideal is to attain "built-in" safety. To suggest a few approaches is the purpose of this paper here today.

When we realize that the bulletin boards are the medium through which we speak to the men, we appreciate the importance of taking advantage of the many psychological angles involved therein. A little time spent in picturing ourselves in the other fellow's shoes will teach us that there is a monotony, a mental fatigue resulting from an endless display of warnings. To the weary fellow coming off tour and occupied with thoughts of troubles at home, our beautifully printed and illustrated commercial posters look about the same. A poster reading "Safety Pays" or "Safety is Your Best Friend" will not register through the brain-fog. At best such material serves only to remind constantly because of its obvious indefiniteness. To reach the man who is not receptive we must supply "punch" to our boards. One of the best methods is to utilize sheets of newsprint 17x23 inches in size, splashing on brief messages packing a wallop. A camel's hair brush and several brilliant inks will produce a poster, striking because of its crudeness, and attractive because of its color and departure from the commercial type. And how else can we convey those special messages? There is a psychological moment following every accident and

every narrow escape when the minds of men are particularly receptive and responsive. That is one time to placard the plant with powerful posters of most distinctive nature. As the metropolitan newspapers rush their special editions to the streets so should we rush our warnings, teachings and safety news to the boards at critical moments.

Utilize the accidents of the other plants to build up an immunity in yours, posting clippings from plant publications and the daily press on special display sheets, no two the same. Personally I find a great value in the use of current news pictures as an attraction to the boards, posting the news pictorial between two safety messages. The habit of stopping is quickly cultivated and will prevail no matter how weary the worker may be. In looking at the center picture he instinctively scans those to the right and left. I will close the discussion of bulletin boards with an example of their application to built-in safety. A poster was placed in the machine shop reading, "There's a Safety Slacker Here—Too Tired To Wear Goggles—Good-Bye 730 No-Accident Days!" An hour later three men reported to the safety department, one apologetically, one shame-facedly, and the third indignantly!

Every safety director will meet a real obstacle in his work to build the safety attitude in the heads of his men if there are a few "oppositionists" about, forever proclaiming the fact that the management is advocating safety for their own profit. Nothing dampens the enthusiasm so much as this. Therefore, it would seem the wisest procedure to make no mention in any way of the saving resulting to the company. Rather dwell upon the saving to the worker, show the pay lost as compared to the trivial compensation. Don't forget the home angle where the cherished automobile, the youngsters' education and the plans for the future are often swept away by one moment's carelessness. Make men realize that \$1,000 paid by the company for an arm will not drive them into receivership, yet that same missing arm will assure them of a cold reception at the next employment office. A pet expression of mine is "With thousands of two-armed, two-legged workers hunting jobs what chance would you have with but one of either?" When your company has spent \$5,000 to guard completely and perfectly a series of machines, you can strike a terrific blow at the "company profit" theory by posting a sign, "\$5,000 Spent For Your Protection—Appreciate, Cooperate, Suggest."

One of your best arguments to place safety firmly in its true status in the minds of the men is to paste a check for the proper amount on a placard. Over it print "Compensation Check," under it in heavy type, "Here's what you get when you lose your arm! Will this check earn a living for you?"

Another essential factor in the attainment of our psychological ideal is the creation of a conviction among the men that the executives really want safety, that they really believe in it, and that they practice what they preach. No greater harm can be done a safety engineer's work than to have a foreman, superintendent or manager pass a bulletin without looking at it, step over a board bearing nails upright, or going about the plant with an undressed wound. On the other hand, a tiny compress on the finger of the general manager creates a lasting impression, an example and a proof that he of the white collar and limousine isn't forcing anything on the fellow in overalls that isn't good for both of them. My own general manager has contributed a tremendous good-will to the work by often borrowing a hammer to repair a dilapidated rail, wrestling a casting out of a passageway or stepping to the foot of a ladder when some worker is about to climb. Scattering his pats on the back for jobs well done has accomplished more in the attainment of a safety morale than could be done by scattering ten-dollar bills.

Judgment must be used in reprimanding as well as in reporting men to foremen for unsafe tactics. I do not believe that a program benefits greatly when a safety man breaks into a crew to scold an unsafe worker, holding him up as a bad example before his mates. If you are to be "ripped up the back," you expect it to be done in private. The same applies to the man in the crew. Some might say the entire gang

profits by the lesson taught at the expense of one; I prefer to believe that the emptiness of one man is far more detrimental to your safety structure than is the slight return from the education of the remainder of the crew concerned. I doubt if safety is ever again sold to a heart that nurses a grudge against safety and you. Hunted up later in the day, the offender can be given to understand the reasons for the delay, and talked to in a friendly but firm way. Thus the violator is as thoroughly rebuked and corrected as if you had "shown him up" before his crew, yet he leaves you in a friendly mood with appreciation for your consideration in his heart. A heart warmed toward safety will furnish the incentive for many valuable suggestions you would not otherwise get. Perhaps, too, a guard will be replaced rather than receiving but a shrug of the shoulders.

Perhaps the surest way to get into difficulties in a pulp and paper mill is to play off one department against another. No two have the same degree of hazard, same number of employees, or men of identical mental equipment. A machinist, by nature of his profession a high mental type, will work among gears for years without injury. He will also work longer with the yard crews safely than will the regulars there. Mathematical corrections may be had for varying numbers, perhaps for varying degrees of hazard and exposure, but nothing can be utilized to show a correction for mentality. Furthermore, contests conducted in such a way as to require correction factors are futile in that the majority of competitors are neither able or willing to resort to mental gymnastics in order to ascertain their standing. Lack of understanding breeds confusion, misunderstanding and listlessness. All three being contagious, it is better not to entertain them at all.

To develop departmental pride is another thing. When crews such as we know in the pulp and paper industry exhibit the enthusiasm of college boys, you know you are getting safety through their skulls. This can be encouraged by a faithful posting of special signs bearing the number of consecutive days without accident. I find a standardized blue-printed poster of exceptional value. In some cases a man will be found who has but a vague conception of the intent and scope of the National Contest, and but a luke-warm interest in Bonus Contests. In his departmental record he centers his pride and enthusiasm, and for this type we must be ready to give some special display. The photographing of the crew at intervals of 500 days, the use of blinking lights to attract attention to a big record, and the careful drawing of visitors' attention to the total all serve very well to build in the gospel. The finest case of devotion to departmental safety endeavor occurred recently when, following an injury to the bones of his foot, a man came out of ether mumbling "—most get back in the morning—can't spoil the record for the gang—1,400 days now." An impromptu indignation committee is certain to call upon the safety department if each day's score is not faithfully posted or if an error creeps into our calculations. When crews resort to calendars and laborious mathematics to make their total read one day more, you may be sure there's a psychological advantage to be had in departmental records. There are no limits to which men will carry themselves in safety achievement if proper play is made upon pride and their love of competition.

Following a period of high-pressure safety activity such as characterizes National Safety Contests, there comes a distinct let-up, a relaxation that is often decidedly trying to the safety man. It is natural that workers' enthusiasm dulls when the incentive to strive is no longer before them. I find it well to strip the bulletin boards and stop selling safety for at least a month. The momentum of a personnel whose safety is deep-seated will carry on much longer than the month without a ripple or a misstep. Safety can be over-done to an extent that crews sour upon the subject. Have you ever heard a song over the radio so often as to disgust you with radio in general? Apply that to the men whom we expect to absorb our safety gospel month after month.

The fairest plant contest and a life-saver for the let-down period following the National Competition is the division of pay-roll into two teams, odd pay-numbers

making up one, and even numbers the other. In this way each department is equally divided and the problem of varying degree of hazard, varying mentality and other obstacles are overcome. It means that a carpenter may be an "Even" while his helper is invariably an "Odd." A moment of carelessness by an Odd, resulting in lost-time injury to an Even, invokes a penalty upon the Odd to the extent the sufferer's injury demands. A scaffold built by an Even that fails and yields a broken leg for an Odd means a huge set-back for the Evens. The difficulties of making men realize that self-safety is not sufficient are admirably overcome by this contest. One hundred Man-Years (achieved about every six months) is the goal, and \$5 in gold is given every team-member who has worked 60 per cent of the period of the award. Ten man-years are taken for every lost-time accident, and 100 days for each day lost after the first. Injuries of any sort not reported at once to the First Aid Room are chargeable for 300 days. Any man invoking a penalty for his team is denied the award if carelessness, negligence or disobedience can be proven.

You may ask what this has to do with built-in safety. No one phase of our work is so fruitful as this Bonus Contest. Each man has, by virtue of the \$5 gold piece, a legitimate interest in the other fellow's conduct. No longer do men feel that dangerous tactics are not their concern so long as they are not exposed to injury. A safety man's heart is cheered to hear the explosive remarks coming from bystanders with an eye on the gold piece when a fellow-worker takes a chance. You automatically fill your mill with safety engineers when you put on such a Bonus Contest, and night and day they work for you. Lay-offs, trips "on the carpet," and even discharge have no horror like that resulting from half a mill's personnel turning their tongues loose on some luckless individual who snatched the gold from their grasp in a careless moment. Such a Bonus Contest teaches team-work, directly places safety responsibility, and utilizes the tremendous influence of public opinion to get under the skin of the worker who is just luke-warm on safety.

The interest taken in pictures can well be observed by watching the Sunday papers being torn to pieces for the rotogravure sections or by noticing the crowds hesitate before the display case of the professional photographer. We can profit by this love of the pictorial by putting the plant camera to work. A man may have worked twenty years for your firm without losing a day from injury, yet never has given the matter a thought. Upon seeing his picture posted with appropriate comments, he develops an abnormal pride and becomes a pillar of your program. Again, when unsafe practices of a chronic nature seem to exhaust your resources and patience, turn to the camera for relief. Suppose trucks are repeatedly left in passageways. Show a truck with man approaching, arms laden with material. Next a spill, with man, truck and material in a heap. The final episode can show the stretcher bearers at work. There is no need for comment; the three pictures tell the story. Credit for ingenious safety devices, jobs of guarding done voluntarily and the gratifying praise for safety suggestion contributors are but a few of the potentialities of the camera.

I believe that if a plant publication served no other purpose than to print names of those men who prove their interest in safety by doing things to further it, it would more than pay its way. When we consider that not only praise, but rebuke, instruction and a different angle of presentation are available through the plant paper, we should insist on ample space. A little sheet supplementary to the regular plant organ and devoted entirely to safety has been used with great success at Nekeosa-Edwards Company. Safety material in a plant publication is absorbed at a time of leisure, being read at home. The family unconsciously develops an interest in their breadwinner's safety welfare, and certain angles can be developed to an extent not possible on bulletins. I feel that those of us who neither write a great amount of safety material into plant publications nor have a supplementary sheet are denying ourselves one of safety's greatest assets.

No one needs a double-dose of safety psychology like the new employee. Coming to us with no idea of the intensity of our accident prevention program, it often happens that disaster results before he gets the idea. The psychological moment in the new man's case is when hired. He is given to understand by the employment supervisor that he must be a safe worker, that he is on trial, and that a complete safety service record is kept. Promotion depends upon this record equally with ability and ambition. Being anxious for work and grateful for a job, the new employee's mind is very receptive to any safety requirements the employment supervisor may impose. Immediately following employment, the man should be sent to the safety director for a detailed instruction in rules, contest and first-aid requirements. I find some such approach as this is effective. "You are joining a crew who are rabid safety fans. They have a record of 1,400 days without an injury, and built it up by careful work. Some of them suffered to keep it growing, getting to work in spite of painful injuries. You are going to be under suspicion and will be watched closely. Men have been taken off crews because the rest wouldn't tolerate their carelessness to the endangering of their record. There's no hurry when danger is present, and there's no place here for careless men. That precious record of theirs is in your hands. If you add to it, you're O. K. If you ruin it by carelessness—just take your own chances."

This year has seen a heavy influx of new men into our plant to take care of difficult construction jobs of a "rush" nature, yet not one of the new-comers has had even a narrow escape. Much credit is due Mr. Irvin, supervisor of employment, and here today, for his psychological sessions with the new-comers. The utter destruction of morale resulting in a crew of safe workers when a new-comer dashes their precious departmental records and hopes is most disastrous. The accident is but a minor factor, for I have no doubt the old saying "Accidents happen in threes" can be attributed to the depressed safety morale resulting from such discouragement.

Do we fully appreciate the safety potentialities of our plant nurses? No one can know the source of injuries as well as the person who treats wounds, and if this person is possessed of tact and the ability to win the good-will of her patients, she can contribute nobly to our work of accident prevention. To those who are prone to feel that a nurse cannot have an understanding of process and hazard, I would advise a trial. Many such ideas are exploded on experiment. You will all remember war-time psychology when men pleaded and stormed for recruits to get nothing but experience. Yet ten minutes later we have seen the tail-board of a truck stormed by volunteers, in response to an appeal by a woman. So, too, can your plant nurse break down the sullen reserve some men hold for your program. Merely to treat injuries is not all we should demand from our plant nurses for in the time necessary to do a dressing the nurse of proper qualifications can extract much valuable information.

Memoranda come in a steady stream to my desk from the first aid room. A safety suggestion has not been put into effect, a worker believes he has been treated unfairly, a partner is very careless or troubles at home distracted his attention from the job at hand. The remedies are obvious, but were it not for the plant nurse these confidences would never have come to our attention. You and I can scold a man and perhaps win nothing but a secret resentment. Your nurse can reprimand and get results. But she must have a thorough knowledge of your plant, processes, hazards and most important, a familiarity with your activities. She must necessarily know you have safety suggestion contest rules if she is to obtain suggestions for you. So, too, must she be thoroughly grounded in the details of the National Safety Contest if she is to appeal to men to lose no time from an injury being treated. Praise from attractive nurses has supplied stimulus when all other approaches have failed. A nurse's use of practical psychology is fully as fruitful as is the application of her

medical knowledge. Her ability to comprehend and contribute to your work is as much a requisite of an industrial nurse as a nursing diploma.

In the last analysis accident prevention will be preeminently successful only when the men in overalls want it so. Owners, executives and safety directors can provide money and direction, but the vital spark must be supplied by the men. That spark must be good-will towards the safety program. The guarding of machinery contributes about as much as does good-housekeeping. Both are essential, yet neither will yield astonishing returns in safety. On the other hand, crews working absolutely without benefit of guards or orderly surroundings will work as safely as those who have every protection.

If, therefore, good-will is the soul of safety achievement we must devote thought to the getting of it. When crews look upon the safety director as a detective, snooping about the detect violations of rule, an antagonism develops which is poison to hopes. On the other hand, the safety worker who in his trips through the plant goes out of his way to call a man by his first name, asking for a sick child or exchanging a few words on the fellow's pet hobby, will win friends both for himself and his work. To besiege a foreman incessantly with complaints of minor nature is to annoy him to the point where his reprimands are harsh beyond need. The sting of such an unwarranted rebuke will be charged against you and your program, and will result in a counter current of antagonism you will be at a loss to account for. Men cannot be made to send in safety suggestions nor can they be made to preach the safety gospel. These things must come from good-will.

When the men believe you are doing a great work in their behalf and that you are not a company scout, they will come to you with their little confidential tips that help so much. Too often men disapprove of certain unsafe practices only to be kept silent through a fear that the safety director will have someone discharged. Knowledge that every man will get a square deal and even "get the breaks" from the safety man nips many a dangerous practice in the bud. Work for good-will even though you suffer temporary loss of efficiency. Get friendly with and study individuals if you would have them enthuse over something you wish them to do for you.

In conclusion I might say that to many of you present this paper offers nothing new, being a review of routine practice in your plants. Yet among us are some whose success has not been so marked or whose program is in the doldrums. To these men I offer these psychological approaches as having great possibilities and worthy of use. However successful any of us may be, none can dispute the fact that guards, good-housekeeping and supervision are but accessories to that fundamental prevention factor, safety consciousness. Accidents originate in the brains of men. When the same brains turn to the prevention you have built-in safety.

R. G. McCONNELL (Defiance Paper Co., Niagara Falls, N. Y.): Mr. Brennan, do you find that the spirit of enthusiasm gradually grows in the minds of the men as you throw out this various inspirational propaganda in your own way? Do you find that the foreman backs it up?

CHAIRMAN BRENNAN: The inspiration must assuredly does grow in the minds of the men, and I know of no other means to plant this seed of safety consciousness other than by the use of those tactics such as touch the finer natures of the men, and at the same time become lasting in their minds.

I don't believe that a foreman has any great appreciation of our psychological endeavors with the men, and I feel that the foremen themselves will learn as the men learn.

I tried to emphasize here that it must go through the foreman to the individual, with the foreman doing work for you in excess of what you expect from others, simply because he is hired for that; whereas the man is not hired—you can't convince the man that he is hired to do safety work, because you can't get it out of him.

The foreman you approach from another angle—your job, your duty—and I find enthusiasm grows just exactly as you are able to think up new approaches. Just like a kid playing with new toys, when you fail to furnish new toys for the men you can't expect them to carry on.

Mr. McCONNELL: Don't you think that the men are enthusiastic about this safety proposition, but in many respects lack the ability to express themselves in the proper way? It is in their minds, and they are somewhat embarrassed about it.

CHAIRMAN BRENNAN: The best way with that situation is to put yourself in the man's place; imagine his mental capacity, and that sort of thing, and make it easy for him to do these things.

For instance, in my safety suggestions I require no writing. He can stop me or any of the laborers, Mr. Irwin of the Employment Department, and give us but an idea. We will do the writing and take his prize to him. We want the basic idea, and we don't care how we get it.

Mr. BARTLETT: Here a week ago I had a foreigner who wanted to take out his naturalization papers. He asked me if I'd be a witness; and I met him at the naturalization headquarters in Boston, and secured the final papers. Gentlemen, on the back of the last paper was a letter which I had written him in 1927 when he represented the beater room on the Safety Committee at our West Gordon, Mass., mill. At that time I wrote and congratulated him on the excellent work that he had performed as a member of the safety committee in his department. And, you know, that man thought so much of that letter that he attached it as a reference to the naturalization papers, which went through Boston and Washington. He had written on the bottom, "Mr. Bartlett has known me for 15 years." Bartlett was nothing to him, but what appealed was the recognition of his service that he rendered in the beater room in those six months on the safety committee.

W. F. ASHE (Thilmany Pulp & Paper Co., Kaukauna, Wis.): Mr. Brennan, I don't want to pass your paper without saying that I think it is one of the most valuable contributions that has been made here in this Section since I have known the Section.

I like your human engineering idea. I have no disagreements with you whatever on your paper, except to say this: Human engineering is an art rather than a science, and your paper is intended, I believe, for this group, to be a matter of suggestion to men in handling their own jobs of human engineering, rather than a treatise on ways and means of doing it.

E. DOUGLAS WALKER (Quebec Manufacturers Service Agency, Montreal, Canada): You mentioned that the foreman was not so brisk to take up accident prevention work or safety work. Now I think we are led to believe that the cost of accidents is part and parcel of the cost of production, as much as the actual producing work itself. Well, now, we know jolly well that if the foreman does not come up to the line in the matter of production, he is jolly soon stepped on, and pretty heavily, too.

Therefore, don't you think that the foreman, being the key between the management and the men, that man should be stepped on in the matter of accident prevention? It is only a matter of discipline.

CHAIRMAN BRENNAN: When you are talking to management, as I had the opportunity, some weeks ago, I would say "When you want safety, Mr. Executive, you will get it, and your instrument of getting it will be your willingness to go down into your pocketbook and to your foreman".

I don't think that a foreman is capable of doing our safety work for us. Otherwise he'd be a safety engineer—no more are the safety men capable of making paper or running a machine shop. We must strike a happy medium, making the management open the safety ball with the statement "Foreman, you are paid for safety and production." Safety men cooperate, aid, but do their intensive work with the individual who is, after all, the one who gets injured.

That is my personal idea, and it may be at variance with the best practice, but I say that for the safety men "Work on the individual" and the management "Work on the foreman".

Naturally we have to utilize our foremen to carry out the many safety functions they are capable of, but because you have, through management, a grasp upon the foremen, it does not seem that there is the necessity for such intensive work. We should always remember that, whereas the foreman is paid for producing safety results, needing only the usual instructions, the individual, who can not be made to do anything, we have no grasp upon, and consequently it would seem that the work with the individual is the most productive work. Management will take care of the shortcomings of any supervisor with whom you can not cope.

F. H. ROSENBERG (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): Let me put this question to you men. Why don't you expect as much of your foremen in safety as you do of production? Why bottle up safety in this drawer and put production over here in this other drawer? We are talking about safety and production. When we talk about safety, to my mind, I am talking about a clean plant, I am talking about good tools, I am talking about good methods, and if I can't have a foreman that is just as good a safety man as a production man, somebody is falling down on the safety job. It may be the safety engineer. It may be the superintendent. But I have come to believe that we can no more expect good production in a dirty plant than we can get black fur off a white goat.

And that is why I don't just agree with the Chairman's first statement about having a clean plant and good tools and poor workmen and poor psychology. Good psychology, to me, means a good plant, good tools, and means a high class foreman.

Now, aren't we laying ourselves open to the criticism that we are not doing enough with the foreman? I claim that we have got to expect this foreman to handle that job, safety, production, the whole works. That is what he is put there for. Now if he has fallen down on one of those jobs, safety, production, housekeeping, or whatever it is, somebody has fallen down there.

I don't like the idea of putting safety in a separate category, and having the foreman say "I am a good production man, but not a safety man." If you have a safety man, isn't he bound to be a good production man?

Mr. LUMMIS: I certainly am in most hearty accord with practically all of the subject as presented by the chairman. We practise, in our organization, a group of fundamentals that seem to us absolutely necessary.

Some of the things that we consider absolutely essential can be summed up under the general term "good plant housekeeping". It means cleanliness and order, which, of course, includes proper lighting, both natural and artificial lighting, and then teaching the individual employee how to do the job you hired him to do, the way you want it done, and insisting that the supervisor of his work sees to it that that advice and instruction is carried out.

Mr. Brennan is undoubtedly right, that a great many foremen are almost an obstacle to a modern safety program, because of a condition that we have all passed through, and those of us who haven't will have to pass through to get anywhere.

A foreman going into the paper and pulp industry, up to very recently, and probably to a very large extent at present, is selected and promoted to supervisory positions, sometimes of considerable importance, on account of his knowledge of conversion processes in that plant. Sometimes his promotion is measured by his years of service.

A good many of the foremen in our company are sixty years of age, or over. They were foremen exercising arbitrary authority on their jobs, hiring and firing, long before industry had to actually pay for industrial accidents.

So that man has the usual amount of human ego that I think we are all blessed with. I know some foremen in our service that probably would continue to be fore-

men, very dear personal friends of mine, that in my judgment I can often see, in the back of their heads, that they believe this whole thing is a sort of a fad, and that some white collar fellow got up some kind of a job where he could tell people what to do.

Now the most difficult task that was ever undertaken by humans anywhere is unlearning a man who has occupied an authoritative position, has become settled in his judgment, in his habits, and all that sort of thing. I rather think that is the type of foreman that Brother Brennan had in mind when he talked about the foreman.

As I see the duties of the safety man—call him engineer or what you will—it is very largely that of education and cooperation. We have purposely and deliberately, even in our very large plants, where we have to have two individuals, we have coupled the job of accident prevention responsibility with our employment service.

The object of that is to throw into the hands and under the jurisdiction of one man the contact, particularly with the new employee, and having some say and authority in suggesting or recommending the transfer or change in occupation for individual employees who may not possibly be fitted for a particular occupation that they happen to fall into at the time they were needed, or because some one thought that they were fit for some position where it afterwards transpired they were not.

But we do feel that there can be no possible way in which you can take away from your department head the actual interpretation of the company's policy toward its employees in accident prevention, and in discipline.

MR. ROSEBUSH: My own position with my company is in the personnel department, in which is included the safety work, and I have a lot to say about the personnel side, the training of foremen in the things that I have mentioned, housekeeping and other things that enter into it, and that is why, perhaps, from my position, I look at this a little differently from a man who might be engaged solely in safety work and felt that he had no contact such as I have in my work. But I still feel that foremanship training, if taken in as a subject altogether, of which safety is a part, which links itself right in with the others, and, as I look at it, I can't draw a line and say Safety is on this side, production here, and housekeeping there. It all goes in together to the qualities that make good foremen.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): You spoke of a belief you had that if a mill was in terrible physical condition, no guards, no supervision, very poor housekeeping; that still and all you could eliminate accidents. Now why I question that is this. As you are aware, I had the pleasure of visiting at your mill. That condition which you say you believe does not exist in your mill. Where did you ever see it, to gain your belief?

Secondly, you said that it is very good practice—I believe you said you did it—to strip your bulletin boards for a month, as sort of a let-down from the pressure of your work.

First the belief; second why, or, rather, just how you strip those boards, and what do you use on them.

CHAIRMAN BRENNAN: I knew we'd get somewhere. He says my mill isn't dirty, but is in good order and all that sort of thing. I quoted that as a comparison, or rather a choice. If I were to have my choice between two conditions, and had no other choice, I would select that personnel in its dirty surroundings, in its hazardous surroundings, knowing that that spirit to go on and carry through would prevail, over that perfectly appointed mill where the men feel no sense of good will toward the program.

I will prove my source of information. Some couple of years ago, while putting on a new roof on our plant, necessitating a false flooring over two paper machines, a fire started, caught the flooring, caught the sheet, and, in an instant, tar pots and everything had the big machine room ablaze. The men left their machines because of tar smoke alone, and in not more than ten minutes the entire roof was down on

two machines running 850 feet a minute. That was a mess! Before the debris was cooled, a master mechanic and his gang were into it with a crane.

Now imagine the debris of two 856-ft. paper machines, smeared with a roof and all of this false flooring, and the work necessary to build a new roof, piled over the machine. There could be no guards, and it certainly was not good housekeeping. It was the worst housekeeping imaginable, and certainly the most hazardous job that they will ever undertake.

Five months later they turned over the driers on that job, without a single day lost. There is the source of my statement that guards and good housekeeping are contributory, but not essential to safety success.

Relative to stripping the boards, when the 30th of June, midnight, comes around, the whole mill breathes a sort of a sigh, in your plant and in my plant they breathe a sigh, and they don't want to come in the next morning and see the same old high-pressure stuff on the boards. So we give them a change of diet. I mean stripping. I mean all high-pressure selling is stopped, and this accumulation of material that comes from the National Council, but which is accumulated from that month—generalities and a few of those—are put in the place of that tremendous broadcast that we carry on for six months, easing the pulse of the mill to normal, rather than trying to over-shoot the program to the detriment of the men's interest. I mean stripping. I mean letting down to the barest minimum, so that every board should have one simple generality on it.

MR. GILSON: After the Contest?

CHAIRMAN BRENNAN: For one month.

MR. HOYMAN: I was thinking about your statement in regard to foremen. As evidence of what we think about it, you may regard the folks we bring to the Congress year after year. Last year it is true that we won the prize at the Niagara Falls Mill. We had a bunch of foremen at the Safety Congress, but we also had the Manager; and year after year, if we bring anybody at all, we bring the Manager—not that he may get an inspiration so much, but as a reward. Our safety starts at the top; we get just as much safety as I am able to sell the management in the first place, which is 100 per cent, because the management is not hard to sell.

In other words, we get just as much safety from the managers as our directors want. The managers get just as much safety from their superintendents as they instill them with and demand of them. Likewise, the superintendent gets from his foremen and the foremen from his folks.

We haven't any foremen here today. We have the manager and two employees from one of our mills.

CHAIRMAN BRENNAN: I think I had better qualify myself for the sake of the record. I repeat that foremen are, in my mill, equal to any, but I did not choose them. They were chosen before safety was inaugurated, and because they were fit for production, or because they attained their position after a long period of service, which does not for a moment prove that those men either have the will or the ability to present safety to their men in its proper form.

That is no reflection upon the foremen, but I do repeat that I think that this insistence upon foremen keymen and that sort of thing is over-rated. I realize the things Mr. Rosebush puts forth, the relation of production to safety, and the foreman to his position. No one could do the things that we have done in the past without them; but I do not place my sole dependence upon the foremen, nor do I stop my program at the foreman, nor do I insist that the foreman do a great deal of teaching.

I will present the material from this angle, which he does not understand. That is my job. I will expect the management to keep the foreman yielding me that enthusiasm that he gets paid for. But this paper is intended for the individual. Who gets hurt in your plant, the foreman or the individual? How can the foreman possibly function when two men are working on a digester and the foreman is in the bag mill at the other end of the plant?

I hope that is clear, for purposes of record. The foreman has his place. He is paid for occupying that place; but I don't demand too much of him.

CHARLES H. PIPPERT (Charter Bros. Machine Co., Middletown, Ohio): I have been in safety work only since the first of the year, and I find that in the past six months we have cut down over 50 per cent of our accidents. What I find is this. We have a meeting with our foremen on the first and fifteenth of each month. We get out literature, pamphlets, etc. We read them, we discuss them, and then we have our foreman go out and put it to the men.

We also have put up on our bulletin boards our different arguments; that is, different literature, for arguments, and then at the next meeting we can again discuss them. But what I have been doing in the past six months is this. I have been insisting on the foremen getting into this thing, getting interested in the affair all the way through, so they can go out and preach this thing to the men for the betterment of mankind and the organization concerned.

CHAIRMAN BRENNAN: We now go into an address entitled "Selling Safety to Employees" by a man whom, if we haven't heard or seen, we know through his literature. We are fortunate in having Mr. C. F. Otto, safety engineer, with the Employers Mutual Liability Insurance Company, Wausau, Wisconsin, who will now speak to you.

Selling Safety to Employees

By C. F. OTTO

Safety Engineer, Employers Mutual Liability Insurance Co., Wausau, Wis.

Selling safety to the employees is a difficult problem, mostly on account of indifference and also because we are dealing with abstractions rather than anything concrete; and so, in selling safety to employees, I am inclined to think that the method that we use has been very, very successful, because we appeal to a man's emotions rather than to his logic, and in demonstrating to you how I proceed in selling safety to employees, I am just going to ask you to imagine that you are an employee back there in the shop or the mill, earning your daily bread by the sweat of your brow.

Safety is something that is good for you, for me, and for everybody else, because safety means the saving of fingers, the saving of hands, of eyes, and lives, and all the pain and all the suffering and all the sorrow that goes with it. When I say that Great Britain spent, during the War, \$34,000,000,000, it is pretty hard for you and me to imagine a sum so vast; but it means this, that for every minute since the birth of Christ—there are only 1,000,000,000 minutes that have passed since the birth of Christ—for every one of those minutes Great Britain spent \$34. That gives us some idea of what \$34,000,000,000 really means.

The Vatican over in Rome has 10,000 rooms. It is impossible to conceive of a house having so many rooms, but it means just this, that you can live in a different room in that Vatican every day, and not live in the same room twice, and it would take you over forty years to make the rounds.

If you went out to the Stevens Hotel in Chicago, which has 3,000 rooms, it means that you can live in a different room every day, and it would take you over ten years to complete the rounds.

So when we say, in America, that 98,000 people lost their lives in accidents, it is pretty hard to imagine a vast army of men so large, but it means if those 98,000 people were to file past the door of this room here, four feet apart, you would spend two days and two nights watching them go past.

So safety, men, is your problem, and it is a big problem.

An old Chinese saying is this "One picture is worth 10,000 words," so visualization is much better than mere words and talking.

Safety becomes your problem, and it is your problem now. Now is the time to think of it more than you ever thought about it before. Tomorrow today will be yesterday. There is no time to lose! Once the eye is lost, it is out for good. It is always better to say "I'm darned glad I did" instead of "I wish I had".

When you put it off you are apt to get into trouble. A fellow came into the shop one time with a black eye. He said "I got that by kissing a bride after a wedding ceremony." "Well," the boss said, "Isn't that the usual thing to do, to kiss the bride at a wedding?" Bill said "Yes, but I was three years late." He put it off too long, and got into an awful lot of trouble.

If we put the thing off, we are apt to get into an awful lot of trouble.

I want to call your attention to just a few things in the matter of safety. You read about the big things that happen. An explosion gets on the front page of a newspaper, but you and I in our daily lives forget the little things in life; and after all, it is the little things in life that count. The days are made up of many, many glorious sunbeams; nights are composed of many, many glorious little stars. Niagara Falls, that beautiful waterfall, is made up of tiny little drops of water. It is the little things in life that count, and it is the little things in the plant that produce accidents.

Back in 1911 a fellow named Robert Lynch went over the Niagara Falls in a barrel and lived to tell the world about it. A few years later he was lecturing in one of our Middle Western cities, and walking down the street he slipped on a banana peel and broke his leg. He went to the hospital, but infection had set in, and they tried to save him by amputating his leg, but in vain. Here is a man who goes over the Falls in a barrel but loses his life as a result of slipping on a little banana peel!

That little cut, that little scratch or bruise, that the average man pays no attention to, lets it go, and then along about the third or fourth day he feels a pain and throb, and he hurries to a doctor, who is just about able to save his arm. Many men and women lose their lives because they pay no attention to that little cut, scratch, or bruise, or little sliver. It is the little things in life that count.

There is only one thing to do. Any time you have any cut, scratch, or bruise—prompt first aid is the only solution, because it prevents the loss of an arm or leg, and you lying in the hospital, suffering the agonies of Hell. Just a little thing, but very, very important.

History tells us that it rained on the night before the Battle of Waterloo. That prevented Napoleon from moving his artillery. As a result, he lost the Battle of Waterloo to the Duke of Wellington, and the loss of that battle changed the map of Europe and changed the entire history of the world. Just a little thing, but very, very important.

That little something in the eye, which the average man does not pay much attention to—a dentist draws a tooth; a piece of the tooth struck the dentist in the eye; infection set in, and he lost his eye. A farmer fed his hogs from an old barrel. A piece of rust flew up and struck the farmer in the eye. Infection set in, and he lost his eye.

Giving a talk down in Warwick two years ago, I came to the eye subject, and noticed that one of the fellows sitting in the front row started to cry, and I knew I was on a tender subject so far as that man was concerned, and I got off it as fast as I could. I asked the superintendent about it, and he told me the story about this man, who had just been married about three or four years, and one Sunday afternoon they went out to visit some relatives on a farm outside of Waukegan. They played indoor baseball games. This woman became very warm and went over to the pump and put her head under the pump, while somebody dashed the water over her head. It paralyzed her optic nerves, and that poor woman became stone blind. The eye hazard is everywhere.

Now you can afford to gamble 10c in pinocle. It is a fine thing to take a chance, but we can't gamble with the best thing that God ever gave man. I have seen fellows taking toothpicks at their eyes, and if they can't get it out that way they take a corner of their handkerchief and twist it all up nice and sharp, and after they get it all dirty and covered with germs from their fingers, they rub it into the eye. What is the result? 99 times out of a hundred they may get by, but the hundredth time the eye will become infected.

The only solution is prompt first aid; a few drops of Mercurochrome to prevent infection, and goggles to preserve eyesight. Just close your eyes for about two seconds and think what would happen if never again you could open up your eyes! It means you can't see any scenery; can't go hunting; can't see a baseball game or do anything in life that you love to do; and, what is more than that, men, it means that never again will you be able to look upon the face of your mother, father, sister or brother, wife or children. That joy, that beauty, is gone forever. Just a little thing, but very important.

Good housekeeping is always good safety. A place for everything; everything in its place. Just a little thing. If you have a plant of 300 or 400 men and 250 leave their tools in order and believe in good housekeeping, and the other 150 do not, it means those 150 are making it tough for every man in that plant, including themselves.

Why not good housekeeping? You men know that when you go home tonight, if you go and throw your hat on the radio and hang your coat on a chair, friend wife is apt to take you by the nape of the neck and lead you around until you put those things where they belong. She believes in good housekeeping. Good housekeeping in a plant is just as important as in a home in New York, Chicago, or wherever it may be. If you don't believe in good housekeeping you are apt to get into trouble.

A certain fellow did this. A minister was giving a sermon one day, and said "All who want to go to Heaven, please raise their hands." All hands were raised except that of one man. "Don't you want to go to Heaven?" asked the minister. The fellow said "Not me. I want to go to Hell." "Why do you want to go there?" the minister inquired. The fellow said "Because I want to. It is mine. It belongs to me." "How do you account for that?" asked the minister. He replied "My wife gave it to me last night."

So that is what we are apt to get if we don't believe in good housekeeping, which is good safety; a place for everything and everything in its place. The little things in life.

Just a few last words. You know the books are full of famous last words. Remember Pershing when he said "Lafayette, we are here", and Nathan Hale, "I only regret that I have but one life to give for my country." And the words of the Master, "Father forgive them, for they know not what they do." A lot of famous last words; but I think these words are used more in industry than any other expression: "Oh well, I'll take a chance!" The chance-taker is always the accident-maker. It is in the little things, and in your particular line of industry, you men, forgetting for a moment that you are employees back in the shop, you have bulletins, approaches like this, calling attention to specific hazards, to the things that really cause hazards in the paper and pulp industry, moving rollers, falling material—good housekeeping comes in there also—and strains in lifting, the right way and the wrong way, picturing to the man so he knows and can see which is the right way and which is the wrong way.

So far as the safety records are concerned let's aim for this perfect safety record, not for the idea of making a record, but for the idea of eliminating accidents from the plant and from industry as a whole.

Now you hunters know darned well, when you go out to shoot duck, that you can never kill a duck or a deer by aiming at a jack rabbit. There is only one way,

and that is to aim for it. There is only one way to have a perfect safety record, and that is to aim for it; only one thing that can put it across, and that is the biggest, best, and finest word, I think, in the English language, and that is Enthusiasm. Nothing worth while in life was ever accomplished without enthusiasm.

Individuals, as we gather here this afternoon, if you were to sell your body f. o. b. to the nearest drug store do you know what you could get for it? Just exactly 98c. Let me illustrate. There is enough lime in your body to whitewash a hencoop; iron enough to make a ten-penny nail; enough sugar to fill a small receptacle—and all the other chemical elements, if you were to sell them in the open market, the most you could get is 98c.

But you instill in that body life, faith, hope, love, enthusiasm, and everything in life that should go into it to make it worthwhile, and you immediately transform that 98c body into a body whose value you and I could never begin to estimate.

Aim for that perfect safety record, because accidents are the static of production. Go home tonight, tune in on the radio, and you will hear a lot of buzzing, crackling, and a lot of noise. It is annoying, and you shut off the radio and turn to something else. So in a plant, let Joe, Mike, or John get hurt, and somebody has to fill in for them. It means a waste of time, loss of time, waste of material, production goes down. You can't have production without safety, and you can't have safety without production. They are Siamese twins.

So with everybody getting behind it, cooperating for safety, and driving it across and being enthusiastic about it, putting your heart and soul into the game, you will be surprised at the results.

When Sir Christopher Wren was building that big cathedral in London, Sir Christopher wanted to get an idea of what the men thought about it. They didn't know him, weren't acquainted with the great architect. So he went up to one of the workmen and said "What are you doing, my friend?" The workman replied "I am breaking stone." Sir Christopher walked down to the second fellow and said "What are you doing?" He says "I am earning three shillings at sixpence a day." Sir Christopher passed on to the third worker and asked the same question. He said "What are you doing?" The workman straightened up and looked Sir Christopher straight in the eye, not knowing to whom he was talking, and said "I am helping Sir Christopher Wren to build this magnificent cathedral."

There you have the three views of life, whether it is in the pulpit, behind the plough, in a factory, or on the street, on a street car, or in an office, we are either breaking stone, or making so much money a day, or we are builders. I say every man is a builder. We don't know what the scheme of the Great Architect may be. We know that we fit into his scheme of things, and no matter what your job may be, it is important and dignified.

Build for safety and happiness, and at the same time you build for safety you build for happiness. If you build for happiness you naturally build for safety.

And so, for the home's sake, let's believe in safety and everything else that goes with it. Over in India they haven't got this thing. But there is a cobra there that each year kills enough people to populate a town of approximately 100,000 people. Why? Because the people over in that country will not kill the snake. They worship the cobra as a god.

We have millions and millions of those cobras right over here in America, destroying homes every day. We call that cobra "Old Man Carelessness." So, for the home's sake, let's keep it safe, not destroy it because somebody forgot to remember, because somebody didn't care, because who suffers most if you get hurt? When the bread winner is taken out of the home, the wife and kiddies must struggle through life alone.

Married men, you left home this morning 100 per cent. You had all your fingers, both your hands, both your eyes. I want to tell you folks, they want you back tonight

and every night just exactly the same way you left them in the morning. They don't want that telephone to ring and say that Joe or Mike or John was taken to the hospital and they don't know how badly he is hurt.

The reason why you want to make safety first the best pal and the biggest pal you ever had in your life is this: When the day's work is done the kids are glad to meet father. When dad comes home, they are glad to see him there. I don't care how black his face or torn his coat or dirty his shirt, that man is a man, and he is worth saving.

When crossing the Channel to what is now known as England, Julius Caesar led his soldiers to the top of the cliffs of Dover and had them look down, and this is the scene that met their eyes: Every ship that these soldiers had crossed the Channel in was being consumed by the tongues of flame. Here they were, in a strange land, the land of the enemy, with all chance of getting back to the mainland cut off. There was but one thing for those men to do, and that is just exactly what they did. They marched on toward Victory.

Members of the Paper & Pulp Section of the National Safety Council, and all the members here connected with the industry, may we, too, march on toward Victory, and finally conquer accidents!

CHAIRMAN BRENNAN: I thank you for that word of inspiration. I don't wonder that that man was selected to sell safety.

That is the last number on this program for this afternoon. Unless there is some discussion—let's have some discussion; this man is an outstanding figure in his line, and it behooves us to take advantage of his presence here, in order to give our mill their money's worth. He is willing to answer questions.

ADJOURNMENT

Thursday Morning Session

October 2, 1930

WALTER J. BRENNAN, Chairman
St. Croix Paper Company, Woodland, Me.

The fourth session of the Paper and Pulp Section convened with Chairman Walter J. Brennan, St. Croix Paper Co., Woodland, Me., presiding.

CHAIRMAN BRENNAN: The business carried over from yesterday's session consists of a discussion of the Safety Code for Pulp and Paper Mills. Mr. Altman, I believe, is not here but Mr. Rosebush will take his place.

F. H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): The question that really is coming before us, gentlemen, is the revision of the entire Code, or some of its sections. Now we have had a committee which has been working in conjunction with the National Safety Council, this past year, and the Safe Practice pamphlet of the paper industry has been gone over, item by item, and compared with this Code.

For instance, in that pamphlet has been written safe practices for the sulphate departments, very little of which was in there before.

I call your attention to the code, Part V, page 15, under Rule 500-C, which says "A grating with mesh of a size not larger than 8" x 8", too small to allow a man to fall through, should be installed at the outlet of the Chip Bin."

Also, on page 18, where you will find Rule 510, Section 51, "Sulphate and soda processes, since the hazards of these processes are similar to those of the sulphite process—the exception being that caustic soda is used instead of acid—the same rules shall govern. A copious supply of running water, boric acid, or vinegar should be maintained as a reagent for caustic soda burns."

I know that many of you men wouldn't bear to having a mesh in the throat of your chip bin, to prevent a man falling through, because the objection is that it prevents chips going through, and causes clogging. So now the question of the revision of this whole Code comes up, or revision of certain sections. I think that that is what Mr. Altman has in mind.

Now naturally the question comes up, "What does the Section wish to do in regard to the entire Code?"

JOHN LUNDRIGAN (International Paper Co., New York City): It would seem to me that the question of revising this Code, if we are going to do it at all systematically or in a practical way, is something that ought to be spread over at least another year, and some definite agency, committee or individual, undertake what I would call suggested changes.

I believe they would consist mostly of what I would term "bringing the Code up to date." All of us should and would be interested enough to criticize anything that appeared impracticable in the recommendations made, even though we weren't capable or willing to advance suggestions.

MR. ROSEBUSH: You may remember that when this Code was adopted two years ago we discussed the very things that Mr. Lundrigan has been talking about; whether or not we would, as a Section, give our consent to the adoption of this Code and have the Government put their numeral on it and send it out as a Pulp & Paper Code; and at that time a statement was made by some one that while it might not be an exhaustive treatise and cover all phases of the work perfectly, we felt it was the best that was in existence, and that until such time as it would be revised we would give our approval to it.

Now it seems to me that we ought to go slowly; and yet, at the speed that is

necessary to get something done. Personally, I think we should consult with the Council, to get their official backing to a revision of the Code, if that is necessary, and then have a committee appointed that would go ahead with this work. I think it is absolutely useless to try to ask the members to send in comments on this Code, and wait for any such procedure, because my experience this past year, with the Safe Practice Pamphlet Committee indicates that it has to be delegated to men who will get together and work on it.

WALTER A. GLEASON (Hammermill Paper Co., Erie, Pa.): I hadn't been aware that the Code was so much out of date that it needs to be revised at this time. Of course I realize that this Code does not take in the sulphate end to such a great extent as is necessary at this time; but to try to revise the whole Code, after this committee and the Division of Documents in Washington have approved it seems quite unnecessary to me.

Mr. ROSEBUSH: Well, there are certain parts of it that seem to be capable of revision.

Moderate Revision is Suggested

M. G. HOYMAN (Kimberly-Clark Paper Co., Neenah, Wis.): On this Code, it wasn't my idea that it needs general revision, for it seems to me that is taking in a lot of territory. For one thing, it is hardly likely it needs it. There was a lot of work put in on this by folks that sacrificed a lot of time. It is doubtful if you ever again can give the time to it that Bob Altman and the others did in the beginning. It is utterly impossible to get committees scattered throughout the paper industry to work together.

That is, you have to localize it into a few hands, and all it needs, perhaps, is a little revision, and supplementing it by these mills or departments or sulphate, or whatever it is that was left out in the first place. In order to do that you will have to localize your committee, and submit it, then, through something like The Paper Industry; but you won't get many responses. I don't say "revise." I don't think much revision is necessary. More than likely it calls for supplementing this by some things that were left out.

H. G. GILSON (Oxford Paper Co., Rumford, Me.): Who first approached this subject of the change in the Code?

Mr. ROSEBUSH: Why, I think it came up about a year ago, or more, in the discussion of the change of the Code, and at that time, as I stated before, we were supposed to read it over and make our comments, and have it up for discussion this year.

Mr. GILSON: Is it the general consensus of this body that that Code needs revision?

Mr. ROSEBUSH: It doesn't seem so, from what has been said this morning.

CHAIRMAN BRENNAN: We must never forget or lose sight of the fact that we are supposed to be the last word in safety. We are professional safety men, and get bread and butter for doing it. Therefore, if we neglect this thing, we approve it in whatever form it may be in.

Being the last word in paper and pulp safety, it is perfectly natural for Labor Boards, State Governing Boards, to take this as it is, coming from those who should know.

I think it is a matter of pride. We should have that engineering pride which goes with the last word in efficiency and in accomplishment. That would be my thought on the thing, that if we maintain a Code at all, then, in order to call ourselves engineers or directors, we should have a Code which is up-to-date, and actually the last word on the subject.

The idea of presentation through the journal, through The Paper Industry Magazine, of course is sound. It will show our executives that the Safety Congresses are

not hot air and a general hand-shaking session, but, rather, will show them that we have as much right to engineering prestige as mechanical engineers have.

Let us, before we come to a decision, consider the fact that we stand back of something which may not be up to the minute, and therefore stands as a reflection upon our profession. Either abolish it or revise it, but take some definite action, whatever the assembly may see fit to do. Let us not forget that angle; otherwise we can't use the term "safety engineer."

Mr. ROSEBUSH: Gentlemen, it does seem as though this Code is a fine piece of work, and it is a mistake to have it put away in the files, where it becomes mouldy and not used. And then there is also the fact that this Section has fathered it, stands back of it, and I can not see any harm for it to be inspected by a committee, and those parts of it which may be obsolete, as Mr. Hoyman suggested, brought up to date, if with nothing more than supplements.

I read you two parts of it that I know there is a lot of disagreement on, and while I think the Code, as stated, when it was adopted as a whole, was very acceptable, I think we ought to keep it up-to-date as far as possible.

Discussion on the Chip Bin

Mr. PEACOCK: Referring to the wire screen, I have a superintendent who challenges that whole idea of any sort of wire or appliance at the opening of a chip bin; and furthermore, he challenges the right and the need for putting any man into the chip bin at all except for purposes of repairs, when the chip bin is out of use.

Mr. ROSEBUSH: In writing over the Safe Practice pamphlet, the question of a ladder going down into the chip bin was thrown out, because one of the mills reported that its ladder was rotten, a condition which did not show from above, and a man going down that ladder was apt to be injured, so they said "Take the ladder out entirely."

Now that is a condition that was found in one mill. There was quite a discussion on the fact that where this calls for a ladder to go down into the chip bin, taking out the ladder is the way I recall it. Wasn't that correct?

Mr. PEACOCK: Yes.

G. W. PHILLIPS (The Champion Fibre Co., Canton, N. C.): It seems to me that this thing can be made workable if we know all the conditions. Now with reference to the chip bin, dry chips, as you know, will feed into the digester without much trouble. Perhaps some of you are not using wet chips. We make paper from chestnut wood, after the tannin has been extracted. These chips are put into the bin pretty wet, and they form a wall almost perpendicular.

Now we do have a ladder. We feel it is necessary to have one, a metal ladder going down into that chip bin, with a rope provided for the fellow to hold to with one hand as he goes down there to stir up the chips. It seems to me that any kind of a screen over that opening would certainly be out of place.

It seems to me that a number of little things like this, if we could just iron them out, note conditions, we can remedy them so that the Code would be all right; but it is pretty hard to convert a hard-headed superintendent, sometimes, when he knows it is interrupting the operations.

Mr. ROSEBUSH: Personally, I like the thought of having this Code printed, section by section, in The Paper Industry, and I also like the thought of having a supplementary edition to the Code. You will notice on the first page that it says, "Bulletin, United States Labor Bureau of Statistics, 1926," and gives the names and addresses of those who were interested. The first name on there is the Chairman, Robert M. Altman, followed by A. B. Costigan, G. E. Williamson, etc.

WALTER A. GLEASON (Hammermill Paper Co., Erie, Pa.): Don't throw this Code away and attempt to make a new Code.

MR. ROSEBUSH: I think we are getting the thing crystalized. Now will some one make a motion? We are pretty generally agreed on it. We ought to have the motion now.

MR. LUNDRIGAN: I make a motion that the chairman of this section appoint a committee, including R. M. Altman; that committee's duties being to cooperate with the National Safety Council, magazines like The Paper Industry, and various Governmental and other agencies having to do with the present Code, in giving such publicity to the existing Code and proposing and considering such additions and amendments as in their judgment are necessary for the best interests of the industry.

MR. GLEASON: I second that motion.

MR. ROSEBUSH: Any other remarks on the question? Are you ready for the question? All in favor please manifest it by saying "Aye". Opposed by saying "No". It is carried.

Mr. Chairman, I think that fulfills my obligation this morning.

Committee Appointed to Carry On the Work

MR. PEACOCK: Chairman Bill, before we leave this entirely, would it be wise to consider some way of securing a redistribution of the Code?

CHAIRMAN BRENNAN: The code can be obtained from the Government Printing Office, Washington, D. C., for 15c. I am sure the Government Printing Office will gladly supply all who desire copies.

In accordance with that motion, I will appoint James Plzak, Consolidated Water Power & Paper Co., Arthur Murray, The Container Corporation of America, and A. Scott Dowd, Editor of The Paper Industry Magazine to work with R. M. Altman, Marathon Paper Mills, and to summon aid from any and all who have the interests of the Section at heart, to carry on this work, not forgetting the News Letter Editor.

As you all know, the National Safety Council work is characterized by practical men, and throughout the country a man by the name of Walter Darling has been traveling, preaching the gospel from a wealth of personal acquaintance.

He has been in the East and has received an overwhelming reception. His work is of the best. He has asked permission to come here and speak to you. He has been in the other Sections. He is to the point, and I now introduce Walter Darling, of Cincinnati, a very eminent lecturer on Safety.

WALTER DARLING (Safety Lecturer, Cincinnati, Ohio): I don't know whether I am capable of talking to you men this morning or not. My work, while it has been to about half a million employees of the United States, is usually not to executives. But I have made a few observations. That may sound funny to you, for a blind man to say that he makes observations, but you know we aren't kidded any by scenery. We get things pretty much as they are.

I don't know whether I can inspire you any, whether I can enthuse you any, or just what I can do here today, but I'd like to say a few little things about my experience. We all know that safe men in industry are men that make safety a habit, and that habits are formed by constant practice.

In order to get men to practice constantly, they must be constantly reminded. But unless their interest and attention are firmly established on a good, solid foundation, constant reminding won't get worthwhile results. A good foundation is, therefore, essential, and its value is governed by the degree of interest it arouses.

I am of the opinion that a good foundation is to have a safety department whose energy and enthusiasm pervades the entire plant. Safety in industry, like the morale of an army, doesn't bubble up from the ranks to inspire and influence its recognized leaders. Unity, harmony, confidence, and cooperation are all the children of good

parents, and when I say that I mean you men, safety directors; and it is your children that you have to look out for.

Every plant can't have a perfect record. They don't have perfect records, but perfect records are possible, and they are worth working for. Work is the only thing that gets them.

As I see it, the difference between the successful and the unsuccessful is indolence, indifference, and indefiniteness on one hand, and ambition, patience, and perseverance on the other.

I don't know whether you have noticed it or not, but men who make records seldom make excuses. I feel safe in saying that the most eloquently delivered alibis that have ever passed the lips of men are echoing down the halls of almshouses and penal institutions throughout the land. They don't come from the men who are making records, making history in safety.

Constancy is the acid test that proves the mettle of the worthy, and eliminates the unworthy.

While you may not be able to lay your finger immediately on the trouble in your particular plant, it can be found. I have heard people say that they had bad luck. A lot of people say that I have had bad luck; but bad luck, to me, men, is a discordant note which vibrates only in the minds of the slothful, and good luck is simply the accrued interest on the efforts of the deserving.

If we are satisfied to let our aims and our ambitions rise no higher than our place in industry and our names on the payroll, then, paradoxically as it may sound, we are all very successful failures.

I can't help think of that little slogan, which is worth pasting into your hat or over your desk or anywhere else. It is just this: "A quitter never wins, and a winner never quits."

I don't know whether I can be an example of working hard or not. It isn't exactly a pleasure for me, and it is a lot easier task for most other people, but it is worthwhile, all of it.

CHAIRMAN BRENNAN: We are grateful to Mr. Darling for his comments here today. A man who has lost his eyes in industry can't help but have the proper slant on our problems.

We now take up the Contest Rules for next year. I will ask Mr. A. Scott Dowd, because he is intensely interested in this subject, to comment on the last contest, and, if possible, suggest something to us.

Discussion of 1931 Contest Rules

A. SCOTT DOWD (The Paper Industry, Chicago): I received a letter from Mr. William Colvin, safety director of the Fibre Container Branch of The Mengel Company, Louisville, Kentucky, addressed to Mr. G. E. Burns, of the National Safety Council, Chicago, under date of December 20, 1929, in which he said:

"Our mill does not manufacture the board which we use to make containers. This is shipped in to us from various mills throughout the country. However, I do not think that this should entirely exclude us from the contest."

"I appreciate the fact that statistical reports made up from mills manufacturing different articles would be quite a problem, but our dues entitle us to membership in the Paper and Pulp Section. Do you not see some way that we can enter into this or another contest?"

"I am very anxious to enter into something of this kind because of the interest I am sure it will stimulate in our employees."

Mr. Burns referred that letter to me, and I answered Mr. Colvin, including in my letter a paragraph which stated:

"The rules for the 1930 Contest, as has been stated by Mr. Burns, were drafted

by the Contest Committee of the Paper and Pulp Section and endorsed by the Executive Committee. Therefore there can be no change made for the present year. However, this matter will be brought to the attention of the Committee at the next Congress, and if found practical, some modification that will permit more general participation on the part of all members of the Section might be effected at that time."

In "Industrial Accident Statistics" 1930 edition, you will recall that there were 148 paper and pulp mills in the Section. The paper box and container manufacturers constituted the smallest number of members, while the paper and pulp mills were greatly in the majority.

The frequency rate of the paper goods manufacturing plants was 14.71 accidents for 1929, while that for the containers was 37.76 and paper and pulp mills had 29.42.

I present this for the discussion of the meeting, as to whether it would be well to include all the members of the Paper and Pulp Section in the contest, or keep it for just the paper and pulp people.

CHAIRMAN BRENNAN: You have heard this unusual request. It is up to us, now, to consider whether or not we will make a special provision for these fellows, or continue as we are for fear of getting into deep water. What is your pleasure? I might ask how many come within that status, Mr. Dowd—how many could possibly come into that category; enough to make a special department or special Section, or something?

The Various Groups of Plants

MR. DOWD: I have it right here. There is a small number of container manufacturers. The next larger group is the paper goods manufacturers, such as the towel manufacturers, etc. There are 27 paper box and container manufacturing plants, 40 paper goods manufacturing plants, and 148 paper and pulp members that reported their accident experience in 1929 for the Industrial Accidents Statistics pamphlet. That is a total of 215, and that is considered the membership of this Section.

CHAIRMAN BRENNAN: In your jurisdiction, Mr. Murray, have you some?

ARTHUR MURRAY (Container Corp. of America, Chicago, Ill.): We have our own safety contest, because we have so many box plants, both corrugated and specialties, such as ice cream pails and things like that, but we will not mix paper mills with converting plants. The experience is so much in favor of the box plant that it is easily 60 per cent better, both in insurance cost and frequency and severity rate, all the way through. There is no comparison whatsoever. The fact of the matter is, on our small box plants, and by small I mean less than 25 or 40 employees, I don't even let them into the contest, because they should run for three or four years without a lost time accident; no reason why they shouldn't. If they have one a year, why there is something wrong. So far as the contest is concerned, as for a small box plant, I would say it would be ridiculous to disturb the present situation.

The solution, as I see it, would be the establishment of a separate contest for the larger converters, with 140 employees and up. You might even have two groups in it. Of course it would be a question of financing prizes in that, but I really think the field is so big—it hasn't been touched at all—it would be worthy of at least an investigation. If we didn't have a contest this next year, why maybe it could be in the ensuing year; but I want to emphasize the fact that we should not mix the converting plants with the paper mills, except under the present conditions, where they are inseparable and where they have the continuous process.

R. G. McCONNELL (Defiance Paper Co., Niagara Falls, N. Y.): We happen to have two mills, the Defiance No. 1 and Defiance No. 3, and we manufacture black hanging paper and some novel news and wrapping paper in those two mills, and we also have two wall paper mills. Now, as a result of the work that this Section has

carried on, and the inspirations that they have thrown out, it interested our Niagara Wall Paper Mill, with an employees roll of from 120 employees to 170. We found out a year or so ago, that it would be impossible for us to compete in this campaign, because the equipment in the wall paper mill did not meet the requirements of the rules.

So we find ourselves standing alone in the wall paper class, although we have forty-three competitors, and I thought probably if you did have a special class it might be a means of bringing about some special accident prevention effort in those other wall paper mills.

CHAIRMAN BRENNAN: That is worthy of consideration. We always have to think of our Section's 100 per cent representation if we are going to get anywhere in the Council and the national movement.

MR. DOWD: It is quite a job to look after the clerical work of one contest in one Section. To divide that up into more than one would entail a lot of work that I don't know that the Council would be willing to assume, without some thought on the matter and the right to say something.

If we intend to give a prize to the container manufacturers, we'd have to give a prize to the wall paper manufacturers. We'd have a number of different groups. They can get up contests among themselves, though, as far as that is concerned.

Keep the Spirit of Fair Competition

MR. LUNDREAN: The thing you have to look in the face is this—we have it ourselves, among our own companies. We make up, every three months, a table showing the experience of each one of our mills as compared with the others, and that, of course, is distributed to all of the men; and it is not only a common source of comment but oftentimes they have expressed dissatisfaction that a fellow who has a wood pile and a sulphite mill is put on an even keel with the fellow who has neither.

Now it seems to me that one of the worst things we can do is to make the big fellow feel that he is in an unfair comparative situation in competing with some one else. We have really thought of subdividing our fine mills, where we have no wood-pile, which is the source of a good many accidents, and making a separate subdivision for them, as compared with our mills that make ground wood and sulphite.

As a matter of fact, we have eight bag mills that we do separate. We make entirely separate subdivisions, and they are in no way, shape or manner compared with our paper and pulp mills. It is purely sentimental, and, to my mind, to some extent an element of fairness in it. We have never seen our way clear to having a so-called "departmental contest," because our common sense and experience tells us that it is absolutely unfair, and there is no way of adjusting the thing, that I know of, to undertake to compare your maintenance crew, for instance, with your finishing crew.

For that same reason, what I'd like to see all of the companies do is, if possible, to come into this general activity, but it seems to me you are going to create dissatisfaction with the fellow who thinks he has the larger problem.

MR. DOWD: I was obliged to bring this up before the meeting, in fairness to these other members of the Section, to see if there is enough sentiment here to show that it isn't fair to bring those people into competition with paper and pulp manufacturers, so that we just can't engineer any way through a general contest. Some other means have to be provided.

CHAIRMAN BRENNAN: You have heard the opinions of these men, who are really on the inside of this matter, and have actually considered it previous to this meeting. What is your pleasure? Do you wish to instruct Mr. Dowd to convey just what has happened here today, our sentiments and our reasons? As to whether or not we are going to consider their admission?

CHARLES H. PIPPERT (Charter Bros. Machine Co., Middletown, Ohio): Mr. Chairman, if I understand rightly, you are trying to build up this organization, are you not? What are you going to do with the rest of the men manufacturing paper, and also manufacturing paper equipment? You are going to try to interest those people to get into this organization, aren't you? They are paying their dues into the National Safety Council; the firms send their men here, and spend their good money for the men to get something out of this, don't they? We all fit into the paper and pulp association, so far as that goes. I really think there ought to be some provision made to take care of the box board and the box manufacturers, wall board, or wall paper, rather, and the other minor industries that enter into the pulp and paper game.

MR. LUNDIGAN: Well, I think you are right, if you are asking me, but it is just simply a case of "Should we add another element to this particular subdivision of the National Safety Council, insofar as this safety contest is concerned?"

MR. PIPPERT: Why not?

MR. LUNDIGAN: As I understand the question, it is whether this man finishing wall paper or making Lily Cups or something of that sort, which are almost free of the industrial hazards that enter into the manufacture of pulp and paper, should be put on an even keel and rating in the question of where he will stand, from the standpoint of accident prevention efficiency in this particular contest being carried on.

MR. PIPPERT: I see.

MR. LUNDIGAN: That is an entirely different question from that as to whether he shall be a member and participate.

MR. PIPPERT: I see now.

Possibly Another Group

MR. HOYMAN: We have three divisions now; we have A, B, and C Groups, which include just paper mills. Wouldn't it be possible to have one more division, Group D, in our paper group? That would take in, wholesale, these other converting companies, where they would be competing only against themselves, and yet be a part and parcel of this contest. I think they are entitled to it, for the reason that they are paying dues the same as the rest of us. They are interested in it. We haven't anything to bring them, as members, into this Section, if we don't let them enter into the whole activities of the Section; and while that doesn't affect me very much—we have some converting, but it is usually tied up with the paper mill—I think these other folks ought to have some representation, and they might be able to get it in that way.

Those folks are entitled to consideration the same as we are. They are paying dues just the same. If we have a contest at all we should provide ways and means of taking them in.

CHAIRMAN BRENNAN: That was my thought, of adding another class. It is possible that there is a great discrepancy among these others in size of equipment and nature of work, and I think that is Mr. Dowd's objection.

MR. ROSEBUSH: Mr. Chairman, it seems to me, from what I heard said yesterday, that it is rather a difficult problem to make the decision among the three mills who win prizes, as to who shall have the Grand Prize, and I really don't see the necessity of a Grand Prize. While it is nice to get prizes, I'd rather see that Grand Prize, the money it represents, I'd rather see that used for the fourth Group, as Mr. Hoyman suggests, and give four prizes, four first prizes, and stop there, because if we allow the formation of Group D, why wouldn't those fellows be entitled to a look-in at the Grand Prize, the same as the other three Groups. My idea is to do away with that Grand Prize entirely.

MR. MURRAY: I just wanted to confirm that suggestion, too. That was the impression I got yesterday when two prizes went to one plant. It really didn't mean any

more to them, but there was a fourth person in the audience who could have capitalized on that award if it had been earned in some other capacity. I do think it would be possible, if your contest were run on the twelve-months' basis, and you had enough exposure during the whole year's time, to have a fair and worthwhile contest among the plants, and you would have to make some exclusions in the other Groups. You couldn't put in every printing plant that had a few box machines to set up boxes, but you would have to restrict it to converting plants. I don't see any big objection to getting into that field and making a survey, seeing what members we have, first, seeing what the average size is, and seeing what the possibilities are. I think our first step is to make a real analysis of our own Section and see what the possibilities are, and then make a recommendation to the Safety Council, if those figures so warrant.

MR. DOWD: Just in following his remarks, perhaps there would be a motion in order, following this, to this effect, to have it effective perhaps in the next contest, so that this contest will go through, but effective at the beginning of July 1, 1931, for the twelve-months' contest. So I feel that it would be worth considering, the idea of giving one prize instead of four, or perhaps two. Instead of creating another Group, perhaps your Group D and E, or whatnot, would compete for one prize only; one prize to the paper and pulp mills and one prize to the converting mills; because they are not comparable. Instead of having Group prizes, give Group certificates, certificates of merit for work well done; but one outstanding prize, decided and voted upon by the judges as they are at the present time, and only one prize. Then another prize, only one prize, to the converting group, and divide the converting group picture, if you please, or choose, into major divisions. I suggest that a motion be made to take that under consideration, and apply it in the 1932 Contest, allowing the 1931 contest to go along as it is.

Change the Nature of the Contest?

E. AUGUSTUS (Meade Paper Co., Chillicothe, Ohio): I question very much, without wanting to be contrary, the real value of this prize idea. I think the idea of contests is fine, in certain places, but in a group of manufacturing plants, such as the pulp and paper industry, with widely scattered mills all over the country, I question whether you are getting at the real thing for which you are striving, by the awarding of a prize to one particular mill. It does that mill some good, but does it accomplish, to the greatest possible degree, the real thing that you are after?

MR. FAIST has suggested that I bring up a little matter that we were talking about. My suggestion was, that possibly we could get a whole lot more good out of this whole contest idea if, instead of setting up a prize for some particular mill that had made the best record, we would establish a certain line and say—setting a goal—"All mills beyond this line will get recognition, their name will be used, we'll give them a little certificate if they want it"—but don't make it one mill. Then you will have fifteen or twenty mills out of your group that can reach that goal. They will take a little bit of pride in it.

The other way, one mill gets a cup and the rest of them are all in the position of saying "Oh well, what's the use?" I am not saying this because of any feeling of sour grapes at all, because we have never won anything, but I believe that the real purpose of your Section in the Safety Council is to reduce accidents.

Now, then, the thing we want to get at is how we can best bring that condition about, and if we can get more people into the contest who feel that they have done something, giving them a little pat on the back, and take all of these different plants, your board mills and your container plants and your pulp mills, and paper and pulp, and bring them all in and say "Now we are all on an equal basis, trying to reduce accidents, and if you can come up to this line and better it, fine!" But don't say to

the fellow who makes the best record "We are going to give you a prize." Let's have all of them try to get a prize.

CHAIRMAN BRENNAN: The idea being that the psychological effect of winning, prize-winning, be spread wider, perhaps, and thinner.

MR. DOWD: We have given the certificates, of course, to the perfect scores and 1, 2, and 3 mills. That is a recognition of their work.

CHAIRMAN BRENNAN: I sent to the Council asking them to have somebody available for a number on the program that is to follow, relative to the full-time secretary. Mr. Cameron, himself, the Managing Director, saw fit to come, and we are certainly complimented thereby.

I really think I ought to review the contest discussion, in order that Mr. Cameron may get the basic idea of this involved situation. As you know, the Pulp and Paper Section has three prizes, together with the major award for the outstanding performance, regardless of size.

Mr. Dowd has had a request from a firm of a class which is not comparable with the manufacturing of paper. It is a firm of converters, and they don't have our hazards, yet we feel that their membership is as valuable as ours, and that their attendance here is just as precious.

We'd like to satisfy them, and take them in, but we see a great deal of difficulty ahead, involving the establishment of a new class, and maybe subdivisions of that, in turn, because they aren't very likely to prove all the same in their hazards either. It is not merely a question of prizes, but a great deal of bookkeeping, of which we demand a great deal now of the Council.

So, while you are here on another errand, I would like to have you comment on that. How valuable are these mills, who desire to come into a contest and for whom there is no provision now, to you and to us?

Thousands of Plants Should Be in the Council

W. H. CAMERON (National Safety Council, Chicago, Ill.): Why, of inestimable value! I wish we could get into the membership or into our influence every mill in the country.

The society, of course, is very large, but there are a great many thousands of the smaller industries that we'd like to have; we'd like to have every paper and pulp mill in, and, of course, are only too glad to render such general service as we can.

MR. HOYMAN: I think that perhaps everybody has expressed his opinion on the proposition, and in order to close up that problem, I make a motion that the Chair appoint two men to act on the Committee with Mr. Dowd, with authority to make such decisions regarding this addition as they see fit, and that that will be conclusive for all.

A. SCOTT DOWD (The Paper Industry, Chicago, Ill.): I will second that, Mr. Chairman. As an amendment—I make a motion that the committee be a local committee in Chicago, so that we can refer to the National Safety Council. We have the Container Corporation—no personalities in this matter; only a matter of expediency that I have in mind.

CHAIRMAN BRENNAN: You have heard the motion, and heard the amendment. The motion has been seconded. All in favor will please make it manifest by the usual sign "Aye". It is carried.

Now as to the amendment, that they be located in Chicago. I don't think that that will meet with any objection, but we'll vote upon that. All those in favor make it manifest by the usual sign "Aye". It is a vote.

I will appoint Mr. Dowd, Mr. Murray, and Mr. Burns, the National Safety Council engineer. I will name you, Mr. Dowd, as chairman, and you will see the matter through and report that immediately to those mills concerned.

MR. DOWD: Is it the sense of this meeting that the contest be an annual one, beginning January 1, 1931, for twelve months? It has to be automatic; for instance, we have another contest ending in 1931, 12 months after July 1, 1930.

CHAIRMAN BRENNAN: We will take both matters together. It is moved that the next contest be a six-months contest, but that immediately on the first of July an annual contest begins. Is that the idea? And that shall continue until such time as we shall see fit to change it. I will open that for discussion. Do I hear a second on that? Now we open up for discussion, because there is a difference of opinion. I know, in this Section, as to an annual contest. Do you all want annual? All those in favor, please make manifest by the usual sign "Aye". Opposed "No". No opposition; it is a vote.

The next contest will be a six-months contest, followed immediately by an annual contest.

MR. PEACOCK: Mr. Chairman, one other matter. I think we ought to vote on the matter that Mr. Augustus and I mentioned. I move that the Rules Committee of the Contest discuss, discover, and put into effect, some method of awarding certificates to all mills in the contest who, each year, exceed or improve upon last year's average.

CHAIRMAN BRENNAN: Some recognition.

MR. AUGUSTUS: I second that motion.

The Motion is Carried

CHAIRMAN BRENNAN: It has been moved and seconded that in the coming contest the Rules Committee make provisions for giving recognition to those mills who improve upon last year's average. If there is no discussion, I will ask for a vote. All in favor say "Aye". It is a vote.

MR. ROSEBUSH: I'd like to make the motion that the suggestion made by Mr. Augustus and Mr. Cameron, regarding recognition of all paper companies on a graded basis, such as is given to the railroads, be considered by the Contest Committee for 1932.

MR. AUGUSTUS: Second the motion.

CHAIRMAN BRENNAN: You have heard the motion. Seconded by Mr. Augustus. All those in favor of this motion make manifest by the usual sign of "Aye". It is a vote.

At the last session in Chicago, a committee was appointed to study ways and means of raising money to finance a paid secretary, and we understood that the approach is everything. We went to Denver, went to the American Pulp & Paper Association informally, to present the General Manager idea. We all appealed to our members to get the individual managements' ideas, which some did.

The depression, together with the lack of enthusiasm, perhaps, brought negligible results along that line. They could commit themselves to nothing.

Our resolutions have been to the effect that we must have enthusiasm throughout the nation, and that the only outstanding figure in the industry is the suitable person to present this matter to the American Pulp & Paper Association.

We also feel that other organizations should contribute in part. It is hardly fair to ask the American Pulp & Paper to do it all, and it doesn't show a general enthusiasm, we think, to have a sole subscription carrying on the work.

In our Section, there is no use saying otherwise, there is a distinct under-current of feeling that perhaps the Section is entitled to a specific help from the Council, rather than the general service which we receive. We would like you to tell us "Is it possible in any way for some portion of those funds—\$11,000 which we pay your Council—to come back to us, at least temporarily, to further this work, and use your name when we go before the national Association?"

You understand that every one of these managers will say "We already contribute for that specific service. We don't feel as though we should duplicate the contribution", not understanding your personal problems out there. It is hard to make them understand your difficulties in raising money. Will you please set the Section right on this matter of whether you could or whether you could not, and why, so that we can go forward?

MR. CAMERON: There is but one thing to do and that is to get to the directors who control the American Paper & Pulp Association—it is the directors who provide all this money. In the Petroleum Association, they didn't have any appropriation at all for safety, and yet through the directors, the men who legislated for that association, they were convinced that the biggest thing they could do, from a public relations standpoint, was to get the oil industry into the proper relation with the public. They wanted the public to know that the oil industry was behind safety.

Seek the Support of the Association Directors

That is my notion about getting to the American Paper & Pulp Association. Get to your influential directors, and have those directors bring the matter up with the Association. In other words, to the directors it is not very expensive; \$10,000 appropriated each year through the association and appropriated by the members, etc., would not be so very large.

Now let me tell you the obstacle there is in the thing. You ought to be familiar with the obstacle in order to be able to meet it. These trade associations, of course, are organized for commercial purposes, and there are a great many subsidiary things that they might do for the welfare of the industry which they believe should be taken care of, and most of the associations do not think that matters of safety should be left to the association.

The first approach would be to get to these directors, and you'd have to have some people of influence. Take Mr. Lundrigan; take your president. He is serving as a director on this particular association. You get to him and sell him this thing, and he will make it a personal issue, believe in it, etc., and he will mix around with these other directors, and that is the way it is done. You don't get up in the meeting and make an address, but you get to the individual directors; and it comes up spontaneously.

For instance, up in Providence, Rhode Island, some years ago they wanted to organize a council, and they felt they couldn't do it without raising a lot of money. Henry Sharpe put his hand in his pocket and took out \$2500. Henry Sharpe's company was an old-time safety company, did wonderful work, believed in safety, and he wanted to have a council in Providence. He dug up \$2500 and put it right on the table, which underwrote that proposition.

Perhaps you can find some leading person or philanthropist in your industry, who would like to do so. At this time, for the whole paper and pulp industry, a fund could perhaps be created, a memorial fund, such as the Smith Paper & Pulp Memorial Fund, or something of that kind.

Now the answer to this whole thing, of course, is to get some new money. We have got to get some extra money for these other general services. In other words, what I am saying to you now is this, that I don't see, at the present time, how we could divert any of our present income for the salaried secretary, for extra services. If we did it for the paper and pulp section, of course, the other sections would want the same thing. Most of the other sections want to have secretaries.

MR. GLEASON: Mr. Cameron, how many of the sections have secretaries?

MR. CAMERON: Just one at the present time, the Petroleum Section. After this

Congress we expect to have our second secretary in the Accident Prevention Equipment Manufacturers' Section.

CHAIRMAN BRENNAN: Are there any questions, now? We have the outstanding figure of the National Safety Council here. We want to get this thing straightened out, because we are all sincere in the thing.

Mr. Cameron has an international aspect. Of course, we come from hard-headed business houses, which have a more selfish interest. We feel that our management will say to us—we always fear they will question our membership and the use of the money. We want to belong. Therefore we often have to say "we must belong, because they give us so-and-so," and we can't preach the international angle or humanitarian angle to our managements, who are hard-headed business men.

By getting the assistance which we sought and hoped for, we knew that we could use that man to build the membership, which is the foundation of the Council, as are stockholders of a corporation. He would spend a great portion of his time in bringing in new members, which would help enlarge the Section and satisfy us, and add to our treasury, which would satisfy you.

I am giving you this as we discussed it. These fellows must be satisfied in order to have them come back here year after year.

A Secretary Cannot Do Everything

MR. CAMERON: There is a little point there. To show you how complicated this is, suppose you asked me how many memberships a secretary will obtain? Not so many. The memberships come awfully slow. I don't think it would be wise to employ a secretary with the expectation that you would have a third or a half of his salary come back through new memberships. He would get memberships, of course, but what he would do primarily would be to permeate the trade.

MR. DOWD: We were talking, this morning, about building up an intensive program this year, having all of our program take place in one day, closing with an evening banquet, and leaving perhaps the next morning open for the discussion of the technique of the contest and various technical matters of the Section's activities, and considering the importance of having that program made up of executives, presidents and managers of our paper and pulp mills. Those men could address our meeting. We hope to have Mr. Cameron on that day's program.

CHAIRMAN BRENNAN: That is a happy inspiration, to have Mr. Cameron climax that meeting, to which we look forward, with all the executives, because we know that when our managers want safety we won't have so many refusals, and we'll get wholehearted support. We feel that perhaps we are a little bit weak, through lack of appreciation on the part of the management. We shall keep that in mind. Our idea is to have an intensive program and get it over with; and then we can let those who wish to stay, stay for special features.

MR. GLEASON: Are we going to take any action on the paid secretary?

MR. DOWD: I move that the matter of the paid secretary be left in the hands of the Program Committee of the Section, with the suggestion that they build a program to include executives and Mr. Cameron, and that the decision as to how to proceed in the matter be deferred until after our next Congress or next annual meeting.

CHAIRMAN BRENNAN: I understand the present Committee is discharged and the work delegated to the Program Committee, to connect that up with the coming program, and that everybody, of course, is to work for enthusiasm in his own mill. Do I hear that seconded? It has been seconded by Mr. Faist. All in favor of this please make manifest by the usual sign of "Aye". It is a vote.

E. AUGUSTUS (Meade Paper Co., Chillicothe, Ohio): The motion on the paid secretary is all right, but isn't there something we can do in the meantime, instead of deferring the action on Mr. Cameron's suggestion until our next annual meeting?

CHAIRMAN BRENNAN: You have just heard Mr. Augustus, and you know what the report was, just to that effect, that the Committee hopes to work continuously.

MR. HOYMAN: Just one thing might be done during this coming year, and that is that at the annual meeting of the American Pulp & Paper Association, if some one could arrange to have Mr. Cameron confer or meet with the directors or the executives of that Pulp & Paper Association at their annual meeting, and present this thing, it will fill in the gap very nicely.

MR. LUNDRIKAN: I would move that the Chair request the American Pulp & Paper Association to invite Mr. Cameron to present to them, at their next annual meeting, his reasons why a paid secretary would be of value to the Paper & Pulp Section of the National Safety Council.

CHAIRMAN BRENNAN (St. Croix Paper Co., Woodland, Me.): You have heard that motion, which was seconded by Mr. Augustus. Any discussion?

MR. GLEASON: I doubt very much if it can be arranged unless it is arranged in advance, because their programs are very full. I know I tried two or three years ago, through Dr. Baker, and at the time our Vice President was President of the Board in New York; and they had so many matters to consider that they wouldn't arrange for it.

CHAIRMAN BRENNAN: You have heard Mr. Gleason's idea on this thing. It would seem to the Chair that the attempt, coming from New York, and perhaps in the person of Mr. Graustein, would get us through those doors. At least, it is worthy of a trial.

MR. AUGUSTUS: Is this Section really in a position where we can request? Is there some way we might get around that a little more diplomatically; instead of requesting or ordering them to do something, could we adopt a resolution recommending or suggesting or something to that effect, rather than requesting?

CHAIRMAN BRENNAN: Do you wish to change the motion?

H. G. GILSON: I think Mr. Lundrigan's idea is very worthy, but I question in my mind "Who are we to make that impression in the form of a request to the Association, to get Mr. Cameron there for this worthy cause?"

CHAIRMAN BRENNAN: There is still a motion before you.

Last Year's Committee Will Continue to Function

MR. LUNDRIKAN: I am perfectly willing to withdraw the motion. That was to get some action of some kind. I haven't any private opinion of this motion, but I think, after this preliminary work is done, we still should leave the authority or the duty on our Chairman, to create the actual content.

CHAIRMAN BRENNAN: Mr. Lundrigan has withdrawn his motion, so we are ready to meet any situation in that way. Now will somebody substitute a motion to cover that new idea?

MR. ROSEBUSH: I'd like to make a motion that the Committee which was appointed last year continue to function in conjunction with the Program Committee on this thing next year.

MR. PEACOCK: I second Mr. Rosebush's motion.

CHAIRMAN BRENNAN: The original motion is withdrawn, and the motion of Mr. Rosebush is seconded. If there is no discussion, we will vote on that. All those in favor of this motion say "Aye". It is a vote.

MR. GILSON: I move that the Program Committee for next year devote one of our sessions, either in the morning or the afternoon, entirely to questions and answers.

MR. ROSEBUSH: Second the motion.

CHAIRMAN BRENNAN: It has been moved and seconded that next year this important matter, from which newcomers get tremendous benefit, and we all get a great deal of good, be given its proper position on the program. All in favor say "Aye". It is a vote.

CHAIRMAN BRENNAN: I am grateful for being elected Chairman of this Section for this coming year, and I will do for you just what I attempted to do in the News Letter. I put everything I had into it, just as the other officers did, but I have got to have support. I have to have your ideas. I can't satisfy any one unless I know what you want. I am going to send the News Letter, this year, throughout the country, delegating it to different sections, and let you all have a crack at the News Letter. Let every one furnish material, as you were told in the previous Letter, and do it! Furnish your ideas in order that you won't find yourself coming in here with complaints which we can't remedy.

I am going to offer you a program which I call an intensive program, next year. I feel we come here for business, and I feel we ought to work as hard here as we do in our mills, which is 8 or 10 hours without complaint. It will be short, snappy, to the point; a long-winded discussion will not be tolerated on inconsequential matters.

I have nothing further to say, except that I hope you will cooperate with me and with the officers. I hope you will give me your ideas, in order that I may please you, and repeat that I am highly honored to be given this position in the short space of time that I have been associated with you. Thank you.

JAMES MCGIVNEY (Brown Co., Berlin, N. H.): As I glance over the questions, I find there are about thirty, and at two minutes each that would take an hour more, so you appreciate the fact that our discussions will have to be short and to the point.

I am not going to read the letters in full, but just take the meat out of them.

The first one has to do with infections. Part of this letter, by Earl E. Grant, of the Crystal Tissue Company, reads:

"Seriously, though, I do believe that pressure should be brought against infections which were not reported at the time of injury. We have been annoyed in the past by our employees getting splinters in their fingers or scratching their hands and not reporting for two or three days. We have been fortunate that these cases were not serious and we believe that the State Laws should protect the employer against such cases."

I am very much interested in that myself, because we had the same problem in the Brown Company. The first thing mentioned is to get after the men and have them report. That means 100%. It doesn't mean anything less. I was talking to a doctor yesterday and he said they have a committee that meets every week to discuss such cases, and if the information is brought out that a fellow has not reported the accident, or the cut, he isn't paid compensation. What is the experience that you have had in that respect?

MR. LUNDRIKAN: In New York State you will pay compensation unless you can prove that he didn't get it in the plant.

MR. MCGIVNEY: That is the experience we had.

MR. LUNDRIKAN: I think you will pay it in any State unless you can prove he didn't get it in the plant. There are two excuses for not paying compensation; that is, proved drunkenness, which, of course, puts you immediately in the position of letting a drunken man work. The other is deliberately injuring himself, which you can't prove.

There's no use talking about State laws.

MR. MCGIVNEY: Here is a letter from Walter Gleason, with three questions:

"Is there an irreducible minimum in the prevention of accidents dependent upon trade risks of the different industries?"

That is the first one.

CHAIRMAN BRENNAN: We don't know that, because, with increased facilities and appliances and psychology in its application it is possible to go below that minimum which has often been set by well-meaning people.

I was told, when I started safety work, that they absolutely could not reduce one accident in our mills, yet they had 170 accidents, and in the year just closing, on the 21st of October, they have had just 3. The very best minds in our plant told me that.

So I venture to say that zero is the irreducible minimum; but it is an ultimate thing, a Millenium. That really is the answer.

MR. ROSEBUSH: I make a motion that we adjourn for luncheon, and those of us who are interested can come back after lunch and finish the session.

MR. GILSON: Second the motion.

MR. MCGIVNEY: All in favor signify by the usual sign, "Aye". Those opposed, "No". The motion is carried.

ADJOURNMENT

Thursday Afternoon Session

October 2, 1930

JAMES MCGIVNEY, Chairman

Brown Company, Berlin, New Hampshire

The fifth session of the Paper and Pulp Section convened with James McGivney, Brown Company, Berlin, N. H., presiding.

JOHN LUNDRIKAN (International Paper Co., New York City): I suggest that the chairman read all questions submitted and then we will decide how to answer and dispose of them.

From W. A. Gleason:

"How can foot injuries be prevented where sling loads of wood are hoisted from hatches on boats and logs drop from the slings? Also, where sling loads, in being lifted from the hold, dislodge the logs in the hold, causing them to roll down and strike the men? (Bear in mind that sometimes when the hold of the boat is full there is hardly a place for men to get from under the loads when they are being hoisted.)

"Would safety engineers get better results if they would devote less time to daily routine work, such as looking after repairs and correcting unsafe conditions, and more time to teaching the personnel of the organization safety methods, and by studying the operating processes and making suggestions for improving methods?"

From A. S. Wilson (American Writing Paper Co., Holyoke, Mass.):

"The question most foremost in my mind is how can the National Safety Council or Section more fully or better serve members who in many cases feel that at present insurance representatives are doing more effective service. This brings up the matter of field or contact man from headquarters. Would like to be able to see some one in the different sections of the territory at least once a year."

From Ernest Augustus, of the Mead Corporation:

"Our most frequent type of accident has to do with the mashing of fingers on calendars, super-calendars, and rewinders. I presume that this same condition holds true in practically all paper mills.

"We have been experimenting for some time with various types of guards to be used in preventing this type of accident, but so far we have been unable to work out anything satisfactory. It seems to me that this might be a very important problem for our Section to consider in connection with the Pittsburgh meeting. Has anybody as yet designed a satisfactory guard?"

From Miss M. A. Barth, of Fibreboard Products, Inc., San Francisco:

"Is there any connection between accidents and wage payment systems which are based on the unit of production rather than on the time element? In other words, if a man's wages depend upon how much he produces, is he not inclined so far as to the extent that he is more apt to injure himself?"

From R. H. Scanlon:

"What is the most advanced method of keeping accident cost statistics?"

From M. G. Hoyman:

"How long do you count absence when employees are off sick? How do you tabulate time lost because of sickness?"

One that has no name signed to it:

"How far do we investigate accidents?"

"Should 'safety engineer' approach employees direct or through the foreman?"

"Should a foreman be held responsible for accidents taking place in his department?"

"Do we reduce accidents by drastic measures, such as dismissal or suspension or by a system of trying to educate careless workers?"

"What are accidents?"

Mr. LUNDRIGAN: That is quite an interesting lot of questions, but, of course, the difficulty there is that to answer that kind of questions so as to produce any real benefit to the rest of us, we ought to have them at least several days before the meeting. That is the reason why I figure that if those questions were in a News Letter or in the call for the convention itself, or something of that sort, nearly all of us who have some ideas on most of them, and some of us have actual knowledge on a good many of them, on account of our own experience—a fellow comes in here with his pockets empty and his mind occupied with probably other things. It is pretty difficult for him to anticipate just what kind of questions are going to be asked.

Some of those are simple enough. McConnell's question, it seems to me, could be answered by stating that he hasn't got the right kind of foreman. Discharge the foreman and get another. The foreman today who doesn't realize that safety is efficiency and efficiency is safety, and that personal injury accidents are a cost, simply doesn't realize what his job is.

On the other hand, our foremen aren't supermen. A lot of them were born and raised in the town where the mill stands. A lot of them served their entire journeyman experience in that plant. They never saw nor had any occasion to study other folks' experience or improvements, and methods in machinery, different ways of educating men. That is why and what we provide this safety service for.

Now it is no use, even for a small plant, saying they are giving their foremen the benefit of the National Safety Council, when they have a bunch of books and tell him to read them. They say "Our plant is too small; we can't afford to have a safety engineer."

My answer is that the smallest plant in existence can afford to have a safety engineer if their accident problem justifies paying for membership in the National Safety Council; because two of these plants in which we got a certificate of merit for no accidents, their safety engineer probably devotes 25 per cent of his time, or less, to the actual work of studying wrong conditions and wrong practices, and advising with foremen and managers as to how to overcome them; but that is the preferred 25 per cent. He must not use pressure of other duties as an excuse for neglecting that 25 per cent.

But the manager who has the proper conception of his job will soon see that this man takes only 25 per cent of his time for this, and he assigns to him enough additional duties which he can perform and which some one must pay for, such as inspection, elimination of waste, testing of various raw materials and finished product, etc., all those kinds of things.

So the excuse that your plant is small and you can't afford a safety man doesn't appeal to me at all.

CHAIRMAN MCGIVNEY: I think that is a mighty good suggestion if it helps to create interest and it assures some special interest, some special problem in every News Letter during the year. While I am 200 or 300 miles away from Chairman Brennan, I'll be glad to take these letters along with me, get in touch with him, and in some way distribute the questions and send the special questions to some

experienced man who has had experience in the particular problem, and get his answer and publish it in the following issue of the News Letter.

Mr. LUNDRIGAN: It seems to me that is the very best way, as long as we haven't had time. Mr. Gleason is just 100 per cent right. It is presumptuous on our part, here, to undertake to answer all of these, or even any part of them, or at the length that they should be answered.

On top of that, we are putting them into a record, here, that the people they are intended for may never read.

It all resolves itself down to this, if our Plant Manager isn't interested enough to read those News Letters—in the first place, if his safety engineer isn't interested enough to point out to the Plant Manager that he should read them and use them in his conferences with the foremen, of course, to that extent we are wasting our time, because it is just going to mean some ink and paper, and the fellow who figures he is going to be automatically saved without working out his own salvation; of course, he is doing the worst thing in the world. He is kidding himself. When you start on yourself—Goodnight!

CHAIRMAN MCGIVNEY: I was asked to put out one issue of the News Letter, and it seems to me it is a pretty good way to handle it.

Mr. LUNDRIGAN: I make a motion that the stenographer transcribe those questions so that they appear in consecutive sheets of paper as questions, you see, and that the information be made the basis of a part of the monthly News Letters that are sent out by the various authors and editors.

Mr. GLEASON: Second the motion.

CHAIRMAN MCGIVNEY: Motion made and seconded. All those in favor please signify by saying "Aye". Those opposed, if any, "No". The motion is carried, and this meeting is adjourned.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Petroleum Section

Officers 1930-31

Executive Committee:

General Chairman—R. E. DONOVAN, Standard Oil Co. of California, San Francisco, Calif.

Vice-Chairman—D. J. WALLACE, Mid-Continent Oil & Gas Association, Tulsa, Okla.

Chairman, Atlantic Division—E. R. ALDEN, Vacuum Oil Co., New York City.

Chairman, Great Lakes Division—J. C. BERND, Sinclair Refining Co., East Chicago, Ind.

Chairman, Mid-Continent Division—H. W. BOGESS, Sinclair Oil & Gas Co., Tulsa, Okla.

Chairman, Gulf Division—J. L. RISINGER, Magnolia Petroleum Co., Beaumont, Texas.

Chairman, Rocky Mountain Division—D. J. GRIFFIN, The Ohio Oil Co., Casper, Wyo.

Chairman, Pacific Division—C. P. ANDERSON, Richfield Oil Co., Los Angeles, Calif.

Engineering Committee:

Chairman—R. A. HARTZELL, Standard Oil Company, (Indiana), Chicago, Ill.

R. W. BLACK, Standard Oil Company of New Jersey, Elizabeth, N. J.

J. H. HERBERT, Standard Oil Co., (Ohio), Cleveland, O.

C. B. SWANNER, Texas Pacific Coal & Oil Co., Thurber, Texas.

H. E. DISCHINGER, Shell Petroleum Corp., Houston, Texas.

B. V. OSBORN, Standard Oil Co., (Indiana), Casper, Wyo.

BARTON CATZ, Standard Oil Co. of California, Los Angeles, Calif.

Publicity Editor—C. L. HIGHTOWER, Texas Pacific Coal & Oil Co., Thurber, Texas.

Chairman, Program Committee—R. B. ROOPER, Humble Oil & Refining Co., Houston, Texas.

Chairman, Statistics Committee—J. W. MYERS, Standard Oil Company (New Jersey), New York, N. Y.

Chairman, Health Committee—DR. C. M. AVES, Humble Oil & Refining Co., Houston, Texas.

Past General Chairmen:

R. S. BONSB, Standard Oil Company (New Jersey), New York, N. Y.

V. R. CURRIE, The Texas Company, New York City.

E. J. SENNE, Vacuum Oil Company, New York, N. Y.

GEO. F. PRUSSING, Union Oil Company of California, Los Angeles, Calif.

C. W. SMITH, Standard Oil Company (Indiana), Chicago, Ill.

Secretary—H. N. BLAKESLEE, American Petroleum Institute, Dallas, Texas.

Retiring Officers

Executive Committee—General Chairman—C. W. SMITH, Standard Oil Company (Indiana), Chicago, Ill. Vice-Chairman—E. D. MURPHY, Mid-Continent Petroleum Corporation, Tulsa, Okla. Chairman Atlantic Division—E. A. TIMM, Standard Oil Co. (N. J.), Bayonne, N. J. Chairman Great Lakes Division—FRANK HARRISON, Pure Oil Co., Chicago, Ill. Chairman Mid-Continent Division—H. W. BOGGER, Sinclair Oil & Gas Co., Tulsa, Okla. Chairman Gulf Division—R. B. ROOPER, Humble Oil & Refining Co., Houston, Texas. Chairman Rocky Mountain Division—B. V. OSBORN, Standard Oil Co., (Indiana), Casper, Wyo. Chairman Pacific Division—W. C. LYNCH, General Petroleum Corp., Los Angeles, Calif. Engineering Committee—Chairman—J. C. BERND, Sinclair Refining Company, East Chicago, Ind. F. L. NEWCOMB, Standard Oil Development Co., Elizabeth, N. J. F. W. LAU, Standard Oil Company (Indiana), Whiting, Ind. C. H. MARTIN, Phillips Petroleum Co., Bartlesville, Okla. H. E. DISCHINGER, Shell Petroleum Corp., Houston, Texas. T. N. SHAW, Midwest Refining Co., Casper, Wyo. BARTON CATY, Standard Oil Co. of California, Los Angeles, Calif. Publicity Editor—S. W. CANDEZ, Tide Water Oil Company, New York, N. Y. Chairman Program Committee—C. L. HIGHTOWER, Texas Pacific Coal & Oil Co., Thurber, Texas. Statistics Committee Chairman—J. W. MYERS, Standard Oil Company (N. J.), New York, N. Y. Health Committee Chairman—Dr. C. M. AVES, Humble Oil & Refining Co., Houston, Texas. Past General Chairman—R. S. BONNIS, Standard Oil Co. (New Jersey), New York, N. Y. E. J. SENNE, Vacuum Oil Company, New York, N. Y. D. J. WALLACE, Mid-Continent Oil & Gas Association, Tulsa, Okla. V. R. CURRIE, The Texas Company, New York, N. Y. GEO. F. PRUSSING, Union Oil Company of California, Los Angeles, Calif. Petroleum Representative and Secretary—H. N. BLAKESLEE, National Safety Council, Chicago, Ill.

Tuesday Morning Session
September 30, 1930

GEORGE F. PRUSSING, Chairman
Union Oil Company of California, Los Angeles, Cal.

The first session of the Petroleum Section of the Nineteenth Annual Safety Congress convened with Mr. George F. Prussing, Union Oil Company of California, Los Angeles, presiding.

CHAIRMAN PRUSSING: Mr. Clyde Smith, our chairman, is unable to be here, because of illness in his family, and as our vice-chairman is not here the duties of chairman have been wished on me.

The first paper on the program is the report of our chairman, which I am going to read to you.

Our Goal

By C. W. SMITH
Director of Safety, Standard Oil Company (Indiana), and Chairman of the Petroleum Section

Our goal is to make the petroleum industry one of the safest industries in which a young man may be employed. This has been our goal ever since the Petroleum Section was organized some nine years ago. What has been accomplished in making the industry safer during this time? Eight years were spent without showing

a great reduction of accidents throughout the industry as a whole but in the meantime certain companies have reduced accidents to the point where they are almost uncommon and unusual occurrences.

1930 is different. Petroleum companies all over the United States and from South America reporting to the National Safety Council are showing a remarkable reduction in accident frequency. Forty-one units in the 1930 Petroleum Section Safety Contest went through the six months of the contest without a single lost time accident. Only three of the 11 trophy awards in 1930 are won on other than perfect no-accident records.

The 1930 Contest shows a reduction in accident frequency of 29 per cent over the 1929 contest and 39 per cent over the 1928 contest. 196,796 petroleum workers participated in the 1930 Contest—an increase of 34 per cent over last year and an increase of 127 per cent over those competing in 1928.

Summary of Annual Petroleum Section Safety Contests

Years	No. of Units	No. of Workers	No. of Accidents	Accident Frequency	Accident Severity
1928	98	86,638	2698	27.06	No Record
1929	180	146,595	4542	24.79	2.15*
1930	308	196,796	4316	17.55	2.36

* Incomplete.

Of course it must be admitted that slowing down of operations in the petroleum industry has had something to do with the improved record. However, there have been periods of restricted activity before but never with such a noticeable reduction in the number of accidents. If the industry continues to reduce accidents during the last six months of this year as they have been reduced during the first six months, we expect the annual summary report for the year to show a frequency rate of less than 20 lost time accidents per million hours worked.

It was in 1927 when the American Petroleum Institute undertook to further the cause of accident prevention in the petroleum industry by financing a petroleum safety engineer on the staff of the National Safety Council. It was in May of that year when our Petroleum Representative was employed. Shall we review the conditions revealed by the annual accident summary for the years 1927, 1928 and 1929?

As we all remember during these years there was a mad stampede to see who could produce the most oil and who could produce it first. Attempts were made at rationalization by the industry which have become actually effective only in the past few months. The conditions which have existed have been most trying to safety engineers. The rush of construction and development was the cause of many accidents but even during the hustle and bustle accident frequency and severity in the companies making annual reports were reduced.

Summary of Petroleum Section Annual Reports

Years	No. of Companies	No. of Workers	Accident Frequency	Accident Severity
1927	22	88,572	31.15	2.65
1928	38	99,477	27.33	2.69
1929	79	226,280	26.78	2.49

The 1927 accident frequency rate reached 31.15 accidents per million man hours reported. The highest accident rate which has ever been reported by the section. The year 1928 showed a reduction of 12½ per cent and 1929 showed a reduction of 2 per cent over 1928.

The severity rate in 1929 declined almost 1 per cent from the 1927 accident severity rate. According to National Safety Council statistics the 1929 accident

severity rate for all industries had increased almost 5 per cent over the 1927 accident severity rate. We are hoping and expecting the petroleum industry to again lower the accident severity rate in 1930 and prove that accident severity doesn't necessarily go up as accident frequency comes down.

In the June issue of the Petroleum Section News-Letter appeared a tabulation of the Annual Summary Report of the Section covering its 1929 experience by departments of the industry and the six geographic divisions of the Petroleum Section. In the all department summary the geographic divisions were ranked according to their respective accident frequency rates.

Division	1930 Contest		1929 Contest		Percentage Improvement
	Rk	Accident Frequency	Rk	Accident Frequency	
Rocky Mountain	1	9.23		Not Segregated	
Great Lakes	2	9.43	1	15.32	39%
Atlantic	3	12.01	2	17.32	31%
Pacific	4	18.18	3	27.56	34%
Mid-Continent	5	19.26	4	36.97	48%
Gulf	6	29.88	5	39.76	25%
All		17.55		26.78	34%

The figures for the 1930 Contest have also been distributed in a like manner and a comparison made. Ranked by accident frequency the contest does not change the ranking positions of the geographic divisions. In percentage of improvement for the first six months of this year compared with 1929 the Mid-Continent Division leads with a 48 per cent reduction in accident frequency followed by Great Lakes Division with 39 per cent reduction; Pacific Division, 34 per cent reduction, Atlantic Division, 31 per cent reduction and Gulf Division with 25 per cent reduction. The contest rate was 34 per cent less than the 1929 accident frequency rate.

These tabulations by geographic divisions definitely show where the accident situation needs the most attention. Mr. Division Chairman you will probably want to study this tabulation and see where your division stands and then get action by the companies in your area to put your division up among the leaders. Keen competition among the divisions as well as among companies will help toward our goal.

That the chairmen of the divisions have been busy is evidenced by the excellent Petroleum Section News-Letters which we have received during the past year. Each divisional chairman produced two of the monthly issues.

Twenty-four posters have been produced by the section with an average circulation of 3,000 copies which means that these posters were well received.

The membership of the section as of September 1, 1929, was 143 companies. On September 1 of 1930 the records showed 166 companies and over 300,000 workers receiving service through the Petroleum Section. During the year 34 names were added to the section and 11 removed. Of the 11 removed, 6 represented mergers without losing the service of the section and 5 firms, none of which were large, cancelled their memberships.

During the past year many of our members have assisted the Service Extension Department of the National Safety Council by recommending membership to non-member companies. I know that our service is of such great value that all of our members will cheerfully use their influence to bring others into the section.

The Atlantic Division (Chairman E. A. Timm, Standard Oil Company of New Jersey) assisted with the work of the Newark, N. J., Safety Council and arranged for petroleum section meetings at the Eastern States Safety Conference in Newark, April 24.

F. L. Newcomb, Standard Oil Development Co. and our Petroleum Representative

H. N. Blakeslee met with the Fire and Safety Marshals of the National Petroleum Association in their Annual Meeting at Pittsburgh in January. At this meeting Mr. Newcomb presented a paper on Preventing and Fighting Fires in Refineries; it has been published in several petroleum trade journals and in the NATIONAL SAFETY NEWS.

E. J. Senne of the Vacuum Oil Co. presented a paper on "Engineering versus the Human Equation" at the Greater New York Safety Conference February 26. Mr. Senne was swamped with requests for copies of this paper and had it mimeographed to supply the demand.

The Great Lakes Division (Chairman Frank Harrison, Pure Oil Co.) arranged a Petroleum Section meeting as a part of the program of the Eighth Annual Mid West Safety Conference in Chicago, March 16. The Petroleum Section program was devoted exclusively to marketing problems and the papers presented brought out much useful information. The papers have since received considerable publicity in petroleum trade publications.

The Mid-Continent Division (H. W. Boggess, Sinclair Oil and Gas Co.) arranged an interesting Petroleum Section meeting in conjunction with the Central States Safety Congress in Kansas City, Mo., March 25. Also with the assistance of the Safety Division of the Mid-Continent Gas and Oil Association a special meeting for oil company supervisors was held at Ponca City, Okla., November 22. Mr. Boggess, D. J. Wallace of the Mid-Continent Oil and Gas Assn. and our Petroleum Representative spoke on the program of the Drumright Chapter of the American Petroleum Institute at Drumright, Okla., April 15.

Petroleum Representative Blakeslee and D. J. Wallace spoke on the program of the Oklahoma Utilities Association at Tulsa, Okla., March 14 and Mr. Blakeslee served as director of the Association's first First Aid Meet. Blakeslee also acted as one of the chief judges at the Industrial First Aid Meet held at the International Petroleum Exposition in Tulsa last October.

The Gulf Division (Chairman R. B. Roaper, Humble Oil and Ref. Co.) started off with a bang after the Congress last year. Charlie Coleman of the Gulf Refining Company arranged a special meeting at Port Arthur, Texas on November 4 for oil company supervisors and Charlie surley wasn't disappointed in the attendance for the meeting room was filled to overflowing.

Charlie also arranged a schedule for the speakers on the program and had them address the employees at various plants in the vicinity.

J. L. Risinger, Magnolia Petroleum Co. of Beaumont took advantage of the presence of safety engineers at the Port Arthur meetings and staged a safety week in Beaumont by putting safety speakers on all luncheon club programs, and by organizing special school work and industrial meetings.

Special meetings for oil company supervisors were arranged at
 Pampa, Texas April 17—120 attended.
 Borger, Texas April 18—200 attended.
 Ranger, Texas April 21—300 attended.
 Wichita Falls, Texas April 23—175 attended.
 Wink, Texas July 18—120 attended.
 Luling, Texas July 28—125 attended.
 Houston, Texas July 30—225 attended.

Usually three speakers appeared on each program and presented information on a hazard in the particular locality, the good business of accident prevention, and the necessity of leadership in accident prevention work.

D. J. Wallace and H. N. Blakeslee were speakers on all of these programs. J. L. Risinger, C. L. Hightower, R. B. Roaper alternated in serving as third speaker at various meetings.

Undoubtedly the joint work of the Safety Division of the Mid-Continent Oil and Gas Association and the local chairmen of the Petroleum Section have done much

good in accident prevention in Oklahoma and Texas, in showing operating supervisors their opportunities to further their own interest and the interest of their companies by preventing accidents.

The Safety Division of the Mid-Continent Oil and Gas Association, directed by D. J. Wallace, very efficiently assisted in holding the Fourth Annual First Aid Meet at the International Petroleum Exposition at Tulsa last October, and its Shreveport Branch with the assistance of Louis Lyons of the Louisiana Oil and Refg. Co. arranged a successful first aid meet in Shreveport, November 11.

The Petroleum Safety Council sponsored by the Safety Division of the Mid-Continent Oil and Gas Association has established chapters at Shreveport, Fort Worth and Houston. These chapters provide for monthly meetings of safety engineers in each locality where accident prevention problems can be discussed and ideas exchanged.

D. J. Wallace and H. N. Blakeslee spoke at the Plant Operators Meeting of the Natural Gasoline Manufacturers Association at Breckenridge, Texas, April 22.

The Rocky Mountain Division (Chairman B. V. Osborn, Standard Oil Company (Indiana)) arranged two luncheon meetings in conjunction with the Rocky Mountain Oil and Gas Association, November 22 and November 23 at Casper, Wyoming. Seventy operating executives attended each meeting and listened to four practical safety talks.

On April 1 an evening meeting was held at Casper for operating executives. About 250 attended and showed great interest in the talks and in a demonstration of first aid which was put on by a crack team from the Mid West Refining Company, Midwest, Wyoming.

Chairman Osborn says "At no time in the history of the Safety Movement has this work been accorded such whole-hearted support as it appears to be getting from the various oil companies at this time."

The Pacific Division chairman, W. C. Lynch, General Petroleum Corporation of California, has served also as chairman of the California Oil and Gas Assn. Safety Committee. Three meetings of the joint committees were held during the year devoting attention principally to producing department safety.

Under the leadership of Barton Cater, Engineering Committeeman, the whole Pacific Division is working on data for the pamphlet "Safety in Rotary Drilling." A real exhaustive study of this problem is being made. The committees are also working closely with the Industrial Accident Commission of the State of California in the development of safety orders.

The Petroleum Section held the only separate industrial sessions at the Annual Pacific Coast Safety Conference in San Francisco, May 16. Interesting and instructive papers were presented. The paper "Exploding Old Ideas Instead of Tanks" by M. B. Anfenger, Fire Prevention Engineer, Standard Oil Company of California, was published in the August issue of the NATIONAL SAFETY NEWS and also in various petroleum trade publications. Comments and inquiries received by Petroleum Representative Blakeslee about this publication indicate that Mr. Anfenger's article has exploded some old ideas.

The Engineering Committee (Chairman J. C. Bernd, Sinclair Refining Co.) reports another year of progress. The Petroleum Section boasts the first Safe Practices Pamphlet of the National Safety Council published in a foreign country. The Caracas South American office of the Caribbean Petroleum Company furnished the Spanish translation of Petroleum Pamphlet No. 5 "Safe Sales Truck Driving" and 5000 copies of the Spanish edition have been used by oil companies in Spanish speaking countries.

Petroleum Pamphlet No. 8 "Handling Cleaning and Filling Drums and Barrels" drafted by J. C. Bernd was published. Petroleum Pamphlet No. 9 "Cleaning Petroleum Tanks" is ready for publication and Petroleum Pamphlet No. 10 "Unloading and Storing Gasoline at Bulk Marketing Plants" is nearing completion.

Data is being gathered on

Safety for the Petroleum Industry Welder
Safety for the Refinery Mechanic
Safe Field Truck and Tractor Driving
Safety in Rotary Drilling

The eight Petroleum Pamphlets which have been published continue to be popular. New members in the section are distributing them for the information of employees and older members continue to order them for presenting information on accident prevention to the new employees.

The Publicity Committee chairman, S. W. Candee, Tide Water Oil Company should be proud of the publicity the section has received during the past year. In the May issue of "World Petroleum", an international publication, appeared a 4-page "Prevention of Industrial Accidents" by our Petroleum Representative. The July issue of National Safety News carried an article "Petroleum Men Measure Safety Progress" describing the activity of the Section, by your chairman. The August issue of NATIONAL SAFETY NEWS carried three articles by petroleum safety engineers. Almost every issue of the NEWS contains an article on petroleum safety and in the Safety Exchange Pages of every issue from one to three kinks developed in the petroleum industry are written up. Articles produced by our safety engineers published in trade publications are too numerous to mention. Editors are frequently writing feature stories concerning accident prevention work. We do appreciate the support given us by the petroleum trade press.

We all know the value of the Statistical Committee work (Chairman J. W. Myers, Standard Oil Co., N. J.). Early in this paper you were told of the progress made in accident prevention based upon the Annual Summary and the Contest reports.

The Health Committee chairman Dr. C. M. Aves, Humble Oil and Refining Company has reviewed pamphlets produced by the Health Division of the Council and has kept in touch with information produced.

The Program Committee Chairman C. L. Hightower, Texas Pacific Coal and Oil Company need make no report. The program speaks for itself. However, we do want to compliment Mr. Hightower for his good work and assistance with the meetings for operating executives.

Petroleum Representative H. N. Blakeslee has done his usual amount of traveling, assisted with meetings for operating executives, visited members, contributed to news-letters and Safe Practices Pamphlets, aided with posters, handled inquiries from other industries regarding safety in handling petroleum products, and handled the details of our contest.

Letters recently received from many of the members universally endorse petroleum section contests, the safe practices pamphlets, and the news letters, as outstanding contributions in the accident prevention work of the section. Quotations from some of the letters express the sentiments regarding this work and the Petroleum Representative:

"Last fall your representative, Mr. H. N. Blakeslee, paid a visit to our plant and gave a very interesting talk to all of our employees. His statements and illustrations seemed to stick in our boys' heads and they certainly have done wonderful work in preventing accidents during the last year."

"Inasmuch as our representative is an oil man and knows the problems we are up against we get information which we get in no other way. His personal visits always bring up some very interesting discussions. He is a source of new ideas which he has picked up in his peregrinations. If we did not have a representative to call on I question where we would turn for our information."

"It would be quite impossible to manage the affairs of our section in continuous growth and usefulness without the services of Mr. Blakeslee or a man his equal. I trust nothing may interfere with the orderly progress of our future work."

Letters received have suggested that special meetings be held throughout all parts of the U. S. for operating executives, that petroleum safety engineers give more attention to combining fire prevention work with accident prevention work and that special safety contest propaganda be prepared by the Council to help contestants interest their employees in the annual Petroleum Section Safety Contests. All of these suggestions are good and will help us toward our goal of accident prevention.

It is my conclusion that accident prevention in the petroleum industry is more effective right now than ever before, that we have more and better petroleum safety engineers than ever before, and that the fire and accident losses are going to be smaller in the future than they are even now and that we are going to continue to make progress to our goal.

CHAIRMAN PRUSSING: I think that's a pretty good report, men. I'm sorry that Clyde Smith could not be here to give it to you himself. That boy's worked!

The first official paper on the program is "Solving the Pipe Line Casualty Problem" by Mr. A. W. Breeland, safety director of The Lone Star Gas Company of Dallas, Texas.

Solving the Pipe Line Casualty Problem

By ALBERT W. BREELAND

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Since accident prevention in pipe line construction, maintenance, and operation is still in its infancy, and since a great deal of information has not been compiled on this great problem, one must of necessity draw to a large degree from his own experiences for assistance in preparing a paper on this subject. In this paper, therefore, I shall attempt to outline the accident prevention program which has been and is now being followed by the company with which I am associated.

Since there is a saturation point in papers on this topic, I have endeavored to make this paper as brief as possible discussing, first—the organization, second—the selection and training of employees, and third—the application of mechanical safeguards and protective devices.

Organization

Accident prevention work, like any other problem in the pipe line industry, must be well organized and properly executed to be effective. To begin with, the management must be thoroughly convinced that accident prevention pays substantial dividends, not only from a humanitarian but also from a financial standpoint, and must give its unqualified support in the work.

Next to the management, and possibly the greatest factor in solving this problem, is the foreman or key man. My experience has taught me that the foreman is the man upon whose shoulders rests the greatest opportunity for controlling accidents. It is the foreman who directs the individual efforts of the men, and from whom the worker receives his instructions. I say opportunity because it should be the desire of each good foreman, or worker for that matter, to take advantage of every opportunity to aid his company. What greater opportunity could befall a man than to be able to save the life of or to prevent a personal injury to his fellow worker or one of those employees for whose work he is responsible?

Safety rules and regulations are useless if not enforced. It is the foreman who must see that these rules are enforced. In my company our foremen are taught that accident prevention work is just as much a part of their job as laying and operating pipe lines and I am glad to say that without exception they treat it as such.

Next to the foreman, and serving as a "connecting link" between him and the

management, is the safety engineer or supervisor. That the safety supervisor must be thoroughly aware of the responsibilities and obligations resting upon his shoulders is self-evident. It is the safety engineer who must, with the approval of the management, compile and promulgate safety rules and regulations; with the aid of the foremen and other supervisory officers, and with the approval of the management, he must conduct safety meetings, compile various statistical data on the company's accident record and claim costs and attend to various other duties. In addition to being well trained for this type of service, he must be a student of human nature, sincere, and full of enthusiasm. His is the guiding hand of accident prevention work.

In addition to the organization outlined above there should also be a medical officer whose duties consist of making a physical examination of each employee, rendering and supervising first aid to the injured, looking after the health of the men, and supervising the sanitation of company camps. The qualifications of a physician for this type of work, in addition to his training and experience, should be honesty, sincerity, a sympathetic understanding, enthusiasm, and a good knowledge of human nature. We feel that the success of our own physicians has been due to their ability to secure and maintain the confidence of the foremen and the workmen.

Selection and Training of Employees

In selecting the casual worker, or in fact, all the workers, or man power of the organization, we encounter possibly our greatest problem. I make reference to the casual worker because it is among this class of workmen that we have our greatest number of accidents. Now that we know what our hardest problem is, how are we going to solve it? In the first place, the prospective casual employee should be given a thorough physical examination to determine whether he is physically capable of performing the duties to be assigned him. Unfortunately the doctor is unable to tell much about his qualifications above the eyes. Those qualifications must be determined after he is on the job. After the doctor has put his approval upon a man's physical qualifications, the foreman, under whom he is to work, should instruct him in the manner in which his particular job should be done, should also acquaint him with the hazards in connection with the job and teach him how to avoid them. He should be taught how to make proper use of protective devices, and the reason for such devices.

At this time the foreman can do his most effective work in starting the new man rightly, and by rightly I also mean safety. At this period when a man's mind is more open and receptive, he should be told of the organization, of its employee relations and activities, and last but not least, of its safety and accident record. He should be made to understand that he is also expected to be a safe worker. If every casual worker is considered as a potential permanent employee and given the proper training in the beginning, we will have made a great stride in solving this problem. It is a very difficult task to instill company pride and "esprit de corps" in a man who knows that he is employed only for a few days. For this reason, it is very important to make the casual worker feel that he is a potential permanent employee, and that his becoming a permanent employee depends entirely upon his ability and application to duty.

In hiring a new man, if the foreman uses the same degree of care in attempting to select the right type of man as he does in selecting equipment and materials, he will soon discover a vast improvement in the efficiency of his organization, to say nothing of the reduction in claim costs. Unfortunately not all of our foremen use the same degree of care in selecting workmen as they do in selecting material and equipment. Here is another problem to be solved in controlling accidents but not a very difficult one.

After a man is put to work the information given him at the time of his employ-

ment should be followed up to see that he has retained it and supplemented with further instruction.

Circular letters and bulletins can be used successfully in our training program. They can be used to publish safety rules and regulations, to impart information regarding specific hazards, to give notice of safety meetings, and for many other purposes. In my company we have no regular schedule for circular letters and bulletins; they are sent out only as the occasion demands.

Posters are also very effective in employe training since they aid in keeping the safety idea before the men constantly. Here as elsewhere, it is extremely important that proper material be used. Posters must not be selected in a slipshod or haphazard manner but only such posters that carry a positive message or thought applicable to operations in the industry should be used. There are two principal types of posters, one showing the ill effects of carelessness and lack of right thinking, and the other showing the rewards of a safe worker. Both types should be used since all men do not respond to the same kind of appeal. It requires the horrible and gruesome effects of accidents to arouse the safety and right thinking habit in some men while others respond to the brighter picture.

Any discussion of bulletins, circular letters, and posters would hardly be complete without some comment on bulletin boards. I believe that one of the most sadly neglected factors in our whole accident prevention program is the bulletin board. At least, this is true in my company and I am of the opinion that the same condition exists in other organizations. Bulletin boards are sufficiently important to be uniform in size, well constructed, protected from the weather, and they should occupy the most conspicuous location in any plant or shop. Posters should be placed on the board regularly in a neat and orderly manner and should not be allowed to remain longer than one week, except in case of special posters. In our company a new poster is placed on each bulletin board on the system every Monday morning and at the same time the old poster is removed and destroyed.

At the present time we are using the National Safety Council poster service. Excellent results can be obtained from the use of home-made posters, especially if they are built around accidents or incidents with which the entire organization is familiar.

If a company has a house organ or employee magazine it can be used to a good advantage, especially since it reaches almost the entire personnel of the organization. In our own employee magazine, "The Blue Blaze", the safety department is allotted one full page in each issue. Using the house organ enables us to put safety suggestions and appeals into the home where they will be read by the wife, mother, and children. It might be truthfully said that "safety, like charity, should begin at home". The family of a workman is vitally interested in his safety and there can be no doubt but that it can exert a strong influence for safety over him.

Since the minds of men are more easily changed or swayed through a personal appeal than through any other method, the safety meeting is almost indispensable in training men to be safety minded. In order to be successful, safety meetings must be well advertised before hand, must start promptly as advertised, must be conducted in an orderly manner, and interest must never be allowed to lag. If possible, they should be held at regular intervals, however, construction work and special conditions might arise necessitating special meetings. In our organization we have not as yet gotten down to a regular monthly schedule but are now working toward that end. During the past two years we have been doing so much construction work that we have devoted a great deal of time to holding meetings for construction crews. Our practice has been to hold a meeting as soon as possible after the job was organized, and to follow it up by other meetings at irregular intervals.

In our own meetings we attempt to have a few short talks, followed by discussion from the men and then a review of accidents which have occurred since the last meeting and suggested means of prevention. Occasionally we show moving pictures

which are well received. We usually hold the meetings at night and try never to keep the men over two hours. When possible, we endeavor to hold the meetings down to an hour and a half. Frequently the wives and families of the workmen are invited to attend the meetings when we hold mass meetings. It is surprising the number of wives and children who come to these meetings.

Once in a while we have occasion to take the foreman to task or to offer criticism and for this reason we sometimes hold safety meetings for foremen and gang pushers only. Otherwise we usually hold mass meetings. We have been criticised for holding so many mass meetings but on account of the type of men in our organization, all of whom have a great deal of pride in their company, we feel that under ordinary circumstances we obtain possibly better results from mass meetings than we would from committee or supervisory meetings. The majority of our workmen take so much interest in our safety meetings that they usually plan a social affair to follow the regular meeting.

In addition to our safety meetings, we hold numerous foremen and employe meetings and twice a year a general foremen's meeting is held in the general office. In all of these meetings, we attempt to present safety and accident prevention messages.

We are now instituting district foremen's meetings which will be attended by general foremen, assistant foremen, and gang pushers. These meetings will be held about every three months and are held for the discussion of various problems. We will also have a talk by a safety supervisor or engineer at each of these meetings. In fact, we do not hold a meeting of any kind at which safety does not always have an important place on the program.

In order to keep the men informed of the progress being made in accident prevention and of their standing as compared to the other divisions or plants and to the organization as a whole, a monthly comparative statement or chart should be put out. In my company we make up and send out a chart at the end of each month to each plant and division, showing the total number of lost-time accidents and frequency rate for the entire company.

The plants which have a perfect record for the entire year and receive an honor roll certificate are very proud of their record. Pride in that accomplishment is usually reflected in the succeeding year's record. We issued fifteen honor roll certificates last year, which was the first year my company had an organized accident prevention program, and I believe that number will be doubled in 1930.

I do not think the employe training program complete without first aid instruction. While we have obtained very satisfactory results from the excellent instructors of the Bureau of Mines, we feel that to make a training program 100 per cent it is well to have the Bureau training supplemented by work of the company instructors. The men trained by company instructors can later be examined by the Bureau's examiners and if a man is able to pass a satisfactory test, he will be issued the regular certificate of first aid instruction. In addition to gaining the benefits desired from a knowledge of first aid, a man seems to appreciate more fully the significance of accident prevention work as a result of his training.

Mechanical Safeguards and Protective Devices

I am convinced from experience that not more than 15 per cent of all accidents in our industry are due to lack of mechanical safeguards and protective devices, the other 85 per cent being due to the human element. In spite of this fact a company should provide every practical safeguard and protective device. With the knowledge we now have of the operations in the pipe line industry, we should have little or no difficulty in providing safeguards and protective devices to prevent at least 95 per cent of those accidents occurring because of the lack of such apparatus.

There are so many places where mechanical safeguards and protective devices should

be used that time and space will not permit me to enumerate them. I shall, therefore, mention only those places and operations where safeguards and devices will have the greatest effects. There are so many hazardous operations in the pipe line industry that I believe it would be most difficult to select the most dangerous from a personal injury standpoint. Possibly one of the most hazardous operations is the transportation of men to and from work because of the potential loss of life and injuries to so many men at one time. The method in use by the majority of companies at the present time is to load the men on a truck with a platform body, the men sitting on the bed with feet hanging off. Picture, if you please, a truck with a platform body going along the highway or over rough roads with thirty or forty men sitting on the bed with feet and legs hanging over the sides and end and it will not be very difficult for you to imagine what could happen if a passing car should get too near or should skid into the side of the truck or if the truck should bounce over rough spots at a fairly moderate speed. What chance has a man to protect himself under such circumstances? None! We have learned from bitter experience what can result from such an unsafe method of transportation of employees. To overcome this hazard we built a frame truck body approximately four and one-half feet high, with an end gate of the same height, boomed at the top and about twelve inches from the bottom with two electrically welded steel chains, very similar to those used in booming pipe. This frame, better known as the "Bull Pen," is collapsible and is easily removed when the truck is needed for hauling material that cannot be conveniently handled with this type body. To load and unload the men, the end gate is removed. When the first body was installed it was pointed out by some of our men that it would greatly decrease the utility of the truck, but on the contrary, it was found that for practically all material with the exception of pipe, it greatly increased the utility and load efficiency of the truck. On welded line construction, I have seen a truck with a normal load of oxygen and acetylene bottles topped off with a load of hay and feed stuff for the skinner's teams or a load of rubber for making fire bends, and sometimes with both.

The results have been so gratifying that all of our trucks on construction work are now equipped with this type of body. Before these bodies were installed accidents were common occurrences and during the past three years two accidents, both resulting from cars and trucks being sideswiped, forcefully impressed upon us the need of a remedy. One of the accidents cost a man the loss of both legs and practically the loss of his mind, while the other cost the injured the loss of one leg just below the thigh. I am glad to say that accidents from this source have been eliminated.

A very important piece of equipment in pipe line construction is the tractor. One type of tractor, the wheel type Fordson, which my company used exclusively until about two and one-half years ago, was the cause of many accidents including three fatalities. The greatest danger in the use of this type tractor was from kicking over or bucking which resulted usually from gunning the motor too rapidly when changing from high to low gear while making a hard pull up an incline and occasionally on level ground. To eliminate this hazard an outrigger or guard was designed which prevents the tractor from reaching the overbalancing point. It was claimed by some critics that this device would prevent a tractor from going up steep inclines or crossing wide ditches, as the tail would drag when the front wheels were approximately 24 inches above the level of the rear wheels, but climbing steep inclines is one practice we try to avoid and this device greatly aids in prevention of it. Two fatalities resulted from the drivers attempting to drive their tractors up short steep inclines. As to crossing wide ditches, this occurs so infrequently that the loss of efficiency is practically negligible. We believe that with the aid of this guard, we shall have no more accidents from this source.

During the last two years, however, we have purchased only the heavy caterpillar

type tractor. We have found this type of equipment to be far superior to the wheel type equipment for pipe line construction. It will not only do more heavy work but also eliminates the hazard of tractors kicking over.

Another hazard in connection with pipe line construction is the old fuse and cap method of blasting. Thanks to science and ingenuity of man this hazard can be reduced to a minimum. The old method was to drill the holes, place the charges, light as many fuses as the powder "monkey" could light, and still have time to get in the clear before the first shot went off. It was at this point that one of the hazards existed. The powder "monkey" did not always calculate his time correctly and the charges would begin to go off before he was in the clear. Then there was no way to determine whether all the charges had gone off except by counting and occasionally a miscount was made with disastrous results. One of our shooters went back to the ditch to investigate after he was supposed to have counted all the charges and just as he was about over the ditch a charge went off. He managed to pull through with his life but lost one eye. In another instance, a shooter lost both eyes because he deliberately disregarded all caution and went back to the ditch to light a fuse which he thought had gone out or had not been lighted, before the charges began to go off. With the old hand-firing method there was also the danger of some outsider or animal approaching about the time the charge was ready to go off.

There was also the danger of a charge which had failed to go off being exploded by contact with a workman's pick or the ditcher or rock excavating machine. With the modern or electric method these hazards have been eliminated. All the charges go off simultaneously and the fire can be held until everybody is in the clear. After the charge has been exploded any wire that is not entirely clear or in any way looks suspicious can be tested with the aid of a small instrument known as a galvanometer to determine whether the charge failed to go off. If the instrument shows a circuit the charge has failed to go off and can be recommended to the blasting machine and fired as in the beginning. I might add that during the year and one-half that we have been blasting by this method we have had very few instances where all the charges failed to go off at one time. I might also add that since we commenced using the machine method of blasting we have had no accidents from this source. In addition to being a safer method of blasting, we have found it to be more efficient and more economical than the old method.

With the fuse and cap method of blasting there is the hazard of crimping caps, as previously mentioned. Many men have lost their lives or were maimed for life as a result of playing with dynamite caps. With the new or electric method of blasting, this hazard is eliminated as the blasting caps are attached to the wire by skilled workmen in the factory.

There are a number of operations in the pipe line industry in which there is an ever present hazard to the eyes. We can not eliminate all the hazards but we can provide a means of protection. Almost 100 per cent. of the eye injuries now occurring in the pipe line industry can be prevented if the workmen will wear goggles. The problem is to make a man realize the danger of an injury and to persuade him to wear goggles. We tried suggestion and obtained fairly good results but did not get the desired results until the management issued instructions that goggles must be worn by workmen engaged in operations in which there was the slightest possibility of an injury to the eyes. Since the issuance of these instructions we have purchased more goggles than ever before but our eye injuries are now negligible.

In compressor stations, all fly wheels, belt and gear drives, shaft couplings, and all moving machinery which presents the slightest possibility of an injury should be well guarded. We now have a living reminder of the lack of proper flywheel guard rails. A man was oiling an engine when his foot slipped through the guard rail and was so badly mangled that amputation was necessary. We do not believe

that an accident of this kind can recur as our present "standard" guard rail is practically fool and accident proof.

Rubber mats should be placed before all switchboards even though it is for only 110 volts as men have lost their lives from contact with even so low a voltage.

There is one mechanical hazard that exists in practically every company operating in the Mid-Continent area, especially in those districts where an adequate water supply is a problem. This hazard is the gear driven pumps in isolated water pump stations with the gears unguarded, and probably receives less attention than any other. This is probably the last hazard to come under the observation of the safety inspector. I think the hazard is made greater on account of the fact that the stations are, as a rule, operated by one man and should he fall into the unguarded gears there would be no one present to shut down the engine or render any assistance whatsoever.

Last August one of our men was overcome with heat while operating an isolated water pump station and fell into the gears. As he started to fall he had the presence of mind to throw out the clutch. The gear stopped in time to save his life; but not soon enough to prevent a painful injury.

Gate boxes, orifice pits, and hot wells should be protected with guard rails and all pits and boxes deeper than three feet should be provided with steps. Main line gate boxes should be protected with a small house or heavy metal lids. Our company uses heavy metal lids except at locations where two lines parallel each other and we have cross-over gates. At such locations, we have small galvanized iron houses over the boxes.

Many of the larger gate valves are equipped with spur gears to facilitate the opening and closing of the gate. These gears should be covered with a guard to fit the contour of the gear, preferably to cover both the drive and driven gear entirely. We have had several injuries from this hazard, one man losing his right index finger and another the use of his index finger. We are now building guards for all of our spur geared gates.

Where it is necessary to cut out sections of pipe for making repairs, there is the ever present danger of fire and explosion and of injury to the eyes of the workmen from flying pieces of steel. To overcome this hazard and to facilitate the work of cutting out a section of pipe, which was a laborious task by the old method, our master mechanic designed a portable cutter for cutting large pipe in the field which is far superior to any other cutter we have been able to obtain. This apparatus, unlike all other cutters which are on the market, has four cutters. It is collapsible and is set up on the end of the joint of the section to be cut and two men can make a cut through twenty inch pipe in fifteen minutes after it has been placed on the pipe and adjusted. Placing on the pipe and adjusting requires less than thirty minutes or less than an hour is required for the complete operation. With this cutter it is not necessary to wait until the line has been completely drained to make the cut and also it eliminates the two hazards mentioned above.

In conclusion I must reiterate that only a small percentage of our accidents are due to the lack of mechanical safeguards and protective devices, and that the vast majority are due to the human element. It is not a difficult problem to provide proper mechanical safeguards and protective devices but to control the human element is the problem confronting us. To this task we must apply our energies and accumulated knowledge.

(Following the paper, moving pictures were exhibited, showing equipment and operations of the Lone Star Gas Co., Dallas, Texas.)

CHAIRMAN PRUSSING: I think you have been looking at what is in the nature of an experiment. Mr. Miller, who made the pictures, tells me that this is his first attempt at taking industrial pictures with a small moving picture camera; and I think you will agree that it adds tremendously to the value of a paper to have it illustrated in this manner.

Mr. Barton Cater, Safety Engineer of the Southern District of the Standard Oil Co. of California, has been one of the most active Safety men in the state. He is, at present, directing the preparation of what I believe is going to be the outstanding safe-practices pamphlet of the Petroleum Section—that on "Rotary Drilling"—a really stupendous piece of work, as those of us know who have attempted to contribute our share toward its preparation. Mr. Cater will now speak to us.

Merely Some Personal Ideas on Safety

By BARTON CATER

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It is possible that a great many of us have an idea that safety is something set apart from the ordinary work, something rather vague and mysterious, something that the Operating man may not know a great deal about.

Perhaps we may believe that in order to obtain results the safety man must be held responsible for all unsafe conditions; that he must make frequent and very detailed inspections; that he must make long solemn reports regarding a missing toe board and send them back to the Lease through official channels, or that he must be given Police Powers to enforce Safety.

Such ideas are wrong. Safety is purely and simply a direct operating problem, and, as such, it should be handled personally in the field by the foreman.

If we are willing to accept this thought, then the safety man should become the personal aid of the operating man, rather than his instructor.

The Standard Oil Company of California has proved in every department that it is not necessary to clothe the safety man with authority.

As a matter of fact, we are given to understand that if we cannot obtain results without authority then some one has made a serious mistake in selecting us.

The safety man who secures results is primarily a salesman, regardless of whether or not he recognizes the fact.

He is selling "good workmanship" under the rather misleading label of "Safety First."

Suppose that we set up as a parallel a national salesman who is representing his factory for a brand of goods that is widely advertised, an article that is well known throughout the entire United States.

The most simple organization that we could think of would be: Factory; Salesman; Distributor.

This salesman would take the product given him by his factory and sell it in wholesale lots to the Distributors.

He cannot reach all of the ultimate consumers personally and must depend upon the efforts of his distributors, plus such assistance as he can give them thru national and local advertising, occasional personal contact with the ultimate consumer, and such other help as the distributor may require from time to time.

In the final analysis the results secured have been due to an interest created in the distributor.

Suppose that we substitute "Safety" for the brand of goods, the company policies for the factory, the safety man for the salesman, the foreman for the distributor, and the rank and file for the ultimate consumer.

The first thing that the Safety Salesman must do is to analyze his product and determine what he has to sell.

He may come to several different conclusions; but if he will go deeply and thoroughly into his subject, he will find two basic ingredients: Good Housekeeping, and Good Operating.

Good housekeeping can be very easily defined by using an old saying:
"A place for everything and everything in its place."

Of course we must be willing to make a distinction between old dirt and new dirt; a distinction between odds and ends of material allowed to accumulate over a period of time and material piled in confusion on account of an emergency repair job; and a final distinction between *normal* operating conditions and operating conditions that are unusual.

If we can create a desire upon the part of the Foreman to maintain good housekeeping under normal conditions—then we have planted a suggestion that will eventually lead to good housekeeping under any condition.

Good operating is performing any certain operation in a workmanlike manner.

We must bear in mind that there are always several good ways of performing any operation. Quite often, however, we find that there is one particular method that is better than any other. The particular method adopted may be largely controlled by local conditions and the basic method must be modified or enlarged to meet the local conditions.

Good operating is always *safe* operating.

Before we go any further, let us make a little test of this theory that the Foreman is the all important man to reach.

Let each one of us assume that we have been placed in charge of some particular piece of important work.

Pick out the operation with which you are the most familiar.

There is a time limit on this job. It is going to be one of the show places on the lease, and the construction and operating costs must be kept down.

Make a mental note of the foreman, above all others, that you would like to have working directly under you on this particular job.

Now—I am going to make three very definite statements:

1. Your foreman is a good housekeeper under any and all conditions.
2. He understands his business thoroughly; he is able to plan ahead; his men like him; he has that happy faculty of being able to explain what he wants done; and he doesn't blow up when things go wrong.
3. If you do not already know, check, and you will find that the Foreman you have picked out has a wonderful Safety record for himself and his crew.

The second step is to determine the type and character of your product.

You should at once assume that it is not a by-product but the very best article that your Company can manufacture at the present time.

With this idea firmly fixed in your mind, you can devote your entire energy to selling the product to the Foreman.

To a certain extent, the quality of the goods furnished the Salesman is going to affect his sales volume.

He can, however, take a very inferior product and create such a demand for it that he will force his factory to install more and better machinery to take care of the increased demand. This generally has the effect of automatically raising the standard.

The final step is to know what your product will do and where and how it can be applied.

It is not a good sales argument simply to tell a Drilling foreman, either verbally or through a written report, that unless a guard is placed over the low gear, the driller will eventually be injured. The foreman knows that already. But if you can offer a guard that not only meets safety requirements but also increases the efficiency of his rig—then you have a prospective sale for every rig he has charge of.

If you have the detailed knowledge of the particular operation, you can work out such a guard or a good operating practice with the assistance of the foreman and his men. Nine times out of ten you will fail if you try to handle it by yourself.

Guards and safe practices worked out with the assistance of the foreman and

his men might be termed composite guards and ideas. As such, they represent the ideas of a number of people rather than those of an individual.

Such guards and such ideas are "babied" thru experimental stages because the men using them have a personal interest by right of participating in their creation.

It is hopeless to assume that you can learn all of the detail of the various operations of the Producing Department. You can, however, acquire a good general knowledge of the department and, by constant plugging, accumulate some definite detailed information. The more definite detailed information you can secure the more intelligent LISTENER you become. No foreman wants to talk to the safety man regarding *safe* operating when he knows and feels that he is not being followed intelligently.

Whenever we start talking salesmanship, someone always brings up "personality" as an absolute necessity.

Most of us assume that it is a certain rather indefinite characteristic that makes us likeable.

A former boss of mine once defined "personality" as:

"An ability to make a person do gracefully something he had no intention of doing."

If we are willing to admit that the last statement has an essence of truth—then "personality" is not that rare thing that is supposed to be part of us when we are born. It is something that can be acquired through a study of human nature. It means merely shoving your own personal likes and dislikes into the background and concentrating on what the individual may or may not be interested in.

One of the most important phases of good salesmanship is the approach.

I have found that the first aid kit gives me a legitimate excuse for calling at any unit at any time. This kit (exhibiting kit) contains a cloth roll-up with all necessary first aid supplies.

I carry about eighteen extra roll-ups in my car. It only takes a few minutes each morning to refill them. When I step out of the car at any location, I always have a freshly-filled kit in my hand. It acts as my *calling card*. If the foreman or driller does not know me by sight, the kit identifies me as the safety man. It carries the suggestion of a direct personal service—presents a reason for my being there and makes a contact that always leads to something on Safety before I leave.

First aid training to small groups of men offers a wonderful opportunity to implant safety ideas.

That first aid training and a falling accident curve are very definitely linked together is an established fact. No one, however, seems to care to hazard any definite opinion on the subject.

My idea is that the rather terrifying injuries discussed—the mental process that the man goes through while applying bandages and splints during training—the emphasis placed on the necessity of knowing how to stop arterial bleeding—and the possibility of converting a simple fracture into a compound fracture all combine to form such a vivid mental picture that the man unconsciously forms a mental resolve to be a safe worker.

The most satisfactory training classes I have ever had were classes of four men each taken from one well-pulling crew. These classes were held on the same day each week for four consecutive weeks. Classes started at seven a. m. and lasted until fifteen minutes past eight.

Starting at seven a. m. is rather tough on the safety man, especially if the Lease is thirty miles from headquarters, but it has this tremendous operating advantage. You simply delay the starting whistle for that particular gang for one hour and fifteen minutes. This allows the Production Foreman to lay out his work and start his free crews on the best wells that are down. When the crew receiving training is released, it can be sent out on the less important jobs.

Suppose that we had trained at the convenience of the safety man. He sets the

time to train Jim Smith's gang at 2 p. m. Perhaps Jim is working on a "parted" job on a 500-barrel well. He has his "fish" and could get out of the hole and back in again and the well on the beam by quitting time.

But—no—at about 1:30 they "hang her up" and start to wash up and come in for training. The Production Foreman wants that 500 barrel well back on the beam. He has to hunt up a gang working on a less important well and send it over. Everything is disorganized, and no matter how much the foreman believes in safety he resents the inconvenience caused his Lease.

Every well-pulling gang on four major leases were trained under the seven a. m. method. There was no undue disturbance of operating conditions. The foremen were satisfied and want more of this sort of training. It was slow work but the results were lasting.

One more word—the training all revolved around a sterile compress and an iodine ampoule. The men were taught to improvise the balance of the supplies required from material that could be found around the location.

While it is impossible to know the name of every man in your department—the more men you make friends with and can call by name the greater chance you have of putting over your ideas with the foreman. We have about 2,000 men in our Department. On a recent test, I found that on going thru the payrolls, that the names of over 500 men were able to create a mental picture for me whereby the man could be definitely placed.

The average foreman believes he has the best crew in the country. He likes to talk about them—tell you how good they are and he is pleased if you know their names and history. He reserves to himself the right to bowl them out—shake them up a little and in general exercise the divine right of foremanship. But let some one else try these tactics and you have a private war on your hands immediately.

Don't kid yourself that the foreman doesn't ask his men what they think of you and your work and, gentlemen, his final acceptance of you is guided largely by what his men tell him.

If you high-hat his men and try to exercise authority that rightfully belongs to him—look out. Never, under any circumstances, see such a thing as a man asleep on duty or a disregard of any operating rule that does not involve the safety feature. The foreman and his men both feel that such a condition is a "family affair" and outside help is resented.

When I drive up to a location, I make it a point to stall around a few minutes and give them a chance to take care of any situation that might be embarrassing to either of us.

They know exactly what you are doing. If they will slip a guard back into place—clean up the floor or any one of a dozen other things, you have gained something that you could not get by having to ask them to do it after you landed on the rig floor.

The safety men must be able to determine instantly when his presence on the Lease is embarrassing to the foreman.

Frequently I have landed on a Lease and immediately left for the other end of the district. This may seem a strange statement from a safety man, but supposing that the foreman has started a job that has suddenly assumed dangerous working conditions where chances have to be taken by both the men and the foreman.

In a great many instances the particular conditions could have been prevented by more careful initial thought and planning.

You can't do any good standing around—the chances are your limited practical knowledge won't be of any value—and your presence makes the crew nervous.

That identical moment is a poor time to talk good operating to the foreman.

If you will simply get out, he will appreciate it and do his best to get through without an accident. Nine times out of ten he will be glad to talk to you the next day and lay plans to avoid a similar future condition.

We have a very strict rule regarding smoking and I was required to turn in any man I caught smoking in forbidden territory.

That meant that the first man I turned in was my "Death Warrant" as far as popularity with the men (and also the foreman) was concerned.

The following proposition was put up to every division superintendent and accepted by them. "The first time I caught a man smoking, I was to talk to him personally as man to man, explain our reasons against smoking and tell him that a second offense means that I had to protect my own job."

That plan has been in effect for five years. A great many men have been caught the first time, but I can honestly say that I have never caught the same man the second time. We have saved some good men for the company and cut smoking to a large extent.

You can use your camera to wonderful advantage in several different ways. By taking a picture of some well-designed guard or an operating kink you can get a great deal of attention at some other point in the district.

The foreman can see something much better than you can describe it.

Generally you secure two different results. The foreman who originated the device is pleased with the advertising and credit he is getting thru showing the photograph; and you are planting a suggestion in the minds of the other Foremen to whom it is shown. He may not use the identical lay-out, but he has been shown a basic idea which he can enlarge or modify to meet his own local conditions.

I have succeeded time and time again in making fast friends of drilling crews by taking a snap-shot and passing out a few prints. It would appear that the average man (tho he will seldom admit it) likes to see his name in print and be photographed.

Generous use should be made of visits from general office men and inspectors of the Federal, State, or County services. Take them over the various leases and introduce them to every man you meet. I can't explain the reason, but I do know the men like it.

If you know your district and your men—when you introduce Driller Bill Jones, you can tell your visitor in front of Bill that Bill was the originator of the idea of placing a platform to stand on while changing the connections on the mud hose.

It's really a petty thing to do and you are actually exploiting Bill's vanity. Bill knows what you are doing just as well as you do, but he likes it just the same.

Several years ago I made the interesting discovery that a good way to get a guard turned down is to try and sell it to the foreman by showing him a detailed blue print.

Unless we are accustomed to reading blue prints, they mean very little to us, yet for some reason we hate to acknowledge this fact.

We are unable to visualize the final product. Not understanding just what it is going to look like, we often play safe and turn it down.

If you will have your engineering office make you up a set of isometric drawings, you will have something you can take to the Field and show to your Foreman without any possibility of causing him some secret embarrassment.

If you are the contact safety man, it is absolutely necessary that you dress in such a manner that you need not be afraid of a little oil, grease or rotary mud. I do not mean that you should not be neat. The men seem to expect that, but wear clothes that can be easily cleaned.

Again, I cannot give you the reason, but I have proved over and over again to my own satisfaction that it is impossible to get close to the men in a white collar and a business suit.

And finally in closing, I want to say to you, who are Safety men—your Foremen are doing to-day, gracefully, willingly, and voluntarily, a great many things that five years ago they told you COULD NOT BE DONE and operating costs kept within reason. During this period of time you have seen your accident curve drop and drop.

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As you encourage your foremen to train their men in good housekeeping and in good operating, there will eventually come a time when the producing department of your company will be the safest place in the oil industry for a man to work.

(Mr. Cater also showed a film strip on rotary drilling operations.)

B. V. OSBORN (Standard Oil Co. of Indiana, Casper, Wyo.): I would like to ask if it would be possible to get pictures of the pipe-cutter he mentioned.

MR. BREELAND: At the present time we are working out a cutter which is an improvement on the old cutter we have been using, in that it can be used for different sized pipe. It will cut eight, ten, or twelve-inch pipe. It has interchangeable cutters. And if you will drop me a line, I shall be glad to get pictures for you.

H. D. KETTEL (Standard Oil Co. of New Jersey, Camden, New Jersey): I'd like to ask if it would be possible to get a picture of the safeguard for the back of the tractor.

MR. BREELAND: I'll be glad to get you prints and pictures too.

CHAIRMAN PRUSSING: I'd like to ask Mr. Breeland what their experience has been in servicing those small tractors on the job. I suppose the small tractor won't last through the day with one filling of gasoline and it becomes necessary to service it while it's hot.

MR. BREELAND: We have had no fire experience from that source, but occasionally, in attempting to start the tractor, instead of using precaution, the operator will open the manifold door, and sometimes a drop of gasoline will get around the spark plugs. We have had one or two pretty bad fires from that source, but not from refilling.

CHAIRMAN PRUSSING: The ordinary tractor of that type, it has been our experience, is quite a serious fire hazard if gasoline is spilled on the exhaust manifold, not because the manifold is hot but because, apparently, it frequently contains glowing carbon. We had a man killed in San Diego a year or so ago with a tractor similar to those you showed in your pictures. The man was servicing a tractor for a road gang and had passed a bucket of gasoline to the tractor operator, who had poured it into the tank through a five-gallon square funnel; and our man had turned his back to go to get another one when the tank overflowed. The gasoline ran down on the manifold; and, apparently because there was no exhaust pipe on the manifold, ran into the manifold and came into contact with some glowing carbon and flashed. The tractor operator, a Mexican, picked up the funnel and threw it, and it struck the tank truck driver in the back. He was burned to death.

Twice this summer on other road jobs, tractors being serviced by our men have flashed from overflow of tanks. We have a definite instruction that no tank truck driver servicing motor equipment may pour the gasoline into the equipment, but must hand it to the operator of the equipment. That is done as a precaution for our own men.

I'd like to call your attention to a chart on one of those bulletin boards. The Petroleum contests and the statistics prepared by the National Safety Council are prepared under code. Out on the Pacific Coast some of us conceived the idea that it might be interesting to know what the other fellow was doing. Someone in the Standard Oil Company asked Bob Donovan "Where does the Union Oil Co. stand with respect to the Standard Oil? How good or bad are we?" And Bob immediately determined to find out. He wrote a circular letter to the rest of us on the Pacific Coast, and asked if we had any objection to telling our codes. Of course, we hadn't, and immediately an interchange of code numbers took place among Pacific Coast Companies. It has had a very interesting effect.

I had a graphical chart prepared showing the petroleum statistics of this section for the past five years. Those statistics were purely line graphs in which no names were mentioned. They were merely code. However, in order to show our own people where we stood, year by year and department by department, I drew the line representing our company double width and sent those out. When Bob got his

code numbers identified for the Pacific Coast, I identified the lines representing the other Pacific Coast companies on this chart, and sent them out to the rest of the gang, and also to our own Safety Men; but not for any public dissemination.

Since we have been here at the Congress, those of us from the Coast have gotten together and we have decided we could afford to pass that on to the members of the section, with the suggestion that perhaps other sections might care to do the same thing. It's therefore on the bulletin board, this master chart, which shows the lines representing each company by its departments for the last five years—it's just one sheet of paper and I have put on it the names of those Pacific Coast companies who have contributed their code numbers.

We hope to get no benefit on the Pacific Coast from knowing which company in the East is represented by which line; but we certainly feel, from the experience we have had, that you may benefit by doing the same thing in your own geographical division.

ADJOURNMENT

Wednesday Morning Session
October 1, 1930

GEORGE F. PRUSSING, Chairman
Union Oil Company of California, Los Angeles, Cal.

The second session of the Petroleum Section convened with Chairman Prussing presiding.

CHAIRMAN PRUSSING: I have a letter here from Clyde Smith, addressed to Mr. Blakeslee, which I would like to read to you:

"It was with sincere regret that I found it impossible for me to attend the National Safety Congress this year.

"To the officers of the Petroleum Section and to other members I wish to extend my greetings and know that they must be enjoying the excellent program which is before them this year.

"To all the members of the Petroleum Section I also wish to extend my thanks for their hearty support during the past two years, and I can only say to the new chairman and other incoming officers that all that will be needed to make our Section a successful organization is to continue to receive the wonderful help and support that I have received while I had the honor of being your chairman.

"Yours sincerely,
"C. W. SMITH"

I think Mr. Lynch has a resolution to offer.

W. C. LYNCH (General Petroleum Corp., Los Angeles): Inasmuch as Mr. Smith has been our chairman for the past two years, during which time the Section has achieved its greatest strength and accomplishments, I suggest that the following message be sent Clyde Smith:

"Your friends in the Petroleum Section take this opportunity to express their appreciation of your leadership during the past two years. We deeply regret that you could not have been with us, and pray your anxiety is being replaced by confidence for the future."

I submit that as a resolution.

H. D. KETTLE (Standard Oil Co. of New Jersey, Camden, N. J.): I second the motion.

(The motion was carried.)

CHAIRMAN PRUSSING: This is Refinery Day in our program, and I present to you as our first speaker Mr. E. M. Lyons, President of the Tiona Refining Co. and also President of the National Petroleum Assn.

The Executive's Opportunity In Accident Prevention

By E. M. LYONS
President National Petroleum Association, Philadelphia, Pa.

There were nearly 100,000 people killed by accident in the United States during 1929, and it is estimated that there were about 10,000,000 disabling injuries during the same period. About 25,000 of the fatal accidents occurred in industry. An authority estimates that 98 per cent of the industrial accidents are preventable; that 88 per cent of all accidents are due to supervisory causes and that 10 per cent are due to physical causes.

Under supervisory causes are listed the following: faulty instruction; inability of employee; poor discipline; lack of concentration; unsafe practice; mentally unfit and physically unfit.

Under physical causes are listed: physical hazards; poor housekeeping; defective equipment; unsafe building conditions; improper working conditions; improper planning and improper dress or apparel.

The 98 per cent of preventable industrial accidents may be greatly reduced through cooperation of employer and employee.

Before considering the opportunities which an employer or an executive has in accident prevention, let us consider whether an employer has any responsibility for accidents.

Before the enactment of workmen's compensation laws, the liability of employers for accident to workmen was recognized under what are known as Employers' Liability Laws. To determine liability it was necessary, however, for the injured to sue in court. The employer had to provide a safe place of employment and safe equipment, competent workers and proper supervision. If, in the eye of the law, the employer had not been negligent, the injured employee had small chance of receiving compensation. If, however, the employer had been negligent, the compensation or damages awarded the injured employee might be a relatively small sum or might reach a very substantial amount, depending largely upon the jury hearing the case. Large corporations were more subject to large damages than small companies. Evidently the juries felt that the large corporations were more able to pay substantial amounts than small companies.

The employers' liability laws were unsatisfactory to both employer and employee. These laws were enacted when factories were comparatively small and before our present large factory system, with its complicated machinery, was in operation. The enlargement of industrial activity, the ever-expanding use of machinery and the increasing frequency of industrial accidents, made necessary more definite laws covering the liability of the employer in accident cases.

The outcome of this dissatisfaction with the employers' liability laws has been enactment of what are known as Workmen's Compensation Laws, the first of which were passed in 1911. Now practically every state in the Union has compensation laws, having for their purpose the compensating of those injured in industries.

The employer does, therefore, have legal responsibility for accidents. The employer's risk is usually carried by an insurance company. Many employers are not satisfied with carrying only the workmen's compensation insurance which is required, nor with the payments to the injured, which are provided by law. They wish to provide for further financial relief to workers. They do this through what is known as "Group Insurance."

In the year 1911, when the first workmen's compensation laws were enacted, the first group insurance was written. At the end of 1912, the amount of group insurance in force was over \$13,000,000. In 1916, it was \$152,000,000; but at the end of 1926, the latest year for which figures are available, 75 companies were writing group insurance and the amount in force was estimated at \$5,600,000,000 and the figure is rapidly approaching the \$10,000,000,000 mark. The principal reason for the carrying of group insurance by the employer, or jointly by the employer and the employee, is due to the humanitarian spirit of the employer. Under the workmen's compensation laws, employees are paid for lost time accidents, total disability caused by accidents, and for accidental death. The group insurance policies cover employees and they are paid the total amount of the policy if they become totally disabled from any cause, before the age of 60 years, and the total amount of the policy is paid in the case of death from any cause. Even with workmen's compensation insurance and the possible added group insurance, the heart of every employer is heavy when a preventable accident occurs. In the smaller fields of employment, the executive knows, personally, all of the employees, their families and their circumstances.

Take, as a typical case, that of John Smith. John Smith has been employed con

tinuously with one company for fifteen years. He was a fine young man when he got his first job. He has been a conscientious worker and has earned fair wages. He married shortly after starting work. He and his wife bought a modest home, on which there is still a substantial mortgage. They have five children, ranging in age from 4 to 12 years. They are happy and contented. One day the superintendent reports that John Smith has been fatally injured while at work. Investigation shows that John had not been careless—it was a preventable accident. The employer knows the amount which will be paid Mrs. Smith as "compensation", and he is thankful that he has provided "group insurance" which will give her about \$1500 additional. Then he thinks of the mortgage, of the funeral expenses and of the amount which will be necessary to provide for the family until the children are "raised" and educated. The total funds available will be far from sufficient even with the utmost frugality, and the heart of the executive is sad, even though the requirements of the law will be fulfilled by the payment of workmen's compensation and a further sum that will be given to the family through the group insurance. The conscientious employer will confer with his superintendent and foreman and will try to take advantage of every means possible to prevent a similar accident. He may reason along the following lines:

"Self-preservation is nature's first law." He likens this phrase to the modern version "Safety First." Self-preservation in its narrow sense, means that the individual looks out for himself, regardless of others, which in another old saying is phrased "Every man for himself and the devil take the hindmost." In its broader sense, self-preservation means the conservation of life, or "Live and let live", and is the primary basis for what is referred to as accident prevention.

The employer also reasons that man has five senses—sight, hearing, smell, taste and touch, and a mind or intellect to record and weigh sensations produced by each. Instinctively, a man uses his senses to avoid injury, but by the senses alone man cannot always avoid serious or fatal accidents. For instance, a workman who is ignorant of the power of electricity would not hesitate to brush aside a highly charged electric wire which may lay in his path. He could not ascertain by sight, hearing, smell or taste that danger lurked in it. His sense of touch would determine the danger, but if he tried to use this sense the mind or intellect would not interpret the sensation in time to save that particular man from death. Certain gases not detectable to the senses, will snuff out life. Germs of diseases are, likewise, not detectable by the senses, except with the aid of scientific instruments.

The worker needs education to supplement instinct. Every man employed in useful occupation is a worker, from the chief executive down to the most ordinary laborer. It is true "The burnt child dreads the fire", but how much safer and saner it is to teach the child the danger of fire, rather than to have it suffer from actual experience. Education of the worker is necessary in accident prevention.

Employers are interested in accident prevention primarily through the spirit of humanitarianism; industrial injuries will never be entirely eliminated. "Accidents will happen", but their frequency can be largely reduced. Studies of accidents in industry show the economic losses which they cause. These losses run into millions of dollars.

H. W. Heinrich, of the Travelers Insurance Company, analyzed 5,000 accident cases, taken at random from the files of his company, and found that the indirect losses from accidents are four times as great as the direct losses.

The Bureau of Labor Statistics estimates that wage earners in this country lose more than one billion dollars a year from their pay envelopes as a result of industrial accidents and, supporting the figures of Mr. Heinrich, the Bureau estimates the total loss to all interested parties at four times as much, or four billion dollars per year. Definite figures are not available because many states do not require records of accidents.

The prevention of accidents is a problem of social and economic conservation; it

reduces the cost of production, irrespective of whether the employer is a self-insurer, or buys insurance. The lessening of accidents reduces physical suffering and increases earnings. Employers, therefore, are also interested in accident prevention from an economic standpoint.

It is reported that the United States Steel Corporation, from 1906 to 1928, reduced its serious accident rate by more than 64 per cent, thereby saving 58,000 employees from serious injury. Although the expenses of reducing accidents were great, the company freely admitted that its safety program saved it \$1,000,000 annually. Other companies have reduced accident rates as much as 73 per cent in a single year. These records are the result of scientific study, the removal of conditions which cause accidents, and the education of workers in safe methods.

The employer's opportunities in accident prevention may be classed under four general headings:

1. Safeguarding employees from avoidable accidents.
2. Formation and adoption of safety rules and regulations.
3. Education of workers in accident prevention.
4. Enforcement of safety rules.

One writer on accident prevention, who views the subject primarily from an economic standpoint, says:

"Our thinking on injury prevention has been colored by machine guards, safety bells and stop signs. They are the only visible tools by means of which work is performed. The real motive power is the willingness to provide the tools. The engineering and educational ability is not lacking. It can effectively reduce the human hazards of industry if only given a chance. This opportunity, in some cases, has come at the employer's request; in other, compulsion seems necessary. This compulsion can be exercised by the State by virtue of the fact that it determines compensation policies. If the government would move industry to practice safety, it must speak the language of industry. It must make its appeal felt from a business standpoint. That is, it must make the issue a financial one, expressed through the medium of costs. In short, safety must be made the counterpart of savings, and industrial casualties the cause of business losses. It is the savings or losses—this differential between any one firm and its competitors—that the possibility of additional injury reduction lies."

Safeguarding Employees from Avoidable Accidents.

An employer imbued with the spirit of humanitarianism and alive to the economic benefits to be derived from accident prevention, will safeguard his employees from avoidable accidents. From both viewpoints, it pays. Large employers of workers have already made rapid strides in accident prevention, as was noted in a few cases previously referred to. It appears that the most progress in accident prevention has been by the large corporations.

An authority in a recent work, says: "The reasons why the safety movement has not progressed faster are many, not the least important of which is the failure to interest medium-sized and small concerns. As a matter of fact, the 'hit-skip' organizations and the factories which consider themselves too small to have accident problems, account for injuries wholly out of proportion to the number of workmen employed."

The educational work being done by the National Safety Council and other bodies engaged in accident prevention, is rapidly increasing the number of executives taking an active interest in this work. When the interest of the employer is truly awakened to the possibilities, accident prevention is made comparatively easy. Little progress will be made without the whole-hearted and continuous support of the employer.

Statistics show that unguarded machinery in defective plants is responsible, to a large extent, for the serious industrial accidents. To make the place of employment

safe is the first consideration of the employer. The requirements of the Workmen's Compensation Law will have to be complied with. The employer, his safety engineer, his superintendent and foremen will investigate every accident and will devise means to prevent recurrence. They will place safeguards around every place where accidental injury is liable to happen. They will study reports of accidents in factories similar to their own and the means taken in these factories to prevent similar accidents. They have available the advice of trained safety engineers to aid them further. Having the determination to make the factory safe, the accomplishment is comparatively easy.

With the factory safe, the next step is the:

Formation and Adoption of Safety Rules and Regulations.

Rules should be adopted which, in the judgment of the employer, safety engineer, superintendent and foremen, will best protect the workmen from accidental injury. The National Safety Council has taken a leading part in accident prevention in this country, and the petroleum industry is particularly fortunate in having in the National Safety Council, the Petroleum Section. The petroleum industry took definite recognition of the work of the National Safety Council when it arranged, through the American Petroleum Institute, to support a petroleum safety engineer on the staff of the Council. The Petroleum Section has published a number of pamphlets on safe practices, as the result of careful and scientific investigations by a petroleum representative of the Council and a staff of engineers. These safe practice pamphlets are as follows:

1. Safe Practices in Pulling Wells.
2. Safety in Gasoline Service Station Operation.
3. Safe Practices in Loading Tank Cars (Gasoline).
4. Safe Practices in Handling and Laying Pipe.
5. Safe Sales Truck Driving.
6. Safe Practices in Cleaning Petroleum Stills.
7. Safety for the Oil Field Pumper.
8. Handling, Cleaning and Filling Drums and Barrels.

The Engineering Committee of the Petroleum Section contemplates the publication of additional pamphlets as follows:

- Cleaning Petroleum Tanks.
- Unloading Tank Cars and Storing Petroleum Products at Marketing Stations.
- Safety for the Petroleum Industry Welder.
- Safety for the Refinery Mechanic.
- Safety in Natural Gas-Gasoline Plants.
- Safe Field Truck and Tractor Driving.
- Safety in Rie Building.
- Safety in Rotary Drilling.

The United States Bureau of Mines has published a number of Safe Practice Bulletins, many of them dealing with different branches of the Petroleum Industry.

The Safe Practice pamphlets and bulletins are available to the Petroleum Industry and may be adopted in whole, or in part, as the employer thinks best.

Having the factory safe and a code of safe practices formulated, the next step in the safety program is the:

Education of Workers in Accident Prevention.

Safety work, guarding and expenditures for safety go mostly for naught, unless the worker himself understands the safety problems, the causes for accident and his responsibility for accident prevention. Interest in safety must be aroused; but more than that, interest must be sustained. A continuous educational program must be

maintained. In large organizations, this work is sponsored by the Safety Department, but in smaller ones, the inspiration must come from the executive and have the hearty cooperation of the superintendent and foremen. The latter are the key men to promote safety educational work.

Accident prevention cannot be learned in one lesson, nor in several lessons. It must be studied constantly and be revised to meet conditions as they arise.

Every plant should have a well trained first-aid department. If possible, every employee should have first-aid training. The petroleum industry is fortunate in having available the experience and services of the United States Bureau of Mines in first-aid training. The Bureau has trained nearly 400,000 persons in the mineral and petroleum industries in first-aid and mine rescue methods. During the period beginning January 1st, 1927, and ending July 1st, 1930, the Bureau has trained 37,931 men employed in the petroleum industry; 9,673 persons connected with the petroleum industry received first-aid training certificates during the year ending June 30, 1930. This first-aid training is available to all petroleum workers. The course requires 15 hours of actual instruction and practice and covers the study of the circulation of the blood through the body, and the control of bleeding; physical shock; artificial respiration for persons overcome from gas, electric shock and drowning; treatment and care of wounds to prevent infection; treatment and care of burns; dislocation; simple and compound fractures and the proper method of handling and transporting injured persons.

One large company in the petroleum industry has kept a careful check on employees who have been injured and has found that four men who have not had first-aid training are injured to one man who has had the training. First-aid training is a wonderful help in accident prevention. The worker who has had first-aid training realizes forcibly the effects of accidents, because of his knowledge of the care necessary to relieve the injured. This knowledge makes him careful in his own work and solicitous of the welfare of his fellow workmen.

The National Safety Council has been publishing safety posters for a number of years. About 800 different posters are carried in stock and new ones are being issued at the rate of 47 each month. These posters, placed in conspicuous places throughout the factory and changed frequently, will prove of great educational value to the workers in accident prevention.

Group meetings of employees, presided over by the safety engineer or by foremen, serve to maintain interest in accident prevention. "No-accident" contests between different departments in plants is an excellent means of stimulating interest in accident prevention. Safety magazines provided for foremen and workers, safety leaflets enclosed with pay checks and other printed messages on safety all appeal to workers. New employees should not only be instructed in their regular duties, but should also have instructions in accident prevention. Accident prevention should be considered as much a part of each man's work as any other of his duties.

To have safety educational work effective, inspiration must come from a responsible head of the organization and every worker, from chief executive to the lowest laborer, must be a firm believer in accident prevention, and be ever on the alert to avoid accidents. Every one must assume, to some degree, the responsibility for accidents, but the primary responsibility rests upon the employer. He can, by the education of his workers in accident prevention, pass on to them a measure of the responsibility. Every honest worker likes responsibility and as part of the responsibility for accidents is placed on the worker, he will assume his share and accidents will decrease.

Employees should be physically and mentally fit for their jobs. The workman who is ill, or who has financial or other worries, will not be as safe a worker as one who is well and contented. Foremen can do much in accident prevention by observing the physical and mental condition of the employees and delegating to them that work for which they are best fitted.

Three of the Executive's Opportunities in Accident Prevention have been dealt with. The fourth and last is the

Enforcement of Safety Rules.

In order to have accident prevention carried out most successfully, it is necessary that safety regulations be enforced.

An army will not accomplish its objective unless every man obeys instructions. Accident prevention will not be effective, unless safety rules are obeyed. In most plants, it is the duty of the foreman to see that the safety regulations are complied with. Minor infractions of safety rules should cause reprimand to the offenders. More serious violations should call for suspension from work. When safety rules are frequently violated, it is best to discharge the offenders. Serious workers who realize that safety rules and regulations are created for their own benefit, will gladly cooperate with the management in the observance of these rules.

Most students of the subject of accident prevention in industry have come to the conclusion that the larger companies have done the most to prevent accidents. It is true that many small companies have done equally as well, but it appears that the greatest opportunities in accident prevention lies largely with the executives of the smaller companies.

Educational work of the National Safety Council is rapidly showing the executives of companies who have not wholeheartedly taken up accident prevention work, the advantages to be gained by not only complying with the existing laws, but by going far beyond and doing everything possible to reduce industrial accidents to a minimum.

In 1926, 20 petroleum organizations reported their accident experiences to the National Safety Council; 22 reported in 1927; 38 reported in 1928, and 79 reported in 1929. Progress in accident prevention has been steady. Many petroleum companies are proud of the records which they have made in safety work. As these results continue to be made known, it will stimulate other companies to more intense activities in accident prevention. It will not be long before every executive grasps the opportunities which he has to prevent industrial accidents.

Now, I also want to tell you about some of the work which the National Petroleum Association has been doing in accident prevention. The executives found, in 1926, they were having a great many fires in refineries; so they thought it would be a good idea if the fire marshals of the different plants would get together and exchange ideas and determine the causes of fires, methods of putting them out, and so forth. As a result an organization, known as "The National Petroleum Fire Marshals' Association", was organized in 1926, in Pittsburgh. There were 22 member companies represented at the first meeting; but, before the end of the year, over 70 companies had representatives in the organization. The only requirement for membership was the appointment by the member company of a fire marshal to the Fire Marshals' Association.

Group meetings were held, and one of the duties of the fire marshals was to make regular inspections of refineries. In one group there were nine refineries, with nine fire marshals; and these fire marshals inspected one of the refineries at intervals of about every two weeks. All the men went completely through the plant, made observations as they went through; and after they had finished their inspection, discussed the hazards, and instructed the secretary to make a written report of the recommendations and findings. Not only did they send the recommendations to the company whose plant was inspected that day, but each of the other eight companies in that same group received the same report; and that had a very good effect on cleaning up the situation regarding fire.

The fire marshals made such good progress in fire prevention, particularly in good housekeeping and eliminating some of the other hazards, they wanted to do more work. They thought they could work on accident prevention and first aid, and we called on our friend, Harry Blakeslee, who had recently come with the Petroleum Section, for advice and suggestions. Mr. Blakeslee gave us very helpful suggestions.

Now the reports include not only the fire hazards, but the accident hazards as well; and we still get the reports of the nine refineries. When we get a report that shows there is something wrong with a plant, we want those other eight refineries to know we are correcting it, so we do correct it immediately.

In taking up the first-aid work, we had the United States Bureau of Mines send a first-aid team to one of our semi-annual meetings to put on a demonstration for our executives; because we felt that the executives had to be educated even before the workmen. They demonstrated five or six different problems in first-aid, and created a great deal of enthusiasm. The result was that the members of the Fire Marshals' Association took up the first-aid work. Then they changed their name to "The Fire and Safety Marshals' Association," and they continue to take up those three problems—fire prevention, accident prevention, and first aid.

A year ago two of the member companies' teams which had been trained by the Bureau of Mines, competed at Cambridge Springs. Last April we had five teams competing. Jim Herbert, formerly with the Conewango Refining Company, was responsible for the first-aid work up in that plant, and had a very fine team trained for the contest. But just before the contest was held, Jim went to the Standard Oil Company of Ohio, and that company had entered two teams. It was rather queer that Jim's old team, the Conewango, won the first prize, and his contestants in Cleveland each received a medal.

After that last contest, the executives felt they should show their appreciation of this good work; so they decided to put up a bronze trophy for the teams to compete for, and I brought that here today so that you might see that some of the executives are really interested in the first-aid work which is really in line with accident prevention.

That plaque was won by the Conewango Refining Company last April.

CHAIRMAN PRUSSING: Mr. Lyons, I want to thank you, and I trust that our Publicity Department will make use of your paper so that some of the executives who haven't yet gotten into this movement will see what it looks like from the point of view of a man in your position.

The operation of cracking equipment has brought a catastrophe hazard into the industry which can only be met by highly trained technical men. That catastrophe is, to a large extent, utterly beyond the ordinary safety man who deals with the every-day hazards of refinery and field. I am glad therefore to be able to introduce to you at this time Mr. E. M. Matson, safety engineer of the Universal Oil Products Company of Chicago, who will speak to you.

Vigilance Makes Oil Cracking Operations Safe as Straight Distillation

By E. M. MATSON

Safety Engineer, Universal Oil Products Company, Chicago, Ill.

Safety in the operation of cracking plants has had the attention during the past few years of some of the best technologists in the designing, engineering, chemical and metallurgical fields.

It can be said therefore with assurance that cracking equipment today is operated generally in a far safer manner than is much of the atmospheric distillation equipment in the petroleum refineries.

The very fact that inherent hazards attend the cracking operation is responsible for the great amount of study that has been put on the subject and the consequent reduction of those hazards to a minimum.

In safe operation of cracking equipment, the following basic facts must be considered:

1. In the handling of flammable liquids, and in their processing accompanied by the generation of gas or vapor, there is involved the danger of fire and explosion.
2. The liquid or vapor is heated to a temperature which when brought in contact with the air will produce self-ignition.
3. The liquid or vapor usually contains corrosive compounds destructive to container and conductor equipment.
4. Under the temperature conditions prevailing in a cracking plant, the strength of the equipment is materially reduced.
5. The boiling range of the cracking stock is in excess of that of water.
6. When pressures are above atmospheric, boiling points are raised and storage of potential energy is increased, and consequently the possibilities of equipment failure are also increased.

Other factors have an influence upon the hazards of cracking equipment, but they are dependent upon these basic facts.

In order to promote safety for any given cracking installation it is necessary to recognize the possible dangers involved, analyze them, evaluate them, and determine how, when and where any particular possible danger may make itself manifest. When this is done the necessary remedial measures may be applied. These measures may be found in the principle of the operation, design, materials, the actual operation, or the maintenance.

In this presentation no attempt will be made to show where, when and how any of the basic dangers in any given cracking installation may become manifest. To do this, it would be necessary to analyze, in detail, the principle involved, the equipment, materials, "hook-up", method of operation, maintenance, etc., of each installation. Furthermore, for any given installation there may be variations in individual units due to local conditions. This work should be done by specialists who analyze refinery operations in detail, from the safety viewpoint which is quite apart from analyzing for increased thruput and improved products or greater efficiency.

Since the advent of commercial cracking the designers and manufacturers of materials have made rapid strides in recognizing the basic dangers. In this connection it may be said that although metallurgy has never been confronted with more difficult problems than those presented by cracking, great strides have been made by the metallurgists in improving alloys and equipment.

Regardless of how well the basic dangers may be guarded against or minimized in the design, the materials and equipment, these precautions may be nullified by unintelligent operation. Therefore, the actual safety of any cracking plant is somewhat beyond the final control of the designer and constructor. In the last analysis it rests with the refiner and the character of operation he requires of his crews and the supervision that is applied to insure safe operation. Constant vigilance is required for safety.

Even with proper design and materials, and careful operation it cannot be said that all dangers are eliminated from cracking operations, because there remains the very important factor of depreciation in the strength of the equipment, which requires its inspection, and maintenance beyond the stage of doubtful conditions.

Investigation of a Cracking Plant

Assuming that from the safety viewpoint a cracking plant has been properly designed, and constructed with the best available materials, and is properly "hooked-up", the following is presented as an outline of the subjects or items that require investigation.

A. Personnel:—

- (1) Operatives.
- (a) Operators.

- (b) Cleanout men.
- (c) Inspectors.
- (d) Maintenance and repair men.
- (e) Substitutes for sick, special or vacation leaves of absence.
- (2) Qualification requirements.
 - (a) Physical.
 - (b) Mental.
 - (c) Previous experience.
- (3) Character of instruction.
 - (a) Practical.
 - (b) Process classes.
- (4) Shift changing-days off-doubling shift.

B. Supervision:—

- (1) Operation.
 - (a) Charging and testing.
 - (b) Starting-up.
 - (c) On stream period.
 - (d) Shut down.
- (2) Cleanouts.
 - (a) Disassembly.
 - (b) Cleaning.
 - (c) Reassembly.
- (3) Inspections.
- (4) Maintenance and repair.

C. Safety equipment and devices:—

- (1) Steam smothering lines and hoses.
- (2) Fire extinguishers.
- (3) Blankets, goggles, helmets, masks.
- (4) Alarms.
- (5) Quick descent devices.
- (6) Remote controls.
 - (a) Dampers.
 - (b) Process valves.
 - (c) Steam smothering line valves.
- (7) Dead and live unit signs.
- (8) Safety valves.
- (9) Dropout lines.

D. Potential hazards and their safeguards:—

- (1) Water.
- (2) Vapors.
 - (a) Toxic.
 - (b) Inflammable.
- (3) Ignition sources.
- (4) Oil spillage and pools.
- (5) Corrosion and natural wear and tear.
- (6) Drainage.

E. Safe practices:—

- (1) In operation.
- (2) In cleanout.
- (3) In inspection.
- (4) In maintenance and repair work.

F. Inspections:—

- (1) Furnace.
- (2) Tube bank.
- (3) Vessels.

- (4) Piping.
- (5) Valves.
- (6) Drains and traps.
- (7) Dropout sump.
- (8) Tanks.
- (9) Pumps.
- (10) Instruments.

It is believed that an investigation following this general outline, will disclose any existing weaknesses in the physical condition of the plant, its personnel, operation, maintenance, safety equipment, and also any dangers that may exist. While only a comparatively few will be discussed at this time, each item when analyzed opens a very interesting and constructive field for thought.

Personnel

In selecting men to perform any task it is reasonable, before making any selections, to determine the qualifications that applicants should have in order to give uniformly intelligent, efficient and safe performance of duty. This is the key-note to success in modern industry and is justified on the basis of large investments in machinery and equipment which must be handled intelligently in order to be profitable and safe. Therefore simple minimum qualification requirements should be established. These should cover age, physical and medical examination, simple mental tests and previous experience.

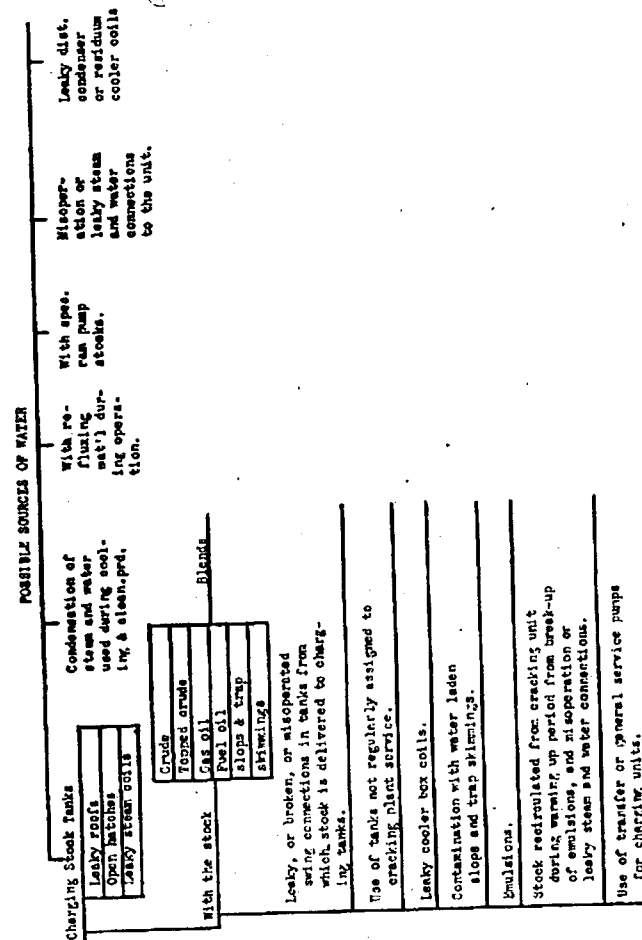
Men selected as operators should be in good physical condition and without disabilities, have good sight, hearing, and sense of smell; be able to read, write, and make rudimentary calculations; be free from nervous disorders; be able to adjust habits of sleep and recreation so they will be fresh on all shifts; be of a mechanical turn of mind, and have previous refinery experience. The same qualifications may be applied to maintenance men, inspectors, and cleanout men. In addition, the maintenance men should have wide experience as regards mechanics, and the inspectors should have or develop that painstaking, searching, inquisitorial mind which investigates beyond "surface" indications. Cleanout men, if they are to be promoted to any of the operating positions should meet substantially the same requirements as operators.

Training

Regardless of how well the men making up the various crews comply with qualification requirements, it is unreasonable to expect that there will be uniformly intelligent operation by the three crews (8 hour shifts) throughout the 24 hours of a day unless the crews are carefully and uniformly instructed and brought together at regular intervals to review the hook-up, complete cycle and results of operation, causes of and remedies for irregularities, emergency shutdowns, safety measures, first aid requirements, etc.

Certain features of operation of any type of unit should be fundamental and specific, and others susceptible to modification by the operator in charge as circumstances and conditions require. But, before such latitude is given or allowed it should be determined that the operators have a very intelligent understanding of the operation, the irregularities that may arise, and the remedies that should be applied.

To insure the best performance of duty a regular class should be established to meet at stated intervals so that all men may be instructed uniformly and gain the same understanding of the operation. To this class all questions of operation and irregularities should be brought and there discussed. Not only will this result in



greater safety but it will also result in maximum throughput, greater yield, improved products, and reduced depreciation.

Although the operatives of a cracking plant may be well trained and competent insofar as their individual duties are concerned yet their combined effort will not be productive of maximum safety unless properly guided and supervised. This is particularly true because of the fact that in the cycle of operation (fire to fire, or stream to stream, as the case may be) several distinct and different groups of men are involved, each one of them requiring strict adherence to definite safety practices and methods. In addition there are three separate shifts in the operating crew, with the ever present tendency, unless supervised, to apply individual personal ideas in the operation hoping to demonstrate superior operating ability. These groups may be classified as follows:

- A. Operation.
 - (1) Charging and testing.
 - (2) Starting up.
 - (3) On stream.
 - (4) Shut down.
- B. Cleanout.
 - (1) Disassembly.
 - (2) Cleaning.
 - (3) Reassembly.
- C. Inspection.
 - (1) Preparation.
 - (2) Tests.
- D. Maintenance and repair.

An analysis will show that the safety of the men employed in each of these groups is dependent not only upon their own individual performance of duty but upon that of the men in the other groups as well. This then emphasizes the need for cooperation and coordination of effort on the part of the entire personnel in the furtherance of safety to all. This can only be accomplished by proper supervision.

The supervision should be of such a character that there is specific assignment of duties with undivided responsibility for proper performance on the part of individuals, crews, or foremen of crews, and that the source of authority over the plant as a whole is centralized. Divided responsibility and decentralized authority introduces self-interest on the part of crews and individuals, lack of consideration for the safety and welfare of others, and indifference toward established methods, safe practices, and plant regulations. It is a deterrent to the knitting together of a group of employees of divergent duties into a smooth working organization imbued with the purpose of safe and efficient accomplishment. Supervision, to be of value, must select the indices of improper operation or maintenance and make corrections at frequent and regular intervals. Supervision that functions only when something goes wrong is misleading and of no value.

Inspection

Periodic inspections of the equipment comprising any equipment employing high pressures at elevated temperatures, are essential to safe operation. Particularly is this true of a cracking plant in which the material being processed contains corrosive compounds, which is typical of practically all cracking stocks. Experience has taught the futility of attempting to forego periodic inspections of cracking plant equipment and it has now become a most important phase of plant operation and maintenance. Upon it depends, in a large measure, the safety of the operators and uninterrupted operation of the plant.

The personal equation is a large factor in the value of an inspection. This requires a man with an appreciation of the responsibility of the work involved, sound

judgment, and a thorough knowledge of the requirements of the duty performed. Some knowledge of the behavior of metals under the conditions imposed, corrosion, temperature and pressure, is necessary. The inspector should develop an experience record of depreciation and accidents, not only in his plant but in outside properties also.

Even for a thoroughly competent inspector, a definite outline for the procedure to be followed in making an inspection should be in effect and standard forms for the reporting of his findings should be used. Such reports will give a good picture of the condition of the plant at the time of the inspection and will in addition serve as a record of plant conditions for future inspections and compilation of data. A series of reports will be a valuable aid in determining the intervals at which inspections need be made of the various parts of the equipment and will also provide a means of anticipating the probable life so that materials for replacements can be secured in advance, thus obviating the need for shutdown of the plant which might otherwise be necessary.

An inspection of the cracking plant to be complete should include not only those parts which may contain or conduct oil and vapors and therefore subject to corrosion and erosion but also pressure and temperature instruments, mechanical equipment such as pumps and flue gas equipment, automatic and remote controls, furnaces, including brickworks, dampers and other auxiliary equipment, ventilation of enclosures, drainage about the process area, tankage, and any other feature or equipment which may have a bearing on the safe operation of the plant. The requirements in connection with some of these will be touched upon in following paragraphs covering potential hazards.

No attempt will be made here to describe a procedure of making a complete inspection and to discuss the factors upon which recommendations for repair, replacement or renewals are based. Suffice to say that piping should be removed upon a reduction in thickness of a predetermined amount consistent with operating pressures, temperatures, and respective pipe sizes, and that the maximum allowable operating pressure of a plant should be adjusted as the need demands based on the weakest element of the plant.

Potential Hazards and Their Safeguards

Water is perhaps the most important hazard in cracking operations. The element of danger from this source lies in its sudden and almost instantaneous expansion into steam when subjected to the temperatures normally employed in a cracking unit, this expansion and the resultant pressure being quite likely to be beyond the usual unloading capacity of safety valves with which the plant is equipped and hence subjecting the equipment to possible rupture.

It is appreciated that water may or may not be dangerous depending upon how and when the water is put into the unit and how the unit is operated. However, the limits within which a unit may be operated safely with water in the unit or in the charging stock are so narrow that the possibility of wrong operation under such conditions makes it a dangerous element. Therefore, the safest and smoothest operation can only be secured by excluding water at any and all times. Precautions therefore must be taken to prevent it from being delivered to the process as well as to withdraw such water as may reach it, from low points in the process into which it may accumulate.

So far as is known water may be introduced into a unit in any one of the ways as shown in the accompanying chart.

As precautions against the introduction of water to the process from any and all of the sources shown in the foregoing the following may be cited:—

- (1) That after an emergency or forced shutdown, if the unit has been steamed or water cooled, the system be completely drained.

- (2) That the danger from water being charged to a unit be eliminated by the installation of at least two or more charging stock tanks, each having a capacity equal to at least a 72 hour supply.
- (3) That no charging stock be charged to a unit until it has settled at least 24 hours and the tank thieved and drained of any water accumulations.
- (4) That in thieving tanks standard thief be used.
- (5) That in draining tanks the drain valve shall not be opened more than one quarter of full opening to avoid false indication due to vortexing.
- (6) That charging stock shall not be contaminated with slops, with skimmings or other water laden oils unless these have been previously settled in special tanks and dehydrated.
- (7) That still bottoms and charging stock from foreign plants be settled out in auxiliary settling tanks for at least 24 hours before being delivered to the charging stock tank.
- (8) That such auxiliary settling tanks be thieved and drained of any water accumulations before transferring to the charging stock tanks.
- (9) That no charging stock be charged to a charging stock tank from which operating units are being supplied.
- (10) That recirculation from a unit being placed in service be to a recirculation stock tank and not to the regular charging stock tanks.
- (11) That charging stock tanks shall have water tight roofs, manhole and gauge hole hatches closed, independent suction connection to suction line of charging pumps, suction connection attached to the side of tank at least 4 feet above the bottom, and without extension, on the inside, of any kind; steam coil for heating shall be made up well, preferably of welded construction, and provided with substantial supports at frequent intervals; the filling connection shall be independent of the connection to the suction line and preferably on the opposite side of the tank.
- (12) That when the accumulation of B.S. in charging stock tank reaches a height of 18" the tank should be cleaned.
- (13) That the steam coil be drained and water drawn from the charging stock tanks by one of the crew of cracking plant when coming on duty.
- (14) That suction connections for ram pumps be from the suction header of the charging pumps.
- (15) That if a special stock must be used from ram pump the ram pump suction be connected as for charging stock tanks and the same inspection and supervision be applied to such ram pump stock tanks.
- (16) That the distillate receiver be examined for water and if necessary drained periodically if distillate is returned to plant as a refluxing medium.
- (17) That all valves in steam connections to the unit be inspected rigidly for condition and tightness.
- (18) That condenser and cooler coils be examined for tightness, during each run.
- (19) That an independent filling pump be provided for filling the unit. (Using filling pumps for other services or general utility pumps for filling, may prove dangerous).
- (20) That surge lines of surge type hot oil pumps be tried for water after charging at least hourly until unit is on stream.
- (21) That emulsified stocks running 1.0 percent or more of water content be dehydrated before charged to unit.

A detailed investigation of individual plants may disclose further sources of water. We have merely attempted here to show some of the sources to point out the possibilities for its introduction into the units as well as their safeguards.

To further preclude any danger from water in spite of the precautions which may be taken as indicated in the foregoing, low parts, or pockets, of the unit should be drained at frequent intervals for the withdrawal of water which might possibly ac-

cumulate therein until the temperature in that part of the unit is above the vaporization point of water consistent with the pressure in the unit prevailing at the time. If the operation of the unit is such that recirculation of oil is employed during the starting up period of the run the drawoff connection shall be at the lowest point in that part of the plant from which the oil is being withdrawn. Furthermore, this recirculation should be continued until the temperature and pressure conditions are proof that water as a liquid is no longer present. This temperature, it must be remembered, is not the boiling point of water at atmospheric pressure (212°F.) but as referred to before will vary with the pressure on the system at the time, as well as with the character of the stock with respect to emulsions and the temperature required for their break-up.

Vapors and Gases

Hydrocarbon vapors and gases may be dangerous both from a standpoint of inflammability and toxicity. In the former instance precautions must be taken with respect to their presence:—

- (a) In the system at the start of a run.
- (b) In the system during repairs and inspections.
- (c) About the process area and in the trenches.
- (d) In receiver, pump house, control houses, and other such enclosures.

With respect to their toxicity we are concerned primarily with items (b), (c), and (d).

The only danger in the presence of air in the system at the start of a run lies first in its admixture with vapors at sufficiently elevated temperatures and in the proper proportions to produce spontaneous or self-ignition and second in its admixture with vapors and their contact with glowing pyrophoric iron sulphide scale or glowing carbon which in this instance provides the source of ignition. In either event an explosion or fire may result, the character and extent of which will depend upon relative air and vapor proportions of the mixture, the total vapor volume and the confinement of the expansion of the combustion products. It is obvious that certain precautions must be taken during the starting up period to avoid the possible ignition of air vapor mixtures.

The expulsion of air from the system may be accomplished in various ways. For instance:—

- (1) By cold liquid displacement.
- (2) By displacement of liquid during which time the liquid is being heated.
- (3) By displacement with vapors evolved by heating the oil charged to the system.
- (4) By vapor or gas introduced from an extraneous source.

It is obvious that the safest and most fool-proof method that can be used for the displacement of air is by cold liquid.

The other methods either may or do produce air-vapor or air-gas mixtures. The source of ignition of all of them may be provided by pyrogenetic action of iron sulphide scale or glowing coke from a previous run.

The methods involving the warming or heating of the liquid may produce temperatures of vapors sufficient for self-ignition brought about by operating irregularities, inattention to duties, and carelessness.

It is realized, of course, that all of these methods may be used safely and without accident for considerable periods of time before a combination of circumstances may arise to produce any ill effects. A knowledge of the following facts may be instrumental in avoiding, to a certain extent, the culmination of such circumstances.

The tendency to create an air-vapor mixture in the explosive range varies:—

- (a) Directly as the pressure.
- (b) Directly as the molecular weight of the hydrocarbon vapors.

In further explanation it may be said that due to residual or applied heat enough vapor is formed under low pressure so that the air-vapor mixture is usually so rich in hydrocarbon as to be beyond the explosion range. If the pressure in the system is increased (above atmospheric) this tends to decrease the percentage of hydrocarbon vapor and increase the percentage of air in the mixture and for this reason the air vapor mixture is more likely to fall within the explosive range at the higher pressures.

The possibility of ignition by the presence of iron sulphide is dependent upon the corrosiveness of the stock being processed and the frequency with which the equipment is cleaned. Without knowing the conditions existent at each and every individual cracking unit the only method for the expulsion of air which can be advocated is by the use of the cold liquid displacement method. Should one of the other methods be used it is of paramount importance that the operators be fully aware of the precautions to be exercised to avoid a combination of circumstances which might result in a fire or explosion.

If after a plant is shutdown, men are required to enter for cleaning or for repairs, vapors therein become an element of danger from the standpoint of toxicity and inflammability. It is assumed that after a shutdown, the plant is emptied, drained, and steamed and that all of the vapors in the system have been expelled. However, it may not remain free of gas and vapor during the entire cleanout period. The possible sources from which oil, vapor, or gas, may come into the unit are raw oil connections, tower refluxing connections, common connections to gas control headers, and from distillate remaining in low parts of condenser coils. These are merely mentioned to cite examples. It has been proved that oil and vapor leakage through connections to shut down units have been the sources of vapors into parts of the equipment where men have worked, thus subjecting them to toxic poisoning and the hazards of fire or explosion. There is but one way to remove these evils and that is:

- (a) When a unit is down, break all connections through which oil, vapors, or gas might enter the unit or can enter the unit for normal operation. Primarily this will include raw oil lines, distillate or other refluxing lines, distillate or final product lines, and uncondensable gas connections.

This precaution should be carried also a step further in that when workmen are employed in vessels it is important to see that all pipe connections thereto which normally carry oil or vapors to or from that vessel, are disconnected, unflanged, or blanked off.

An element of danger with respect to vapors also lies in its presence about the process area, and in trenches where it may serve as a propagant of flame from furnace fires, torches, etc., on the outside area into enclosures where a number of men may be on duty and where the operating controls are located. The possible sources of such vapors are leaking or ruptured valves, piping, fittings, pumps, liquid level and sample lines, and discharge from relief valves. The only way to approach immunity from leaky or impaired valves, fittings, and piping is to make sure that proper materials have been used and that the equipment is inspected periodically so that repairs and replacements can be made before breakdown. Pump packing should be frequently examined and taken up to avoid leakage. Misoperation of pump discharge valves should be avoided to prevent excess pressure in pump cylinders with possible fracture of cylinder head or gaskets. Relief valves should be connected to discharge lines that will conduct the vapor outside the immediate plant area. Sample and liquid level drawoff lines connected to the hot side of the unit should be provided with ample capacity cooler coils.

The sources of vapor in enclosures include those mentioned with reference to outside areas but the hazard element can be considered to be of greater consequence due to their confinement and more or less continued presence of workmen.

Aside from the factors mentioned as being the possible causes for the presence of vapors on the outside, we also have in addition on the inside of enclosures, sample sinks, and distillate receiver tanks.

Sample sinks should have a waste pipe discharge into a combined sump, seal and trap located outside the enclosure so as to prevent a flash from the sewer system extending into it. Adequate provisions for flushing such sinks should also be provided.

Distillate receiver tanks and connections thereto are a common source for the escape of vapor due particularly to the character of the product. In addition, frequent operation of valves and sample lines involve the escape of this vapor. Breakage of gauge glasses is another factor. It is difficult to insure freedom from such vapor at all times and therefore care and supervision and such safeguards as can be adopted should be provided.

In order to reduce and isolate the danger of vapors and gases from distillate tank enclosures it is recommended:—

- (1) That wire glass windows or partitions between the control house and the distillate receiver tank house be no larger than is necessary for the controlman to make his observations.
- (2) That these windows be in fixed sashes so as to cut the control house off from the distillate receiver tank house and that the wire glass panels be kept in good condition.
- (3) That the handles of all control valves including those on the gauge glasses be extended inside the control house, and where the stems pass through the glass or panel, suitable vapor tight stuffing boxes be provided.
- (4) That a 1½ inch steam jet be installed in the distillate receiver tank house with control valve outside the control house.

If these recommendations are executed the control house will not be involved, the controls on the distillate tanks will not be in the vapor zone and therefore the men will not be exposed and in case of a serious discharge the steam will serve to purge the receiver tank house and diffuse the vapor so as to reduce the possibilities of ignition.

As mentioned previously a danger of petroleum vapor in the system during clean-out and repairs and about the process area as well as in enclosures, lies in its mere existence through contamination of the air the workmen breathe. This danger is of course more pronounced in the enclosures. In addition to the precautions that have been mentioned in eliminating the source of such vapors, ventilation should be provided to remove such vapors as may be present through failure of the precautions to completely stem their source. Such ventilation should be designed to remove the vapors from low areas and trenches and other dead pockets into which vapor may settle.

Insofar as vapors with respect to their inflammability are concerned, a source of ignition must be provided to render them hazardous. It becomes necessary therefore to eliminate, if possible, any and all sources of possible ignition. Of these we have:—

- (1) Electrical devices and equipment.
 - (2) Open flames and welding torches, furnace fires and torches for their ignition.
 - (3) Sparks from tools and static discharges from armored steam and air hoses.
- With respect to electrical devices and equipment, bells, telephones, switches and attachment outlets, and inside enclosures, as well as extension cords for portable lights it is well to bear in mind the following:—

- (a) The rules and regulations of the National Board of Fire Underwriters and the National Fire Protection Association, prohibit the installation of any spark producing devices or equipment in buildings that contain or may contain inflammable vapor.

- (b) Electric bells, telephones, switches, and attachment outlets are spark producing devices and for this reason they should not be installed in enclosures. Where installed inside of control or pump houses they constitute an ever present danger that may, under a gas and vapor condition provide the spark that will touch off a bad fire or explosion.
- (c) Extension cords for portable electric lights are a necessity around the refinery premises. They are indispensable for inspection and repair work. They are exposed to serious wear and often abuse. When made up of proper materials, properly assembled and regularly inspected they are safe for use in atmospheres that may contain inflammable vapor. Extension cords should be made up of extra heavy metal shell plugs; extra heavy reinforced, rubber covered flexible cable; Keyless metal sockets; vapor proof globe and substantial non-abrasive metal guard, with hook and wood handle. In assembling this equipment the ends of the flexible cord should be soldered, then fastened under the terminal screws in the socket and plug and then soldered to the terminal. Inside of the socket and plug, the cord should be knotted or taped so as to avoid any strain on the terminal. In addition, the attachment plug and the socket or guard should be equipped with a clamp or other mechanical means for taking mechanical strains off of the terminals.
- (d) It should be the duty of the electrician to keep a memorandum of the distribution of such extension cords and lamps and he should be required to maintain supply of extra extension cords and lamps (complete). The electrician should also be required to collect all extension cords at regular intervals (say monthly) and make a careful inspection of each and such repairs as are necessary.
- (e) Employees should be instructed against using portable lights unless they are in good condition and never used unless the vapor-proof globe and metal guard are in place.

These items may seem of small consequence but the tiny sparks they produce or may produce have caused many fatal accidents and large fires in atmospheres of inflammable vapor.

Occasions also arise requiring the use of welding about the plant during maintenance and repair work. It is necessary too that torches be used to ignite furnace fires. These are unavoidable and emphasize the requirement of care in elimination of the presence of vapors as previously outlined.

The occurrence of sparks brought about by the handling of tools or the use of improper tools must also be guarded against. In addition, sparks due to static discharges from improperly grounded armored steam and air hoses are also possible occurrences. Whatever the source they are an element of danger where hydrocarbons may and sometimes do exist in spite of all precautions to prevent it.

Corrosion of Equipment

Undoubtedly the greatest hazard problem of the petroleum refining industry today is corrosion, and it is particularly vital with respect to the safe operation of cracking plants.

Corrosion of cracking equipment is due primarily to the action of hydrochloric acid produced by hydrolysis of magnesium chloride, and hydrogen sulphide formed by the thermal break-down of sulphur compounds in the oil. This latter, a gas, not only corrodes but as referred to before, deposits a pyrophoric scale on the equipment which in contact with air may glow or burst into flame.

The fact that certain of the sulphur compounds are stable at cracking temperatures while others readily undergo decomposition to form hydrogen sulphide precludes

foretelling with any certainty the corrosiveness of the charging stocks based on sulphur content.

The action of these two corrosive agents is quite different. Hydrogen chloride is apparently quite harmless in the absence of water and is therefore most active in the cooler parts of the equipment where water can condense, such as condensers and heat exchangers.

Hydrogen sulphide is not particularly active below 500°F. and accordingly is most corrosive in the hotter parts of the system, namely, furnace tubes, return headers and caps, reaction chambers and vaporizers transfer and vapor lines, hot oil pumps, dephlegmators, pyrometer wells, etc.

There are a number of substances other than those cited which may contribute to the corrosion of cracking equipment, but their influence is either negligible or has not been proven. In addition, there is some electrolytic corrosion where unlike metals are used in the presence of water without regard for the different electric potentials.

Oxidation may also be mentioned with respect to the deterioration of furnace tubes and tube supports. The extent of this corrosion is dependent upon furnace conditions, temperature and excess air, together with coke deposit within the tubes and the temperature rise in the tube metal accompanying it. It is not particularly serious on the tubes as long as they are kept clean and comparatively cool by proper oil velocities.

Although considerable effort has been centered in the preliminary desulphurization of charging stocks, no economical method has as yet been devised. Other means have thus been resorted to in combatting its influence. Generally speaking these may be grouped as follows:—

1. The use of non-corroding metals.
2. The use of resistant metallic linings.
3. The use of non-metallic lining.
4. The injection of chemicals.

Corrosion with regard to the frequency of replacement of equipment is a matter of operating cost. However, with respect to equipment failure it is a matter of operating safety. Therefore, no investigation of a cracking plant, from a standpoint of safety, can be considered complete unless it includes the element of corrosion both as to its character, severity of attack upon the respective parts of the plant, and the measures taken to combat it. With such information further remedies if available may be suggested to overcome or at least minimize this evil. Space does not permit covering in detail the various methods of combatting corrosion other than as touched upon in the foregoing. Suffice to say that there are methods available to prevent it or alleviate it. In considering for adoption the use of any method it must be remembered that economical considerations do not always justify or make feasible the use of any of these remedies. In this event careful periodic inspections of the equipment are probably the only alternative safeguard against corrosion failures and the attendant danger to life and property.

Plant Practices Conductive to Safety

In addition to the safe practices mentioned in the foregoing paragraphs with respect to water and vapor there are many others which are worthy of attention. Some of these are cited below:—

- (1) Expulsion of air from the system should be completed before the self-ignition temperatures of an air-vapor mixture are possible of being established.
- (2) Safety valves must be tested and reset if necessary for releasing pressure prior to each run. A periodic test pressure one and three quarters times the safe allowable operating pressure should be applied at least once a month or prior to each run when the length of the runs exceed a month.

- (3) The plant shall not be charged until the operator foreman has made an examination as to the setting and workability of valves, damper controls, etc., and completeness of the reassembling; and in addition has had plant formally turned over to him by the cleanout foreman.
- (4) Furnace fires shall not be lighted until the furnace has been steamed for a period of 15 minutes to expel any vapor or gas present in order to prevent possible flashback or explosion. Lighting torch shall be ready for use before fuel burner valves are opened.
- (5) Torches for lighting furnace fires shall not be carried about the process area.
- (6) Burners shall be disconnected and removed after shutdown to preclude entrance of the gas or oil through possibly leaky burner valves.
- (7) During the coming-on-stream period low points in the process shall be drained at 15 minute intervals for withdrawal of water which might pocket therein.
- (8) Transfer temperatures during the starting up period shall be increased only at a rate consistent with pressure to prevent premature vaporization in the coil and coking of the tubes which condition is deleterious to operating results and may lead to overheating the tube metal and finally tube rupture.
- (9) An hourly log record shall be kept of operating temperatures, pressure, and other control conditions from the time of firing the plant. Unusual plant conditions or irregularities shall be noted on the log sheets and the relief crew shall be informed thoroughly, thereof.
- (10) Hot spots on furnace tubes are a forerunner of tube ruptures. They should be watched carefully. If they become worse the plant should be shut down.
- (11) In case of tube rupture the plant shall be immediately dumped and proper valves adjusted to isolate tube bank from rest of system.
- (12) In case of leaks in the wall of bursted piping all operators shall make their immediate exit from proximity thereto and assume position of protection. The plant shall then be brought down in the usual manner. Quick dumping and sudden release of pressure will produce a shock to equipment, the effects of which may tend to change small leaks to large ruptures, in which event extreme danger may result.
- (13) Steam or water for cooling prior to cleaning shall not be introduced until plant pressure is well below steam or water pressure, and then under careful control.
- (14) When shift changes are made the relief crew shall be on duty ready for service 15 minutes before the change hour. Each man shall accompany the one he is relieving on a last tour over the plant for a joint inspection of the equipment in operation over which he has had or will have jurisdiction. The relieving men shall ask for and receive full information regarding the performance and condition of the equipment in connection with their duties. In short the men taking the unit over should know exactly what they are getting and the men being relieved know what they are turning over. Thus the responsibility is fixed and stimulates the men to a more careful performance of duty.
- (15) Tube cleaning tools shall be kept moving within the pipe being cleaned whenever the rotor element is in motion. To hold stationary even momentarily will wear down and weaken the pipe wall.
- (16) Unbolting or loosening flanges when hot (frequently called hot bolting) shall be done only with exercise of extreme caution and after pressure has been released. Gasket failure and joint leaks may result in the discharge of hot vapor or liquid through the joint.
- (17) Return bend plugs, caps and holding members shall be replaced in the same fitting from which they are removed. Before replacement they shall be properly cleaned and lubricated.

- (18) Cleanout men shall make sure that tubes have been drained and thoroughly steamed and pressure released before attempting removal of plugs or caps.
- (19) Cleanout men shall assume protected position whenever chamber manhole covers are dropped.
- (20) During cleaning operation requiring the presence of men in chambers or dephlegmators, one man shall be stationed outside to furnish and summon aid if necessary in case of injury or accident to those within.
- (21) Safety valves in hot service shall be inspected and cleaned during each shutdown. This is true also of other valves installed in lines to prevent back flow of oil and vapors into the furnace during tube ruptures.
- (22) Before any vessel, run of pipe, furnace robe, etc., is headed up, cleanout foreman shall inspect and check condition.
- (23) Dropout lines and relief lines shall be steamed after use to purge the oil or coke which might otherwise restrict or plug them when cold.
- (24) The use of automatic control equipment shall in no way be considered an excuse on the part of operators for inattention and laxity on their part and failure to maintain smooth operating conditions.
- (25) The cleaning of clothes as well as other items with gasoline, distillate, etc., shall not be permitted in or about a cracking plant process area.
- (26) Operatives and others shall not be permitted to congregate in groups in process area of the cracking plant.
- (27) Clothes worn by all cracking plant operators shall be clean and free from oil.
- (28) If a unit is to be shutdown for a prolonged period of time it should be completely drained of oil and adhering coke and then filled with a sulphur free oil. Valves which permit of draining the system shall be locked closed. Pumps shall be opened, cleaned and greased and then reassembled. This applies also to valves. Temperature and pressure instruments shall have all parts thoroughly cleaned and protected against moisture, vapor and dust.
- (29) If a plant is to be placed in operation after a prolonged period of shutdown a thorough inspection shall be made of all parts regardless of how the unit was prepared for the shutdown.
- (30) If at any time it becomes necessary to shut a plant down prematurely because of leaks in piping, fittings, valves and connections, it should be drained, cooled and steamed in the usual manner for a normal shutdown, before repairs are attempted.
- (31) Coming-on-stream period of a run which follows major repairs shall be extended, over the time required in normal practice, so as to permit of more than ordinary observations of the effectiveness of the major repairs.
- (32) Steam should preferably be used in fighting oil or vapor fires due to leaks in hot process equipment. The amount applied however should be enough only to smother the flames as an excessively large volume applied directly to hot equipment, valves, fittings, etc., may produce cooling or contraction strains sufficient to enlarge the leaks and thus aggravate the condition.
- (33) A pressure certificate shall be posted in a conspicuous location to show the maximum allowable operating pressure, the test pressure, and the releasing pressure of safety valves with which the unit is equipped.
- (34) Steam connections to the system shall have check valves, in addition to the usual block valves, to prevent back flow of oil or vapor into the steam supply lines.
- (35) Block valve shall not be installed in relief lines.
- (36) Only cracking plant operatives shall be permitted about cracking plant area, unless special permission is obtained.

Safety Equipment and Devices

It is needless to state that in spite of well trained, and well supervised crews, accidents are liable to and sometimes do occur, if for no other reason than human frailties. Therefore, it is of paramount importance that provisions be made to retard and combat their ill effects by the use of auxiliary safety equipment and devices. Among these it has been found particularly advantageous to include the following:—

- A. Steam smothering lines and hoses at strategic locations.
 - (1) About the process of fires and flashes following exposed equipment failures.
 - (2) Inside enclosures, control and pump houses for fires following ignition of air-vapor mixtures, possible accumulation, or accidental release therein.
 - (3) In tube and header compartments of furnace for fires caused by tube ruptures and return bend failures.
- B. Chemical extinguishers, both hand and carriage type or better yet central station type at points of easy access and availability. Portable equipment located inside of structures shall have notices to that effect posted on the exterior of these structures. Caution should be exercised in applying cold chemicals to hot leaky equipment to avoid sudden contraction strains.
- C. Sand barrels and shovels at suitable locations for use in preventing flow of oil spillage to points of possible ignition as well as for combatting oil spillage already ignited. These barrels, painted red, should be supported horizontally on saddles, and have their open end closed off with loose brick. The shovels also should be painted red and marked for emergency use only.
- D. Blankets, woolen or asbestos for smothering ignited clothing.
- E. Quick descent devices to permit safe escape from elevated positions about the plant in case fires below cut off the normal means of descent. Such devices may be of tubular chute or guy wire type with either sling or platform. It is essential that such devices be periodically used so that in times of actual requirement the men will be thoroughly familiar with their use. This applies particularly to the guy wire slide device type.
- F. Remote controls for the manipulation of dampers, process valves, and steam smothering line valves, to obviate the necessity of workmen entering the fire zones in time of emergency.
 - (1) Damper controls should be of the two-way type so that a balanced pressure condition may be maintained in the furnace in case of tube rupture or header failure and thus prevent the entrance of air and the exit of flame through air openings, inspection doors, cracks in settings, etc.
 - (2) Process valves, remote controlled, shall be those used in emptying the unit and in isolating those portions in which pipe or equipment failure may have occurred so as to thus shut off or minimize the quantity of oil or vapor which can possibly reach the opening and discharge into the process area, or outside confines of the process.
 - (3) Valves in steam smothering lines for discharge of steam in buildings and other enclosures shall have remote controls located outside so that in case of ignition of flammable vapors therein the occupants need not hesitate within to manipulate them. Their first thought should be of egress.
- G. The posting of "dead" and "live" unit signs to indicate the operating status of the unit. The opening and closing of valves on the wrong unit with the thought that a "live" one is a "dead" one and vice versa has taken place with serious consequences. The recurrence of such an act is possible. The presence of signs at control points about the units to tell the men whether a certain unit is on the line or down for cleanout will help to preclude misoperation of this kind. Because of the character of the raw stock and the products manufactured all cracking installations possess the potential possibilities for fire or explosions. So far as is

known at this time there is no way of eliminating all such dangers but many of them may be eliminated and others mitigated and controlled. Weaknesses in the operation of a cracking plant can be discovered only by a proper analysis of the cycle of operation, equipment, "hook-up", personnel, supervision, inspection and maintenance. With this accomplished the dangers and weaknesses can be determined and corrected and the methods of inspection, supervision, and maintenance, arranged so as to keep the plant in the safest possible condition.

CHAIRMAN PRUSSING: I think you will agree with me that Mr. Matson has delivered here something which can be referred to during the coming year by our operating men with a good deal of profit to themselves. I know that the proceedings of this Section are used not only for one year, but often for many years in the various plants of the oil industry, as textbooks for the training and supervision of personnel. And I know that this paper will be among our valuable contributions this year.

At this time every year we hold our annual election of officers, and I'd like to introduce Mr. E. J. Senne, who is chairman of our Nominating Committee—Mr. Senne.

Report of the Nominating Committee

E. J. SENNE (Vacuum Oil Co., New York): The Nominating Committee has carefully considered names for officers for the coming year. We trust the names submitted will meet with the approval of all, and we sincerely bespeak for these gentlemen your fullest support. The following are the nominations submitted for your consideration:

General Chairman—R. E. DONOVAN, Chief Safety Engineer, Standard Oil Co. of Calif., San Francisco.

Vice-Chairman—D. J. WALLACE, Director, Safety Division, Mid-Continent Oil & Gas Assn., Tulsa, Okla.

Chairman, Atlantic Division—E. R. ALDEN, Vacuum Oil Co., New York City.

Chairman, Great Lakes Division—J. C. BERND, Safety Director, Sinclair Refining Co., E. Chicago, Ind.

Chairman, Mid-Continent Division—H. W. BOGESS, Sup't. of Safety, Sinclair Oil & Gas Co., Tulsa, Okla.

Chairman, Gulf Division—J. L. RISINGER, Safety Director, Magnolia Petroleum Co., Beaumont, Texas.

Chairman, Rocky Mountain Division—D. J. GRIFFIN, Safety Engineer, The Ohio Oil Co., Casper, Wyoming.

Chairman, Pacific Division—C. P. ANDERSON, Safety Director, Richfield Oil Co., Los Angeles, Calif.

Engineering Committee:—

Chairman—R. A. HARTZELL, Standard Oil Co., (Ind.) Chicago, Ill.

R. W. BLACK, Safety Engineer, Standard Oil Co. (New Jersey), Elizabeth, New Jersey.

J. H. HERBERT, Safety Engineer, Standard Oil Co. (Ohio), Cleveland, Ohio.

C. B. SWANNEN, Safety Engineer, Texas Pacific Coal & Oil Co.

H. E. DISCHINGER, Safety Engineer, Shell Petroleum Corp., Houston, Texas.

B. V. OSBORN, Safety Engineer, Standard Oil Co. (Indiana), Casper, Wyoming.

BARTON CATER, Safety Engineer, Standard Oil Co. of Calif., Los Angeles, Calif.

Publicity Editor—C. L. HIGHTOWER, Safety Director, Texas Pacific Coal & Oil Co., Thurber, Texas.

Chairman, Program Committee—R. B. ROOPER, Safety Director, Humble Oil & Refining Co., Houston.

Chairman, Health Committee—Dr. C. M. AVES, Medical Director, Humble Oil & Refining Co., Houston.

Chairman, Statistics Committee—J. W. MYERS, Standard Oil Co. of New Jersey, New York City.

Secretary—H. N. BLAKESLEE, American Petroleum Institute, Dallas, Texas.

CHAIRMAN PRUSSING: You have heard the report of your Nominating Committee, gentlemen. The chair will now entertain further nominations.

T. N. SHAW (Midwest Refining Co.): I move that the nominations be closed, and that the Petroleum Section go on record as unanimously in favor of the report of the Committee.

The motion was duly seconded and unanimously carried.

CHAIRMAN PRUSSING: At this time I want to introduce a man whom most of you know and to whom we on the Pacific Coast owe a considerable debt of gratitude, personally and professionally. When Bob Donovan left the Bureau of Mines to go with the Standard Oil Company, he had already endeared himself to the petroleum group on the Pacific Coast. He had trained a good many of our men, not only the workmen in the fields, but a good many of our potential safety men, in the elements of safety and first aid. And it is fitting that, with that background, I should introduce as our incoming chairman for the following year Mr. R. E. Donovan, the dean of petroleum safety engineers on the Pacific Coast.

(Chairman Donovan accepted the gavel from Chairman Prussing.)

CHAIRMAN DONOVAN: Members of the Petroleum Section, I sincerely thank you for the honor that you have brought to my company and to me, by electing me Chairman of this Section; and my only hope is that I can make as great a success out of the chairmanship as the past chairmen have.

Early this year when I was extremely anxious to get some information regarding the cleaning of "sour crude" tanks, everyone referred me to Jack Roaper. Therefore, I think it is very fitting that he should be selected to give the paper on that subject this year.

The Business of Cleaning Sour Crude Storage Tanks

By R. B. ROAPER

Safety Director, Humble Oil and Refining Company, Houston, Texas

Deaths resulting from the handling of sour crude have given executives and safety men of the oil industry many a sleepless night. One of the most dangerous operations in connection with the handling of high sulphur crudes is the cleaning of tanks. This paper outlines the method of cleaning tanks used by the company with which I am associated. Other companies may have different or even better methods; however, we have found that our present plan is giving good results.

The process of cleaning sour crude tanks has developed to such an extent that nearly every department in the refinery has some part to play in the operation. This work has developed so extensively within the last few years that we have found it to our advantage to have one responsible man assigned to the supervision of tank cleaning work, and his duties are confined entirely to this work.

When inspection reports indicate that it is necessary to clean a tank a request for mechanical order is sent to the Mechanical Department where an order is prepared covering the necessary work. Each Department which takes part in this work is furnished with a copy of the mechanical order.

The first and perhaps the most important operation in cleaning a tank is the blanking of all lines connected to the tank with the exception of the steam line. Numerous accidents in different refineries have emphasized the importance of this procedure. A recent near catastrophe in one of the eastern refineries particularly

emphasizes the importance of blanking lines when cleaning tanks. This particular tank was located adjacent to a pump house and it was decided to use a pump in the pumphouse for removing the residual oil and water in the tank instead of placing a portable pump at the manhole. All other lines except the line to the pump had been blanked. This pump, however, was manifolded with a number of lines. The operation progressed smoothly until after the noon hour during which time the workers had shut down the pump. During this period a leak apparently developed in the manifold and a small amount of sour distillate with a high hydrogen sulphide content found its way to the tank. The men returned to work and re-entered the tank. Not only were several workmen in the tank but another foreman had accompanied the cleaner foreman into the tank to explain some particular operations. All of these men were overcome before they could get out of the tank. The man on watch at the manhole sounded the alarm and the men were pulled out of the tank. Artificial respiration saved their lives.

Not only is it necessary to blank lines connected to tanks when cleaning the tank but also while performing any other operation. Two mechanics were recently installing a pipe flange on a new tank in New Mexico. Some lines had already been connected to this tank. The gate valve on one of these lines apparently leaked, and hydrogen sulphide entered the tank. Both men were killed.

After the lines have been blanked and the manhead plate removed, the next operation is to float the oil and as much of the residual matter as possible out of the tank by placing a high pressure water hose through the manhole. A portable pump is then set outside of the tank to remove the water and oil from the tank. A pit is then dug near the shell of the tank at the point where a door sheet will be cut out. Steam is turned into the tank and after steaming 36 to 72 hours depending on the concentration of combustible hydrocarbons and hydrogen sulphide remaining in the tank is indicated by tests. Two door sheets are then cut out of the bottom ring of the tank as nearly diametrically opposite as possible. Large rivet busters requiring three men to operate are used in cutting the rivets in this operation. One tack rivet above the liquid level on each up-and-down rivet column is left intact in order to hold the sheet in place until the other rivets may be backed out with a small one-man rivet buster. Wooden pegs are driven in the bottom holes to prevent the oil from running out. Steam is continued in the tank during this cutting out process as an extra fire hazard precaution; however, as soon as it is completed the steam is turned off and the tank allowed to cool.

After the tank is cooled a sample of the gas is taken for analysis in order to determine the percentage of combustible hydrocarbons and hydrogen sulphide gas. We obtain a gas sample by using a pipette, approximately 9 inches long and 1½ inches in diameter (250 c.c.), with rubber tubing attached to both ends. A screw clamp is attached to the tubing on the top and bottom of the pipette. The tank tester, equipped with gas mask, lowers by means of a twine through the top manhole on tank the pipette which is filled with water. Before lowering the pipette the bottom screw clamp is removed and the upper clamp is slightly opened. This allows the water to run out of pipette and at the same time gas is drawn into the pipette. After pipette is empty of water, it is drawn to the top and the screw clamps are fastened to both ends. The pipette, with the representative gas sample, is taken to the laboratory to be tested.

The sample is first tested for hydrogen sulphide. To do this it is necessary to run a blank test as follows. A graduate pipette is filled with a very weak starch solution, about 1½ grams per 1000 c.c., and 100 c.c. of fresh air is drawn in pipette, displacing almost all the starch solution. Approximately 1 c.c. of iodine solution (0.003 normal) is admitted to pipette and contents shaken. This gives a bluish color solution and is kept in test tube for comparison with the test gas sample. The above is repeated using the gas sample in place of air. If 1 c.c. of iodine solution makes a weaker color than that of the blank, the sample shows hydrogen sulphide

and the tank is rejected. If the color is similar or stronger than the blank, the test is free of hydrogen sulphide.

In testing the sample for combustible gases an N. D. Portable Combustible Apparatus, manufactured by the Standard Inspection Laboratory of New Jersey is used. Approximately 100 c.c. of the gas sample is drawn into mercury filled "U" tube of this apparatus and a reading is noted on a scale which is graduated in centimeters. Then the sample is "fired" with electric current (25 amperes) which flows through a platinum wire which glows white hot. The wire is kept glowing for about 2 minutes and current is shut off and gases are allowed to cool for about 3 minutes. A reading again is noted and if a contraction of more than 0.5 c.c. the tank is turned down. An 0.5 c.c. contraction is equal to 0.2 per cent of combustible gas figured as pentane. This figure is obtained from curve calibrated for each apparatus.

The lower limit of inflammability of pentane gas in air is 1.3 per cent pentane by volume. This amount of pentane is equivalent to a contraction of 1.1 c.c.

Thus it can be seen that these tests are very severe but up to date we have experienced no fires nor gassing of men for any tanks which have been tested.

It has been our practice to have not more than three men equipped with cannister type gas masks enter the tank at one time. We understand that some companies have not used masks on all tank cleaning operations; however, it has been our experience that stirring up the bottom sediment in a tank frequently liberates gases which might be dangerous to the workers. For this reason we have insisted that masks be used regardless of laboratory report. The question of proper inspection, adjustment and time records for gas masks has been discussed by previous papers. I, therefore, will not take time to consider this phase of the problem. The company also supplies hip boots to men doing this tank cleaning work.

After the two bottom plates have been removed the men enter the tank with wooden drags built for the purpose of pushing the major part of the liquid BS through the openings into the pits at the sides of the tank. It is pumped from these pits to the most convenient point where it can be used as fuel. After as much of the BS as possible has been removed by this method a runway is built into the tank and the remaining BS is removed by the use of wheelbarrows and sloop carts. This runway is built so that a laborer can wheel the loaded wheelbarrow out of the tank, up a slight incline and dump it into a sloop cart. The sloop cart is then hauled to the boiler house pit where the BS is used in Duncan burners as fuel.

After all the BS has been removed from the tank bottoms not more than six men equipped with cannister type masks are sent into the tank to do the necessary scraping and sand blasting. Regular roofing buggies are erected with side scaffolds on one side six feet apart, and a platform on top with hand rail, for safety of men working on the rig. The scaffold is necessary, of course, to reach the side sheets and structural steel. These buggies are built on wheels so that they can be moved about to all parts of the tank. Bronze or a non-sparking metal is used, exclusively, in scraping the tanks.

Occasionally it is necessary to sand blast these tanks. In such cases the men doing this work are supplied with regular sand blast helmets. These helmets are equipped with air blowers which are operated through a reducing valve from the main air line. By this means the air is maintained at a uniformly low pressure. Men doing this operation, work in 30-minute relays.

When the tank has been properly cleaned and approved for service the door sheets are replaced. An angle bracket 4x6x1/2 inch is used to secure a 2-ton hoist in rivet hole 28 inches above the sheet which has been cut out; the other end is secured to the sheet with shackle bolt and nut, the nut being placed on the inside of the tank; the sheet is then drawn up in place and redriven with cold rivets. In doing this particular part of the operations in connection with tank cleaning, extreme care must be taken. This has been impressed upon us very forcibly by a sad experience at one of our refineries where the men were attempting to replace a door sheet that

had been removed to clean a tank. The sheet was being put back into place by the use of moccum bars, and after it had been gotten back against the tank the men attempted to remove the moccum bars by raising the sheet with spud bars. There was a slight wind blowing at the time and when the sheet was raised high enough to place back on the tank the top of it leaned outward. Four men were raising the sheet, which weighs approximately 3000 pounds, and when it started falling they were unable to hold it. Three of them were fortunate enough to get out from under it, but one of them was not quite able to make it and the sheet fell across his back fracturing his pelvis, from which he died about ten hours later.

Hydrogen sulphide gas reacts with iron or iron oxide to form iron sulphide. This presents another problem in tank cleaning. Most of you have seen these large chunks of iron sulphide which are dark brown or black in color. This formation of iron sulphide not only corrodes the steel work in the tank very rapidly but it also presents a very grave fire hazard. Iron sulphide combines with the oxygen of the air to form iron oxide or rust and sulphur dioxide. This reaction is accompanied by the liberation of considerable heat. As a matter of fact, if a blast of air is blown across a quantity of iron sulphide it will glow, or at times even burst into a flame. A number of disastrous fires have resulted from the fact that an excess amount of iron sulphide has been permitted to accumulate in tanks. This experience has emphasized the importance of removing this iron sulphide and taking every possible precaution to prevent its deposition. So far we have not been able to develop any method which is 100 per cent successful in this respect. Some companies have used rub shell paint successfully; others have used aluminum spray; and still others have used plating methods of various kinds. None of these, however, have been 100 per cent successful as far as our experience is concerned.

Iron sulphide does not oxidize in the presence of moisture, and this characteristic can be utilized in cleaning a tank. It is kept moist during the cleaning operation and a large percentage of the scale can be removed by placing a high pressure hose upon it. This method likewise reduces the fire hazard.

Every man who is called upon to work in cleaning sour crude tanks should be thoroughly instructed in the Shaffer-Prone-Pressure method of artificial respiration. A man who has been overcome by hydrogen sulphide gas has one, and only one, chance of life, and that is by the application of artificial respiration by his fellow workers.

ADJOURNMENT

Wednesday Luncheon Session

October 1, 1930

R. E. DONOVAN, Chairman

Standard Oil Company of California, San Francisco, Cal.

A luncheon session of the Petroleum Section, at which the 1930 Petroleum Section Safety Contest Trophies were presented, convened with Chairman Donovan presiding.

CHAIRMAN DONOVAN: We have now come to what is to some people the most important part of the whole conference; that is, the awarding of the prizes for the Third Annual Petroleum Section Safety Contest. I think that the Petroleum Section is very fortunate every year in being able to have the president of the National Safety Council come to our luncheon meeting and make these presentations.

You want to hear who won those prizes, so I'm going to introduce to you Mr. C. E. Pettibone, President of the National Safety Council.

Presentation of the Safety Contest Trophies

By C. E. PETTIBONE
President, National Safety Council

I don't know that you're very fortunate in having the president here. That's what you make him president for—it's just his job to come around and be shown off.

I, personally, am very much interested in this question of contests and trophies. It seems to me it's a very desirable thing to keep up. More and more, as I study people throughout America, I think we are getting to the place where we don't like to be forced to do things. We kind of object to too many laws and too much enforcement and too many rules. I believe absolutely in discipline and law and enforcement. But more and more I believe we can get people to do things by some other method and accomplish much more by it. I think a great deal of our public safety—the automobile problem, for instance—is to get the people to want to do things. You can arrest a lot of people, but you can lead them a lot farther. You've got to have discipline, you've got to have order, and you've got to have organization; but there is a lot you can accomplish by simply leading.

Then there is one other characteristic of American people, and that is the love of sport—the love of competition. We'd do anything in competition.

It seems to me right there you combine in these awards yearly two essential characteristics of the American people,—the love of competition and the love of being led,—and I think you accomplish a great deal more than you would in any other way.

This being president of the National Safety Council is quite a job; and I think none of us, no matter how long we are connected with it, realizes all the functions and ramifications and work of this Council. The outstanding thing I have learned this year (after having served with the Council as Vice-President and on the Executive Committee for a number of years and thinking I knew all about it) is that I knew very little about it, and that the Council goes on not because of its presidents but because of the volunteer officers and the staff. So, not being able to know all about it, I hunted around for those things that apparently needed attention. And the one thing that didn't need any attention was the Petroleum Section. From every report I got this section was being run absolutely marvelously. I had nothing but the best reports. But, frankly, I don't know as much about the Petroleum Section as I ought to; so I am going to follow my old system of making the secretary tell you about the Contest.

H. N. BLAKESLEE (Petroleum Section Representative, National Safety Council):

I have prepared a memorandum to help Mr. Pettibone along in making the presentations; but he said he'd rather I'd stumble through it than for him to try to, so I'll proceed with the memorandum:

The Third Annual Petroleum Safety Contest, for which 11 trophies and 35 certificates are being presented today, has been the most outstanding of the Petroleum Section Safety Contests, both in numbers of companies and in totals of workers who have competed and in accidents prevented.

This is the third of the Annual Contests, these contests covering the first six months of each respective calendar year. A total of 196,796 petroleum workers participated in the contest this year, which is 34 per cent more than competed in the 1929 contest, and 127 per cent more than the number who competed in the 1928 contest.

In the 1930 contest accidents decreased 29 per cent as compared with the 1929 contest, and 39 per cent as compared with the 1928 contest. Among these 196,796 petroleum workers in the 1930 contest, 4,316 accidents occurred as compared with 4,542 accidents among 146,596 petroleum workers in the 1929 contest. In other words, 226 fewer accidents occurred in the 1930 contest among 50,200 more petroleum workers than occurred in the 1929 contest.

The first trophies to be presented will be to the Class A and Class B winners in the Manufacturing Department. It might be well to mention here what is the best no-accident record known to have been made in the Manufacturing Department. The Wood River Refinery of the Standard Oil Company (Ind.) which last year won the Manufacturing Department trophy for refineries working 100,000 man-hours a month or over, actually worked a total of 2,080,869 man-hours without a lost-time accident, which is the best report so far received by the National Safety Council.

The Class A trophy this year, to the refinery among 41 contestants with an exposure of 100,000 monthly man-hours or over, goes to the Casper, Wyoming, refinery of the Standard Oil Company (Ind.). During the first six months of 1930 this refinery worked 1,410,127 man-hours without a single lost-time accident.

(B. V. Osborn here accepted the trophy on behalf of the Standard Oil Company (Indiana) Casper, Wyoming.)

MR. BLAKESLEE: The closest competitor of the winner was the Norco Refinery of the Shell Petroleum Corporation of Sellers, La. The Norco Refinery worked 1,192,025 man-hours during the contest without a single lost-time accident; and in recognition of this accomplishment the National Safety Council presents it with a certificate of merit.

(L. W. Dawson accepted the certificate for the Norco Refinery.)

MR. BLAKESLEE: Next in line comes the Bayonne Works of the Vacuum Oil Company which worked 648,213 man-hours and completed the contest without a lost-time accident. To the Bayonne Works goes the distinction of having completed the 1929 and the 1930 contest with perfect accident frequency records; and in the 1928 contest it won the Manufacturing Department trophy with a frequency rate of 2.63. The Bayonne Works wins a certificate this year.

(I. B. Lobb accepted the certificate for the Bayonne Works of the Vacuum Oil Company.)

MR. BLAKESLEE: Also to the Vacuum Oil Company goes the distinction of making the lowest accident frequency record in the Manufacturing Department for more than one refinery. The frequency rate for the Bayonne, Rochester, Olean and Paulsboro plants combined, and employing 3,600 workers for the period of the contest, is 2.22. The second best record for a company grouping of refineries was made by the Union Oil Company of California. The frequency rate for its Olean and Los Angeles Refineries, employing 1,200 men, is 2.59. The third best record for a company grouping of refineries was made by the Standard Oil Company (Indiana). The frequency rate for its Whiting, Wood River, Casper, Sugar Creek, Greycliff and Laramie Refineries, employing 7,300 workers, is 3.93.

The trophy to the refinery which showed the lowest accident frequency rate among 51 contestants working less than 100,000 man-hours monthly goes to the Ingleside Refinery of the Humble Oil and Refining Company with a record of no lost-time accidents for 547,997 man-hours worked.

(G. L. Farnard accepted the plaque for the Ingleside Refinery of the Humble Oil & Refining Co.)

MR. BLAKESLEE: Thirteen other refineries in this group completed the contest without a single lost-time accident. They are: Barnsdall Refinery, Inc., Barnsdall, Okla.—268,176 man-hours worked.

Next with a perfect record is the Vacuum Oil Company, Rochester Works—203,176 man-hours worked.

(E. R. Alden accepted the award for the Rochester Works of the Vacuum Oil Co.)

MR. BLAKESLEE: The next perfect record in line is Standard Oil Co. of New Jersey, Camden Works—196,293 man-hours worked.

(H. D. Kettel accepted the certificate for the Camden Works of the Standard Oil Co. of New Jersey.)

MR. BLAKESLEE: The next record in line—Conewango Refining Co.—101,360 man-hours worked.

(C. H. Lindberg accepted the certificate for the Conewango Refining Co.)

MR. BLAKESLEE: The next is the Panhandle Refining Co.—109,858 man-hours worked.

MR. BLAKESLEE: The next goes to the Bakersfield Refinery of the Standard Oil Co. of California—95,264 man-hours worked.

MR. BLAKESLEE: Next is the Standard Oil Co. of Indiana, Laramie Refinery—89,711 man-hours worked.

(B. V. Osborn received the award.)

MR. BLAKESLEE: The next certificate goes to The Texas Co., Pryse Works—88,489 man-hours worked.

(V. R. Currie accepted the certificate for The Texas Co., Pryse Works.)

MR. BLAKESLEE: We have another certificate for the Barnsdall Refineries, their Wichita Plant—82,646 man-hours worked.

The next in line is the Humble Oil & Refining Co., their Neches, Chilton & San Antonio Refineries—68,938 man-hours worked. To prevent jealousy among the refineries, we issued a certificate for each one of the three.

(R. B. Rooper accepted the certificates.)

MR. BLAKESLEE: The next certificate goes to The Texas Company, Cody Refinery—Cody, Wyoming, I believe—59,443 man-hours worked; and also there is one for the El Paso Refinery of The Texas Co.—50,614 man-hours worked.

(V. R. Currie accepted the certificates for The Texas Company.)

MR. BLAKESLEE: Next, and the last perfect record in the Manufacturing Department, is the Associated Oil Co., Watson Refinery—28,104 man-hours worked.

These perfect records in the smaller refineries indicate that many small refineries must be exceedingly well managed. In comparison, the 41 refineries working 100,000 monthly man-hours or over, show an average accident frequency rate of 12.46; while the 51 refineries working less than 100,000 monthly man-hours show an accident frequency rate of 32.10. This comparison would seem to indicate that as a whole the larger refineries may be better managed from the viewpoint of accident prevention.

The trophy to the Sales Division, among the 52 competing units in the Marketing Department group with 100,000 man-hours or over monthly, has been won by the Kansas City, Mo., Sales of the Standard Oil Co. (Ind.)—1,226,511 man-hours were worked without a lost-time accident.

(B. V. Osborn accepted the trophy on behalf of the Standard Oil Company of Indiana.)

MR. BLAKESLEE: The Green Bay Sales Division of the Standard Oil Co. (Ind.),

working 889,758 man-hours; and the LaCrosse, Wis., Sales Division of the same company, working 869,931 man-hours, completed the contest without a lost-time accident and are receiving certificates from the National Safety Council.

(B. V. Osborn accepted on behalf of the Green Bay and LaCrosse Sales Divisions of the Standard Oil of Indiana.)

MR. BLAKESLEE: The entire Marketing Department of the Standard Oil Co. (Ind.) employing 23,000 workers, went through the Contest with an accident frequency rate of 3.28. The Marketing Department of the Standard Oil Co. (N. J.) comes second, with an accident frequency rate of 7.60 for 7,400 employees. The best record of the units of the Standard Oil Company of New Jersey was made by the Charleston, S. C., Sales Division, with an average frequency rate of 4.80. The Minneapolis Sales Division of the Standard Oil Co. (Ind.) has the distinction of having worked 1,987,200 continuous man-hours without a lost-time accident which is the best Marketing Department record known. This record was made previous to the 1930 contest.

The trophy of the Sales Division, among the 34 contestants in the Marketing Department working less than 100,000 man-hours monthly, has been won by the Huron, S. D. Sales Division of the Standard Oil Co. (Ind.) with no lost-time accidents for 546,705 man-hours worked.

(B. V. Osborn accepted the trophy for the Huron Sales Division.)

MR. BLAKESLEE: The Southern California Sales Division of the General Petroleum Corporation of California, working 361,960 man-hours completed the contest without lost-time injuries and a certificate is being presented by the National Safety Council for this accomplishment.

(W. C. Lynch accepted on behalf of the Southern California Sales Division of the General Petroleum Corp. of Calif.)

MR. BLAKESLEE: While Mr. Lynch is here, I discovered that the Arizona Sales Division of his Company also worked 27,736 man-hours without lost-time.

MR. BLAKESLEE: The Western Sales Division of the Shell Petroleum Corp., working 289,950 man-hours, also completed the contest with no lost-time injuries; and a certificate is being presented for that accomplishment.

(R. C. Byars accepted on behalf of the Western Sales Division of the Shell Petroleum Corp.)

MR. BLAKESLEE: The trophy in the Producing Department, among the 25 contestants working 100,000 man-hours or over monthly, goes to the Midwest Refining Company which worked 810,280 man-hours with an accident frequency rate of 2.47. The Midwest Refining Company won the Producing Department trophy last year with an accident frequency of 8.31.

(T. N. Shaw accepted the trophy for the Midwest Refining Company.)

MR. BLAKESLEE: The closest competitor of the Midwest Refining Company this year was the Hope Construction and Refining Company, with an accident frequency of 6.77.

The trophy to the Producing Department, among the 36 contestants working less than 100,000 man-hours monthly, goes to the Arkansas Producing Division of the Ohio Oil Company which worked 95,553 man-hours without a lost-time accident.

(J. P. Sutton accepted the trophy on behalf of the Arkansas Producing Division of the Ohio Oil Company.)

MR. BLAKESLEE: To the Indiana Producing Division of the Ohio Oil Company, the Council presents a certificate in recognition of 66,834 man-hours worked during the contest without a lost-time accident.

(G. W. Bell accepted the certificate.)

MR. BLAKESLEE: The Tonkawa Division of the Comar Oil Company, a subsidiary of the Shell Petroleum Corp., holds the distinction of the best known record in accident prevention in the Producing Department of the Petroleum Industry. This division, employing over 200 men, had worked 1,259,023 man-hours without a lost-time accident as of August 1st of this year. This record was started November 23rd,

1928. Congratulations and best wishes are due Superintendent Copeland of the Tonkawa Division of the Comar Oil Company. It is to be hoped that this experience may continue and that the record may be reported as unbroken at the Annual Safety Congress next year. Had the Tonkawa Division been entered as a separate unit this year it would have been among the prize winners.

The trophy to the Natural Gas Gasoline Plants, among the seven contestants working 50,000 man-hours or over monthly, goes to the Midwest Refining Company, Midwest, Wyoming, which worked 362,008 man-hours during the contest without a lost-time accident. The best known record made by a Natural Gas Gasoline Plant shows 654,712 man-hours worked without a lost-time accident. This record was made by this year's trophy winner, the Salt Creek Division of the Midwest Refining Company.

(The trophy was accepted by Mr. T. N. Shaw.)

Mr. BLAKESLEE: The Standard Gasoline Company of the Standard Oil Company of California, last year won the trophy, and placed second this year with an accident frequency of 6.44 for 1,241,528 man-hours worked.

The trophy for the Natural Gas Gasoline Plants, among the 14 contestants working less than 50,000 man-hours monthly, goes to the Hope Construction and Refining Company which worked 175,712 man-hours without a lost-time accident.

(O. O. Perry accepted the trophy for the Hope Construction & Refining Co.)

Mr. BLAKESLEE: Winners of certificates in the smaller Natural Gas Gasoline Plants for records of no lost-time accidents during the contest are:

The Ohio Oil Co., Illinois Plant—100,899 man-hours worked.

The Ohio Oil Co., Rocky Mountain Plant—85,004 man-hours worked.

The Ohio Oil Co., Texas Plant—45,828 man-hours worked.

The Ohio Oil Co., Louisiana Plant—41,742 man-hours worked.

(G. W. Bell accepted the four certificates.)

Mr. BLAKESLEE: A certificate goes to the Texas Pacific Coal & Oil Co.—44,173 man-hours worked.

Shell Petroleum Corp., Brown County Plant—17,129 man-hours worked.

(L. W. Dawson accepted the certificate for the Shell Petroleum Corp.)

Mr. BLAKESLEE: The trophy to the Pipe Line, among the 24 contestants working 30,000 man-hours monthly or over, goes to the Lufkin Pipe Line of the Gulf Companies which worked 317,343 man-hours with an accident frequency rate of 3.15.

(L. A. Brauer accepted the trophy for the Gulf Co.)

Mr. BLAKESLEE: The nearest competitor for this trophy was the Oklahoma Pipe Line Company, with an accident frequency rate of 3.36 with 893,310 man-hours worked.

The best known record in the Pipe Line Department for no lost-time accidents is held by the San Joaquin Division Pipe Line of the Standard Oil Company of California for 334,000 man-hours worked.

The trophy to the Pipe Line among the 14 contestants working less than 30,000 man-hours monthly, goes to the Southern Pipe Line of the General Petroleum Corporation of California, which worked 172,560 man-hours without a lost-time accident.

(W. C. Lynch accepted the trophy on behalf of the General Petroleum Corp. of California.)

Mr. BLAKESLEE: While Mr. Lynch is here, just let me add that two of the certificate winners among the pipe lines of this group are: General Petroleum Corp. of California, Mountain Pipe Lines—115,216 man-hours worked; and General Petroleum Corp. of California, Northern Pipe Lines—111,200 man-hours worked.

(Mr. Lynch accepted the two certificates.)

Mr. BLAKESLEE: A certificate also goes to the Shell Pipe Line Corp., Illinois & Indiana Pipe Lines—154,673 man-hours worked.

(L. W. Dawson accepted the certificate.)

Mr. BLAKESLEE: A certificate also goes to the Associated Oil Co., Southern California Pipe Lines—138,464 man-hours worked.

To the Midwest Refining Co. goes a certificate for 149,536 man-hours worked. (T. N. Shaw accepted the certificate for the Midwest Refining Co.)

Mr. BLAKESLEE: A certificate goes to the Standard Oil Co. of New Jersey, Inter-Refinery Pipe Lines—61,600 man-hours worked.

(R. W. Black accepted the certificate for the Standard Oil Co. of New Jersey.)

Mr. BLAKESLEE: Among seven tanker fleets competing in the Marine Department, the Atlantic Refining Company came out in first place and won the trophy with a frequency rate of 15.04 with 797,840 man-hours worked. The Marine Department is the only department which did not contribute to the 29 per cent improvement in accident reduction as shown by the 1930 contest. The Atlantic Refining Company won the Marine Department trophy last year with an accident frequency rate of 11.65. Some one missed an opportunity to make a lower record in this department.

(J. S. Hunter accepted the trophy on behalf of the Atlantic Refining Co.)

Mr. BLAKESLEE: The 1930 Petroleum Section Safety Contest has demonstrated what the petroleum industry can do through concerted action to prevent accidents. It is hoped that there will be no resting on laurels obtained and that the same stride which has been set in this year's contest will be continued for the remainder of the year, thereby making 1930 the most outstanding year thus far in accident prevention work in the petroleum industry. It is also hoped that this improving stride will continue through the years to come.

PRESIDENT PETTIBONE: I do want to say for the National Safety Council, or, rather, its Executive Committee, that we are awfully glad to be able to furnish the trophies and certificates for the awards. Certainly, all the credit in the world is due to the winners, and yet I can't help but feel that this is one contest where, even if you don't get a trophy or certificate, you haven't lost. Anyone who has tried and competed for one of these certificates or trophies has unquestionably done a great deal to save lives and prevent injuries; so you have won even though you have lost. And I hope that many of you will be in here next year to take the trophies away from the people who got them this year.

J. W. MYERS (Standard Oil Co. of New Jersey, New York City): Just one point that Mr. Blakeslee hasn't mentioned, and that I think throws a lot of light on the significance of our work—the industry. As a result of the last three years' work, our frequency rate goes down now to 17, as compared to 25 for all industries connected with the Council. So that, despite the hazards of the petroleum industry in all its branches, which we know only too well, our rate is one-third below that for all industries. I think we can have every reason to be proud of that, and we can take that message back to our executives as a further incentive to bring the rate still lower.

ADJOURNMENT

Thursday Morning Session
October 2, 1930

R. E. DONOVAN, Chairman
 Standard Oil Company of California, San Francisco, Cal.

The third session of the Petroleum Section convened with Chairman Donovan presiding.

CHAIRMAN DONOVAN: I'm going to introduce to you Mr. Leopold F. Adamiak, Mining Engineer of the Polish Bureau of Mines, who will talk to us on "The Investigation of Petroleum Industry Accidents by the Polish Bureau of Mines."

**Investigation of Accidents in the Petroleum Industry by
 the Polish Bureau of Mines**

By LEOPOLD F. ADAMIAK
 Mining Engineer, Polish Bureau of Mines, Poland

Almost every kind of human labor exposes man to some danger, which, however, can be averted. Safety from hazards depends both on caution on the part of the individual and the establishment of such methods of routine work as would prevent accidents; in other words, safety rests on experience.

Routine operations in the oil fields being particularly hazardous, the prevention of casualties in the petroleum industry requires searching investigation of the sources of accidents. This is the slogan of the safety organization in the Polish Bureau of Mines.

The Development of Polish Petroleum Industry

Polish petroleum industry developed in Small Poland, the southern part of the present Republic of Poland. Up to the close of the World War this part of the country was annexed to Austria as the result of the temporary loss of independence of the Polish nation and the partition of the ancient Polish realm. No conqueror rule was ever favorable to the interests of the people, and this proved emphatically true in the case of Poland. In the sixties though, due to a general change of policy of the Austrian Empire, Small Poland (then termed Galicia) was given limited autonomy rights which, in spite of the many restrictions, allowed a certain range of action to the native genius and initiative. Beginning with this period the situation of the southern part of the land became by far more tolerable than the fate of Central Poland under the Russian sway and of Western Poland (Great Poland) under the regime of Prussia.

The early stage of the Petroleum Industry in Small Poland goes back to 1855. The climax of the production was reached in the years 1905-8, owing to the discovery of the Boryslav basin where some of the wells yielded an output reaching 10,000 barrels of crude oil per day. Special mining authorities were constituted in 1874, approximately corresponding to the Bureau of Mines in the states of your Union. The organizing of these authorities was one of the many features bearing evidence to the native spirit of initiative as soon as the people were enabled to do things by themselves. After the re-establishment of independent Poland, these local mining authorities were substituted by the Mining Authorities of the Republic (the Polish Bureau of Mines).

Organization of the Polish Mining Authorities

The Polish Mining Authorities are organized on the general principles of government administration. Their supreme executive power is vested in the Mines and Foundries Department of the Ministry of Industry and Commerce, in Warsaw. The next link down the executive ladder consists of three so-called High Boards of Mines, each of these exercising authority over four District Boards, the total thus amounting to sixteen components. The District Boards of Stanislawov, Drohobycz and Jaslo supervise areas where oil fields are the prevailing feature. These District Boards of Mines have immediate control of the safety work, and they are empowered by law to issue regulations for accident prevention and enforce these regulations.

The District Board of Mines extend complete supervision in the oil fields, they oversee permissions to drill, drilling, shutting off water, producing, mine statistics, etc. The staff of the District Boards consists exclusively of mining engineers subordinated to the chief of the office.

Foremen and Drillers

Under the Oil Mining Act issued in 1908 each routine operation in the oil fields has to be directed and supervised by the foreman (tool-pusher) and the driller. The District Board of Mines decides on the number of wells assigned to the care of each foreman, this is usually under five for the drilling period and sixteen to twenty, on the average, during pumping or swabbing. The assignments vary in accordance to the local safety conditions and, in no lesser degree, to the education and experience of the foreman. The requirements in this respect are at present pretty high. In order to qualify the foreman candidate must have graduated as mining or mechanical engineer, possess a thorough knowledge of mining laws and regulations, and a two-year credit in practical work, reported to the Board of Mines at the beginning and the close of the term.

The driller has to be a graduate of a special school, the curriculum of which covers two years and includes instruction in safety. The practical work required of the driller candidate is a three year's term, at the least. Moreover, he has to pass an examination before a committee consisting of a delegate of the District Board of Mines as chairman and two members, a mining engineer and an experienced driller. Upon passing the examination the candidate is given his driller certificate.

The names and qualifications of all foremen and drillers within the district are listed in the books of the District Board of Mines.

The foremen and drillers are held personally responsible for casualties in the oil field. On entering upon his duties the foreman has the right to require the providing of adequate safety equipment. In the case of a refusal on the part of the oil operator, the latter is the person responsible for eventual accidents.

"Sickness Chests"

The working men injured while employed in the oil field are cared for in the hospitals maintained by the so-called "sickness chests." These are semi-state institutions organized by the independent state of Poland, not by any of the previous conqueror governments. Membership in these "chests" is obligatory on all working men. The sickness chests take care not only of the working man but of his dependents as well.

State Accident Insurance

All working men have to carry accident insurance. They are insured in the State Accident Insurance Institution which has been organized on thoroughly modern principles by the present State of Poland. The insurance rates are paid in, one-half by the policy holder (the workingman) and in the other half by the oil operator. In cases of permanent disability the Accident Insurance Institution pays the injured man a yearly pension. In the case of death the pension is paid to the widow and the children.

The working man who sustained a serious injury in an accident charged to the oil operator has the right to sue the latter in court for a lump-sum compensation.

Classification of Accidents

Under the penal law in the Republic of Poland the injuries sustained by the working men while employed in the oil field are classified as serious in the case of (1) resulting into deformation of the body or the loss of a limb, (2) necessitating 20 days and up of medical treatment. The first case comes under the heading "Direct seriousness of injury", the second one is "Serious injury due to the length of necessary treatment".

Casualties calling for less than 20 days of medical treatment are classified as light injuries and do not involve punishment of the persons responsible for the accident.

Office of State Attorney

A state attorney office is attached to each District Court in Poland. In cases of actual or suspected transgression of the obtaining penal laws, the state attorney conducts a preliminary inquest to be followed by prosecution in court on the grounds of sufficient evidence. In the absence of such evidence the inquest is dropped.

In fatal and serious injury cases, charged on ascertained evidence to inadequate safety equipment or any other indirect cause of the given casualty through the fault of those held responsible, the latter are punished under the provision of the penal law. The state attorney and the court are guided in their judgment of the case by the opinion of the District Board of Mines.

Reporting of Accidents

Accidents in the oil field have to be immediately reported to the respective District Board of Mines. Each particular report has to be issued in four copies, all of them signed by the foreman. Report forms used in the Polish oil fields are almost identical with those in use in the United States. Fatal cases must be reported over the telephone, this to be followed by the written report.

The District Board of Mines forwards one of the report copies to the local "Sickness Chest" and another one to the State Insurance Institution. The state attorney for the district must be advised of all serious injury cases; this is being done, as a rule, upon the investigation of the accident by the District Board of Mines. However, in some particular cases the District Board of Mines would send a copy of the accident report to the state attorney without investigating the given accident. This happens in the cases of injuries which do not involve any serious harm to the individual but, due to some secondary cause, might require over 20 days of medical care. Here is an example to illustrate such occurrences. The casualty may be an insignificant wound on the man's finger, coming by its nature into the class of light injury, but it may develop infection which demands a treatment longer than 20 days. Such a casualty does not by itself demand investigating by the District Board of Mines, yet should the treatment outlast the period of twenty days, the case becomes one of

serious injury calling for the punishment under the law of the person responsible for the accident. Hence the need of advising the state attorney who has to step in upon the lapse of the 20 days of medical care. The doctor of the local "sickness chest" is the one who opines whether or not an injury of this class requires more than 20 days of treatment.

In a serious injury case the District Board of Mines delegates one of its staff to investigate the accident on the spot.

Investigation of Accidents

The delegate of the District Board of Mines investigates all the details of the accident right on the spot for the purpose of, (1) establishing the cause of the accident, (2) finding out to whose fault this cause should be charged. The establishment of the accident cause contributes to gathering material for prevention work, the finding out of the one responsible for the casualty constitutes the foundation for the District Board of Mines opining on the given case, this opinion to be sent in writing to the state attorney.

The investigation by the delegate is conducted in the presence of the witnesses to the accident, the foreman, driller and the injured man himself, his condition permitting him to attend the process. The delegate of the District Board of Mines interrogates the witnesses, makes drafts and takes pictures of the accident's spot. He has the right to have the drilling operations in the oil field stopped for the time of the inquest. He is empowered to order a demonstration of the process of the accident, so far as is possible. The foreman and the driller make depositions regarding the cause of the accident, wherein they should be guided by their experience in the oil mining.

In especially complicated cases the District Board of Mines has the right to employ the services of experts for investigating the accident. The selection of such experts rests with the District Board itself.

The delegate of the Board of Mines draws a protocol of the proceedings over the signatures of those present at the investigation. In the case of the injured man being at the hospital the delegate has to examine him there and to commit his answers to writing.

The District Board of Mines does also investigate the accidents as distinguished with the Board's opinion on the case, to the State attorney for the district. A report on the accident is sent in to the respective High Board of Mines.

The District Board of Mines does also investigate the accidents as distinguished from casualties, viz. the unforeseen occurrences in the oil fields which although no injury has been caused might have turned to be the cause of injuries. Investigating fires in the oil fields is also the province of the District Board of Mines. This is being done almost exclusively for prevention purposes, not with the view to establishing the responsibility for the accident or the fire.

Prevention of Accidents

The policy of the Polish Mining Authorities is to base the accident prevention work on the total of obtainable experience, to wit: the accident statistics and the investigation of accidents on the spot. On the basis of data thus provided the District Boards of Mines in Stanislawow, Drohobycz and Jaslo issue circulars and instructions for their respective oil mining areas, and the High Board of Mines in Cracow issues safety regulations binding in the petroleum industry throughout the country.

Early this year the Polish Mining Authorities, with the cooperation of the Polish Oil Mining Engineers' Association, in Boryslav, started on the important work of standardizing the Polish cable drilling devices. At present the Polish Mining Authorities are also cooperating with the so-called "Time and Motion Investigating

Bureau" which is doing for Poland what Henry Ford has done for America. The scheme is the standardization of the work methods of the derrick crew.

Regulations for Efficient Accident Prevention

The following is a copy of a circular issued in April, 1930, by the District Board of Mines in Drohobycz; it may serve as an example illustrative of the supervision of the District Boards in the matters of safety:

"There occurred lately many serious accidents at the cable and cable-pole drilling of oil wells. These accidents resulted from the defective handling of the job by some of the working men.

"Here is an instance. A fatal case occurred recently as a result of the faulty handling of the bull-wheel while the drilling bit was being changed in the derrick.

"Furthermore, there occurred a few serious accidents in making up joints with wrenches, circular track and jack, also several accidents in handling bull-wheel ropes and one case of falling into the cellar.

"In order to prevent such accidents in the future we do hereby issue the following regulations, based on Sec. 71 of the oil laws of this country (passed March 22, 1908) and agreeing with the resolution passed in these matters at the oil conference in Boryslav, March 27th last.

"1. The important drilling operations, such as the handling of bull-wheel brakes should be assigned exclusively to skilled drillers and experienced assistants.

"2. The brake lever of the spare bull-wheel (*) should be built in a manner allowing the working of the brakes without the driller having to shift his position.

"These regulations refer to drilling devices at cable and cable-pole rigs erected subsequent to April, 1920. It is also recommended that the above mentioned devices be installed on wells that were already in operation at the time this circular was issued.

"3. The jacks used for making up and breaking out the drilling tools should be kept in perfect condition, inspected periodically. Spare jacks should be kept on hand.

"4. The bull-wheel ropes should be:—

"(a) Provided with railing while in motion so as to prevent any of the working men coming in contact with bull-ropes.

"(b) Fastened or hung up when removed from the bull-wheel so as not to be caught by the moving machinery.

"5. A two piece iron grate should be placed under the derrick floor to prevent the working men from falling into the cellar when floor boards are temporarily removed.

"6. No tools should be used for putting twist in drilling cable other than self-opening keys, circular wrenches, etc., which are safe to handle by the workman in the case of the drilling cable untwisting.

"7. The workmen should be instructed to stand at side of jack lever when using circular track and jack.

"8. In conducting drilling operations inside the derrick some of the oil tools may happen to fall to the floor, in which case the only part of the derrick safe to stand upon is the one protected by platforms inside the derrick. Therefore standing on any other unprotected spot in the derrick should be allowed exclusively to the working men who have to attend to some definite and special job.

"9. Detailed instructions should be worked out for regulating the operation of oil wells which are drilled by the cable-tool or cable-pole methods. The workmen should be carefully instructed how to attend to the most important drilling operations such as the lowering, pulling out and changing of the bit, the twisting, casing and so forth.

"10. Special attention should be given to preparing instructions about the operating of the oil wells where the work is speeded up on account of a bonus being paid."

"A second bull-wheel is used in Polish oil fields that is not seen in your country."

It should be remembered that the Polish Mining Authorities, first organized in 1874, have over fifty years of safety experience to their credit. Upon the foundation of this long time experience they are working steadily toward ever better results. The circular just quoted indicates the ever increasing attention given to investigation of accidents on the spot. Detailed investigation of each case of serious injury is found to be of greater importance for accident prevention than the considering of statistics, although the latter could not and should not be neglected in any way.

The nearest future will doubtless be the era of many remarkable improvements in the industrial life of Poland, including the petroleum industry. The first ten years of the independence of the Republic had to be devoted to rebuilding the country out of the ruins caused by the World War and the hostile alien regimes of the partition period. This task being accomplished the national genius of initiative is sure to manifest itself along all the lines of World Progress.

CHAIRMAN DONOVAN: I am sure that Mr. Adamiak's paper gives us a very thorough picture of what they are doing in Poland for safety.

Now, Mr. Hartzell, assistant director of safety of the Standard Oil Co. of Indiana, was to have given us a paper on "Accident Prevention in Bulk Marketing Plants." Mr. Hartzell couldn't get here, and I understand that Mr. B. V. Osborn is going to pinch hit for him.

Accident Prevention in Bulk Marketing Plants

By R. A. HARTZELL

Assistant Director of Safety, Standard Oil Company (Indiana), Chicago, Ill.

The subject which has been assigned to me for presentation to this representative body of petroleum men, is, I am sure you will agree, large and complicated.

The nature of the products handled in the petroleum industry requires a perfect understanding on the part of employees as to the hazards that might be caused by improper handling, and hence the necessity of being preventive minded.

The prevention of accidents is a never ending job. Even though success has attended our efforts over a certain period of time, it is necessary to continue a strenuous program in order that all employees may continue to be alert to all the possibilities of accident.

It is obvious that every precaution must be taken to prevent fires that will destroy our property and profits; it is equally obvious that personal injuries must be avoided in order that the employee receive a full pay check and keep, at the same time, our personnel intact for efficiency in our program of service.

In order to arrive at this ideal condition, the officials and supervisory forces must adopt rules and principles governing the various activities of the industry, and implant them indelibly in the minds of every employee.

Furthermore, proper construction of the fireproof type and up-to-date equipment are almost an absolute necessity to successfully operate such units of the industry as marketing centers or plants. A continual program of improvement that removes obsolete buildings, equipment, and methods of handling is an important factor in keeping the industry level with advanced ideas of efficiency.

Assuming that equipment is kept in good condition, there is no greater hazard in petroleum products than in various other products in so far as storage and marketing are concerned, if a few simple rules are kept in mind and observed.

It is necessary in any business to have some rules that are iron-clad because of the inclination of the worker to forget his instructions when charged with certain duties. Rules are merely instructions put in writing as a basis for disciplinary action when instructions are forgotten or disobeyed.

In the first place, every man in charge of such a plant must know, or devise, such regulations as are necessary, and then insist that every employee be thoroughly

acquainted with, and obedient to, those regulations. In other words, we are again more dependent on the prevention minded employees than upon mechanical safety.

One great difficulty encountered in the organization and subsequent advancement of accident prevention in marketing, is the wide territory over which small bulk plants are located. Most of these small storage and sales centers are in the charge of one man, an agent, who operates the plant and delivers the products by means of a motor tank to various service stations and consumers in a specified territory.

To insure proper operation of such units, the agent is first given complete instructions, and then kept up to date in all matters by supervisors in charge of general sales activities who visit these plants frequently. By enlisting each supervisor in the good cause of accident prevention, it is possible to carry on the educational program with these employees to a successful degree.

These small bulk stations include, as a rule, a small warehouse, several tanks, a pump house, with either gasoline engine or motor equipment, tank unloading apparatus, motor tank loading dock, and many other features to take into the same consideration as the larger plants.

There are three outstanding features of accident prevention at bulk plants, that may be discussed at this time as follows:

1. Fire hazards.
2. Storage and handling.
3. Personal injury to employees.

Each of these subjects may be sub-divided in order to be handled with clearness to our listeners—therefore, let us first deal with fire hazards and sub-divide as follows:

- (a) Cleanliness and orderliness of the plant and premises.
- (b) Grounding and bonding.
- (c) Unloading tank cars.
- (d) Equipment.
- (e) Electric installations and control switches.
- (f) Automobile and tank truck exhausts.
- (g) Tools and spark producing instruments.

The above headings bring about the following necessary precautions, regardless of the size or location of the plant.

All grass and weeds should be kept closely cut and the cuttings removed from the premises. Oily rags and other combustible materials should be placed in a metal receptacle with a tight cover, furnished especially for this purpose. All oil spills and similar conditions should be cleaned up immediately, dry sand being a good covering of oily ground not possible to remove. Where paved yards or drive-ways are installed, the spills may be wiped up with rags and then washed down with water. Good housekeeping should be in effect at all times inside of warehouses and other buildings on the premises. Storage of products should be given considerable consideration to enable employees to properly handle the packages without danger of injury, and to make it possible to maintain a neat, clean storage room.

Grounding of pipe lines, unloading apparatus and rails of the side track are considered a necessity to avoid danger of sparks from stray current from such sources as electric railways, steam railway, signal circuits, power lines and electric systems of the city, or in the plant itself.

To protect plants from such stray current and static where overhead unloading is done, rail bonds should be brazed to all rail joints of both rails of the side tracks serving the bulk plant within at least one half car length of both sides of the overhead unloader. A strand of bare annealed copper cable should be brazed to the base of each rail and carried across to the pipes of the overhead unloader. This wire should then be soldered to ground clamps which have previously been sweated to the overhead unloader. When this installation has been completed and a tank car is spotted in front of the overhead unloader ready for unloading, it will be seen

that all eight wheels of the tank car are standing on a bonded section and this section is electrically equalized with the pipes of the overhead unloader. Then if stray current should flow it will follow the path through the cable rather than follow up through the tank car thence to the unloading pipes and down to the piping system. Therefore, no electrical sparks can occur at the top of the car when the down pipe is being inserted or withdrawn.

Frequent inspections of bonds should be made, as the constant vibration and expansion of the inter-rail apertures is a strain on the bonds, which in time wears them out.

Storage tanks, pipe lines and motors should all be grounded to bleed off all stray current from either outside sources or from defective equipment in the plant itself. Motor tanks, prior to opening for loading, should be grounded by means of a separate clip to equalize any difference in potential that might exist in the tank and pipe lines used in loading. Stray current, or even static, might be present and cause a spark if grounding is neglected, with resultant fire or explosion.

It might not be amiss at this point to call attention to the danger of electric power lines over unloading apparatus and storage tanks. This should be avoided wherever possible, and in any event installation should be high enough to make any contact with tools impossible.

The unloading of tank cars entails several definite hazards from both personal injury and fire standpoints. Slipping while opening the dome and placing unloader is always to be guarded against, especially during winter months when ice and snow are prevalent.

The use of steel bars or hammers in opening domes is not advised. Oak bars, non-ferrous bars, and, in case of necessity, a wood or lead hammer, are tools that will cause no sparks and are, therefore, approved implements. Care should be used in handling the dome cover that it does not scrape on the car dome and cause a spark.

A dome should not be left open during the unloading process. Sparks which may be emitted from passing locomotives or other sources might play havoc should they chance to drop into an open tank car. It is a good practice to place water moistened burlap or canvas around the loading spout. Better still, a standard adjustable cover of canvas lined wood has been designed by some companies for this purpose. If burlap or canvas is used, care must be taken to see that they are kept moist lest they become a hazard rather than a protective measure.

There should be a strict rule against unloading cars of volatile liquids after dark, and therefore artificial light will seldom be needed.

If it is necessary to bring a light into use for the purpose of inspecting or looking inside of a tank car only an approved type of flashlight should be considered. The folly of using a lantern or match is obvious. Almost as much to be condemned is the use of electric extension cords for this purpose. Short circuits too often occur, creating sparks that cause fire and explosion. Even when using an approved flashlight the contact to turn it on and off should be made only in the open and not inside the dome.

It is scarcely necessary to mention that smoking by employees working about the tank car is to be forbidden. No leniency should be extended to the employee who sees fit to defy our code in this respect. It is our duty to eject the right-of-way trespasser and the casual loafer who chances to loiter about our premises, with nothing else to do but contentedly observe operations with a lighted pipe, cigar or cigaret in his mouth with no regard as to where he throws the ashes, butts or matches.

In addition to the suggestions already made, every unloader or helper should be thoroughly acquainted with, and follow, the instructions of the Interstate Commerce Commission governing this work.

The equipment used in handling gasoline, naphtha and kerosene must be given serious consideration. Under no circumstances should gasoline or kerosene be pumped through the same pipe lines, either in unloading cars or transferring from storage. Separate pumps should also be used in the handling of these two products.

The use of the same pump and pipe lines for these two products allows a chance for mixtures in storage and resultant stock losses, if nothing more serious. This precaution should be observed at all points of distribution regardless of how small the bulk marketing plant may be, if these products are both handled at that point.

The pumping units used are generally of two types, namely, the electric motor and the gasoline engine. The latter type, still existent in some small bulk stations, is fast being replaced by the electric motor unit.

This equipment should be replaced in a pump house separate from all other buildings and remote from loading and unloading operations, to eliminate the danger of ignition of gases escaping into the air while these operations are in progress.

The pump house should, of course, be of a well ventilated type as well as fire-proof construction. The vents from gasoline engine exhausts should discharge outside of the pump house and have a muffler to eliminate carbon sparks. Motors are of various types, and should be inspected frequently to insure operation with as little sparking as possible. The explosion proof motor is, of course, the most desirable.

Electric installations are, undoubtedly, a most important factor in the safe operation of the bulk plant, and owing to the many fires and explosions caused by improper or faulty electric installations the following suggestions are presented as effective in our organization. These suggestions concern hazardous locations.

"Hazardous location" means any location where a dangerous concentration of gasoline, or other flammable vapors, may exist, either in normal operation or by accident, such as the overflowing of a tank, breaking of a pipe line, or leakage from pumps. This covers such typical places as pump houses and loading equipment installed or operated inside of buildings or close to entrances.

These hazards should be removed as far as possible by allowing no inside loading of flammable products, and the entire removal of equipment for this purpose installed outside and remote from other operations. All electric switches, when operated, cause an arc when contact is made or broken, and are, therefore, a menace where flammable vapors exist.

Therefore, knife switches either open or enclosed, including so-called "safety switches", are dangerous, unless they are of the oil immersed type. They should be removed to a remote location where vapors cannot come in contact with them when operated. Push button and snap switches are equally dangerous, and should be remote from hazardous locations.

Oil immersed switches often have thermal cut-outs, above the oil, and when these operate by reason of over-load there is the same danger as in an open knife switch. These parts, if not oil immersed should be removed to a weather-proof box remote from any vapors.

All switching devices not oil immersed, fuse plugs and control devices, should, therefore, be removed from hazardous areas and placed in weather proof boxes. All electric wiring should be in rigid sealed conduit to prevent vapors getting into control boxes.

Electric light installations should be vapor proof with switches of vapor proof type or removed to an outside location. Extension lights should not be used in hazardous locations because of the constant danger of short-circuits and consequent explosion and fire hazard. Use approved type of vapor proof flashlight only when artificial light is necessary.

The exhausts of automobiles and trucks present considerable danger, and engines should be shut off when volatile liquids are being transferred in proximity to, or into, these vehicles. Also in case of spills while loading, the vehicle should be pushed

away before starting the engine, as a carbon spark might ignite the vapors arising from the spill.

Steel striking steel will produce sparks sufficiently hot to create a hazard of fire or explosion in flammable vapors, and, therefore, caution is necessary while doing repair work in the plant, especially around pump houses and tanks. The use of non-ferrous tools is advised where this danger exists.

The next division of subjects is storing and handling, which may be sub-divided as follows:

- (a) Tankage.
- (b) Valves and lines.
- (c) Loading docks.
- (d) Barrel filling.
- (e) Storage in buildings.

Taken in the order named, the following precautions are advisable. Tanks should, first of all, be gas tight, and equipped with a relief valve for escape of excessive pressure. Also a safety check valve should be installed inside of the tank at the outlet pipe.

The purpose of the check valve is to shut off the flow directly at the tank when all other valves may be open. These check valves can be opened and closed by pulling or releasing the rope which leads to the rod inside the tank. The purpose of the safety check valve is sometimes thwarted by the substitution of wire for rope on the outside of the tank. Should a valve be open at a time when a fire might occur reaching the safety check valve wire, obviously the valve stays open until the wire should melt. Rope would snap immediately and the valve close. These valves should not be allowed to remain open constantly; they should be opened and closed as often as a product is pumped from the tank. Allowing a weight to hold open the valve constantly, also defeats its purpose since the pulley wheel or lever on which the rope operates needs exercise to keep it in working order.

All pipe lines should be painted to show the nature of the product handled by that line; that is, gasoline, kerosene, or other products. Previously, I have advised the use of separate lines for gasoline and kerosene, regardless of the size of the plant. Our gasoline lines are all painted red and kerosene lines gray.

All valves should be tagged with the name of the product controlled by them. This includes the valves in the pump house, at the tank, at the loading docks, and wherever there may be a possibility of confusion as to proper progress of the product to its ultimate destination.

Loading docks should, in all cases, be outside and remote from other operations, and if supplied with electric light, the system should be vapor proof. No loading should be done without the grounding device, previously mentioned, being used.

Barrel filling with flammable liquids should be done outside of buildings, or at least where there is good ventilation. The handling of steel barrels, both empty and full, is the cause of numerous personal injuries, and proper methods of handling should be provided.

In case of inside examinations of barrels only a vapor proof barrel lamp should be used. Barrel explosions are usually serious.

Storage in buildings in so far as flammable liquids are concerned, should be prohibited, except possibly in small quantities in sealed containers, such as samples. Other storage, such as barrel and box goods should be systematically arranged to allow handling with the minimum of danger from injury. Improper storing of barrels and boxes often causes serious injury, either from collapse of tiers, or from difficulty in moving the goods.

The third subject is that of personal injuries to employees, which sub-divided, include the following:

- (a) Handling material.
- (b) Mechanical.

(c) Supervision.

Handling material includes, for the most part, barrels, boxes, pumps, motors and tanks of various sizes. The injuries sustained while performing this work are from the same causes that exist in almost all industries. Therefore, the hazards are not peculiar to the petroleum industry in any way. The precautions to take are the same that have been discussed at various times in the past, and require no further comments at this time.

Mechanical hazards are also of the same nature as found in any machine shop, carpenter shop, garage, and repair shop, and are, therefore, not peculiar to our industry. However, all mechanical guards should be installed, goggles should be worn when necessary, and the usual educational activities be carried on.

Supervision is the key to the success of any safety organization, that their aim of 100 per cent accident prevention may be successful. The supervisor, or foreman, is the employee to whom has been given the duties of carrying on an economical program of work. His first duty is to properly instruct his men as to their duties and procedure. He must then follow up these men to assist and teach them in regard to specific duties until he has a working force of safe, efficient workers, who make no mistakes and have no accidents to mar an economic production for the company that employs them.

It is through these employees with executive power that we must expect to have our policies and rules implanted in the minds of the employees with a full understanding of the importance attached to them.

CHAIRMAN DONOVAN: I am sure that paper was chuck full of safe practices in the Marketing Department; and, to prove that it works, all you have to do is look at the record of the Standard Oil Company of Indiana.

CHARLES H. FISHER (Universal Oil Products Co.): I'd like to ask the speaker whether or not he believes it is advisable or necessary to ground a tank while being loaded.

B. V. OSBORN (Standard Oil Co. of Indiana, Casper, Wyo.): I think it is our practice, although you understand I'm not employed in the marketing division myself. But I believe they ground the tank wagons both while being loaded and unloaded.

MR. BOND (Standard Oil Co. of New Jersey): I think it is most essential that it be grounded while loading, because a tank is insulated from the ground by rubber tires. Consequently, the tank acts as a condenser, and builds up charge unless it is grounded.

Isn't it safer to have your loading rack—your loading dock—without a canopy—have it open?

MR. OSBORN: Instructions have been issued in our company in the refineries, and I believe also in the Marketing Department, that all these loading racks, including our general gasoline loading racks at the refinery, shall be grounded—shall be insulated.

GEORGE F. PRUSSING (Union Oil Co. of Calif., Los Angeles): I think in certain locations the amount of electrical protection to be given to tank car spots is entirely different from what is needed in others, and the discussion that we had in the American Railway Association and American Petroleum Institute bears that out. If anybody, however, doubts that the complete insulation of a spur track from a main track—from a main electrical railway—is essential, I can cite one instance where a serious fire almost occurred as a result of bridging an insulated joint, at a refinery where gasoline is loaded on a spur track served by the Pacific Electric Railway, a railway operating at about 600 volts at that point. The spur track is long, and the insulated joint which separates the spur track proper from the main railway is shorted out by the usual switch, so that the train may enter the spur. On this particular occasion a rather heavy string of cars was brought in, and the last car bridged the insulated joint. After the string of cars was dropped by the electric locomotive, the operators made sure that the switch had been opened which normally shorts out the bond and

the rails. However, he didn't notice that one pair of wheels was on the outside of the insulation.

The car filler put the spout, which is of brass, down into the car; but, before that, went through the usual routine of putting on a grounding clamp on the lug of the dome. While the spout was in place and just as he was about to open the valve so that gasoline might enter the car, the electric locomotive on the main line started up with a heavy train. There was a surge of current through the return rails, and part of that current entered the spur track. Now that spur track was grounded; that is, insulated from the main line, and it was bonded through the loading rack, which is of steel, and bonded to the rails. But in spite of that, due to the weight of the current, the bonding clamp actually melted off and a spark passed from the loading spout to the edge of the car dome sufficient to give the car loader the fright of his life. He jumped from the car.

Now, it just happened that that car was apparently vapor free. It may have been cleaned out before it came in, but there are the facts. We have what is left of the bonding clamp as a good advertisement for caution. But no fire resulted. Had it occurred a moment later—if that valve had been opened—you can readily see what might have resulted.

But there is a special instance which isn't common to steam railways. You don't get a surge of current like that with a signal system. And the question has been raised time and again whether it is necessary to insulate the spur track, provided that you thoroughly ground it. There is no question, however, on the electric railway.

G. F. C. TAYLOR (Shell Eastern Petroleum Products Corporation, New York): There is one point I'd like to bring out with regard to the control of internal valves on tanks. The paper read suggested that rope should be used. Why isn't it a better practice to use a small wire with a fusible link on it. Then you've got something that will be positive in its operation.

MR. OSBORN: The only answer I could give to that would be you can't always tell where the point of fire is going to come. If you were sure the point of fire would come where your fusible link was, you'd be in good shape, but you might have to have a rather lengthy fusible link there for that purpose.

MR. TAYLOR: The practice is to put a fusible link close to the ground, and use a very fine wire. We haven't had any fires around the plant, but we feel that is a practical proposition. The wire is just heavy enough to control the valve. It goes about as quickly as a rope.

T. N. SHAW (Midwest Refining Co., Midwest, Wyo.): I would like to ask Mr. Prussing if it's not only possible, but probable, that spurs from steam railways might, somewhere in their system, cross electric lines in that city that might transmit a current.

MR. PRUSSING: I think there is no question about it, especially in a city served by an electric railway. Every city with a street railway system has that hazard. There are, however, a great many locations where that hazard does not exist. The railways have always been rather skeptical about the insulated rail joint because the rail insulation once in place is seldom tested and is subject to very rapid deterioration. It's not 100 per cent unless renewed occasionally. For that reason there's been a good deal of discussion as to how far one should go with the use of insulating joints between the spur track and the railway. However, if the spur track is even on a steam railway and within five miles of an electric railway raising the hazard, caution is certainly warranted.

MR. TAYLOR: We had an experience with a steam railroad that shows you can get a sufficient spark if the joint isn't properly made to cause a fire. One of our comparatively new bulk terminals was supposedly O. K. so far as insulation was concerned; but, when making up the joint, they insulated one side of the rail and didn't insulate the other. A car unloader was unloading by gravity. He made up his connection; and there was a spark emitted from the hose. There was a slight

amount of gasoline drippings on the ground, and there was a flash. Now that was from a steam railroad. They made an investigation and discovered the voltage on there which didn't exceed 70 volts. It was a leak from the signal system, but still the voltage was enough to cause a spark that would, if someone hadn't been around to take care of the situation, have caused considerable damage. Even with steam railroads using electric signals, it's just as essential that your bonding be properly installed as on an electric railroad.

CHAIRMAN DONOVAN: Mr. Lloyd Stone, representing the University of Tulsa, Tulsa, Oklahoma, was going to give us a paper on "Future Petroleum Executives Should Know Accident Prevention," and I understand our good friend, Henry Boggess, Sinclair Oil and Gas Co., Tulsa, Okla., is going to pinch hit for him.

Future Petroleum Executives Should Know Accident Prevention

By LLOYD STONE
Manager, Tulsa Safety Council, Tulsa, Okla.

For years it has been an axiom in safety work that education is one, if not the most important, factor in accident prevention work. We have stressed, and heard stressed, this important fact over and over since we accepted the responsibility of cutting down our huge "life and limb" overhead in industry.

We have spent lots of time in stressing the value of foreman-training, placement of men and the proper instruction of new workmen and this phase of safety work is bearing fruit.

In establishing this course in Petroleum Safety Engineering in the Petroleum Engineering College of the University of Tulsa, we are just trying to give this education phase a practical chance to prove itself, and while it may not cut our accident frequency rates down this year or next year it is bound to save hands and arms for workers in the oil industry in the future. The men who are devoting their time and energies to this work will reap lower frequency curves in their own plants and organizations through this new departure in industrial accident prevention work, and the entire industry, particularly in the Mid-Continent field, will benefit from it.

The oil industry, as we know it today, is an infant industry among the business giants of the nation. It is new and has hazards that are peculiar to itself. In this industry we find many hazardous divisions and from the day the drilling location is staked until the gasoline goes out of the automobile in the shape of energy and exhaust vapors, the whole chain of production, manufacturing and distribution is fraught with unusual hazards involving millions of men daily.

During the first few years, in fact clear down until now, the oil industry has appealed to the adventurous. The chance, glamour and dangers were a part of the picture. The big thing was to strike oil, produce the wells. Speed was the thing, both the cost. Money was poured in without thought and they got oil—certainly oil—but with this black gold came an enormous toll of life, limb and suffering. An economic cost that has never been fully determined.

We built rigs and paid no attention to anything that resembled the thing we call the safety-factor. In the drilling field, accidents were as common as bad lunches. Drillers and tool dressers took the chances as a matter of course and every well, duster or gusher went down at a cost of two dollars and one accident per foot. Then came the pipeliners, with the attendant hazards in their work. Next we find the petroleum in the refineries, with the high pressure stills which are as temperamental as the gasoline they produce.

All these are problems that enter into overhead cost of the gasoline you buy outside here at your filling station.

The leaders in this industry were quick to see and the insurance companies quicker to point out that this cost was the big item in the industry. The far-sighted business leaders set about to bring safety into this industry. Consideration was given to safer methods, safety machinery and safer surroundings. Today we are finding this industry fast on its way from the place where a day without an accident was an accident.

Less than a week ago I was talking to a district superintendent of a large independent oil company. We got to talking safety and I found a safety convert. I might say he was a rabid convert. He was telling me about the accident prevention work in his district. It has been less than six months since this oil firm was refused accident insurance, at one time half of the men on this superintendent's pay roll were on the industrial casualty list. Then began safety work. Last month this superintendent had but four accidents, and none of these was a lost-time accident.

This summer Henry W. Boggess, safety engineer for the Sinclair Oil Company and president of the Petroleum Safety Council, Don J. Wallace, director of the Safety Section of the Mid-Continent Oil & Gas Association, A. C. Burnett, president of the Tulsa Safety Council and I, worked out plans for a University course in accident prevention work for which regular college credit should be given.

We took this matter up with Chancellor John D. Finlayson of the University of Tulsa and Dean R. H. Langenheim of the Petroleum Engineering College, and worked out details for a two hour accident prevention course which has been included as a part of the curriculum of the Petroleum Engineering College. It was adopted as a third year course and required of all students graduating with the degree of Petroleum Engineer.

Our first big problem was in providing a text book for this course, and in a hurry. We could find no prepared text or anything that would resemble such a thing. We got together and outlined the subject—Accident Prevention in the Oil Industry—and after bisecting the whole problem, holding an autopsy over the body, we developed our outline for the course.

Then we divided up the job of preparing the text in the form of class lectures. We called a meeting of a number of outstanding safety engineers and they have accepted the responsibility for this work. As soon as these lectures are completed, they will be correlated and printed as a permanent text book for this course of study.

Helping in the preparation of these lectures and text are C. L. Swin, safety engineer of the Skelly Oil Company; Arthur O'Dell, safety engineer of the Barnsdall Oil Company; F. F. Thomason, Dr. F. L. Flack, and Raymond M. Carr, all of the Sinclair Company; J. C. Young, safety engineer of the Tidal Oil Company; Harry C. Mathers, safety engineer of the Independent Oil and Gas Corp.; Ray Miller, secretary manager of the Association of Natural Gasoline Manufacturers; E. D. Murphy, safety engineer of the Mid-Continent Petroleum Corporation; H. Y. McCants, of the E. W. Bullard Company, in addition to Mr. Boggess and Mr. Wallace.

In this paper I am going to dwell but briefly on the chapter headings included in our course of study and series of lectures.

The course begins with a brief history of modern industry and the scope of accident prevention work as a background for the course. Relationship of accident prevention work to the oil industry leads up to the particular subjects to be discussed in detail. The work starts with employment management, the proper placement of men and foremanship.

First aid comes in for considerable discussion not only for the value of first aid knowledge but to impress the students with the object lesson afforded in the treatment of actual accident victims.

We touch on the importance of design, construction and installation; on specific drilling hazards; on lease operation problems; on gasoline plant construction and operation; on pipe-line construction and operation; on atmospheric and high pres-

sure stills, treaters and filter houses in the refinery together with a discussion of the hazards of bulk stations and retail filling stations.

The course is concluded with a thorough analyses of accidents, and the stressing of the importance of the compilation of these records.

This course of study is now a part of the regular work in the University of Tulsa and is being offered during the present fall semester for the first time.

This course of study is "something new under the sun" as far as we are concerned. We are watching the development of the course with the idea of contributing something very definite in Accident Prevention work to reduce the toll levied on life and limb, and to reduce the wanton economic waste brought about through destruction of materials, equipment and loss of time.

V. R. CURRUE (Texas Co., Texas): I would like to ask Mr. Boggess who delivers these lectures.

MR. BOGGESS: We have selected rather arbitrarily six engineers in Tulsa, each particularly fitted to cover his particular subject; and they deliver them personally. And each man who is assigned a subject—of course, the six of us are assigned twenty-two subjects—each man who is assigned a subject must have an alternate in case he'd be away. The Dean takes no part in it other than being present.

G. M. KINTZ (U. S. Bureau of Mines, Pittsburgh, Pa.): Last year the School of Mines here, during two weeks in May, put on a short course in Petroleum Safety for their Junior Engineers that were not on the trip. At that time they used the National Safety Council Safe Practices Pamphlets and the Bureau of Mines Safety Practice Bulletins. The Bureau of Mines put that on, with the help of local men.

CHAIRMAN DONOVAN: You will recall that we postponed one paper from the first day, because there wasn't time enough left to give it. Mr. W. C. Lynch, manager of the Personnel Department, General Petroleum Corp., Los Angeles, is now going to give us a paper.

Prevention and Control of Oil Field Fires

By W. C. LYNCH

Manager Personnel, General Petroleum Corporation of California,
Los Angeles, Calif.

The problem of fire prevention and control in the oil fields includes, often times, practically all phases of the oil fire question to be found elsewhere. In addition to the ordinary oil fire risk, we have the wells themselves and coupled together, a very complicated problem results in congested areas. If we deal in this paper with the major problems of a congested area like Santa Fe Springs or Signal Hill, we will touch on the more serious risks to be encountered in any oil field location. We have high pressure to contend with, many gas and oil lines, gas traps, oil tanks of all descriptions and sizes, absorption plants, compressor stations, etc. Frequently, much oil covers the ground, and gas, in large quantities, blows to the air. Numerous sources of ignition of oil and vapors abound and it often appears miraculous that we do not have more fires than we do in the more congested locations.

The nature of the work and the class of labor employed does not lessen the risk to say the least. Of necessity, certain practices are carried on that are hazardous and the type of men to be found in the fields are, for the most part, prone to take a chance. This applies particularly to the new field in process of development. Once a field has settled down to normal production, we can breathe easier because we are much more secure in our control of the sources of ignition; the man power employed and the general house-keeping conditions. But during the development stage of a new field, the rush of work makes for conditions of extreme hazard and one of the

greatest difficulties in fire prevention and control measures in the fields is to incorporate such measures in the original construction work so that the two go hand in hand. Except for extinguishers, it seems for the most part, that fire prevention and control problems are left to be settled after the thing to be protected or guarded against actually exists and stands ready to give trouble. Of course we realize that one of the principal reasons for this chronic situation is that an oil field is not an oil field until proven. Each well is a gamble and a most expensive one. Much money is risked and the spending of additional money to guard against oftentimes remote contingencies is subject to much argument. Then, too, a field will grow and in a manner most unexpected. No possible foresight can visualize just what must be protected against. Sooner or later conditions develop in a congested field that are beyond hope and in the hands of providence. All that can be done is to try to prevent the occurrence of a fire and if it occurs, to prevent its spread. The operations must be carried on, conditions often are impossible to change, and if boiler fires are against a derrick and an oil tank eight feet from the fire box, what can be done about it? After such things exist and the oil and gas are present, it is definitely established that we have a serious hazard on our hands and laws may be passed preventing future installations of this sort but by that time the field exists and abounds with hazards marvelous to behold.

The construction in a new field starts with economy as a keynote. Wood is cheaper than steel. Short steam lines cost less than long ones. Fire hose and water pumps for fighting fire are a needless expense to start with. Each operator figures the same and many operators have but a fifty foot lot on which to economize. Sooner or later a vast amount of kindling is in place with little means for extinguishing the fire when it occurs.

Congestion

The remark made above about a boiler fire in close proximity to derricks and tanks is no exaggeration. We have seen boiler stacks so close to wooden derricks that corrugated iron and asbestos board are used to protect the wood from charring, and oil tanks receiving crude are, once in a while, placed only far enough from the boilers to provide passageway. On a fifty foot lot there may be a derrick, oil tanks, boilers, compressors, gas traps, a sump, a don house, pumps, piping, etc. This is bad enough with a heavy crude that has to be pumped from the well, but when wells are in the gusher class, under pressures of a couple of thousand pounds with large gas content, the situation becomes critical.

Our fruitful sources of fire have been from boilers principally, and welding a close second. Numerous other causes are to be found as smoking, friction sparks, static electricity, spontaneous combustion, etc. While every effort should be directed toward keeping sources of ignition at a minimum, a very great benefit is to be derived from keeping the oil and gas confined within the tanks and pipe lines. If we could be assured of no escape of oil or gas to the atmosphere, our problem would be reduced to a minimum. However, breaks occur, wells come in unexpectedly, we get oil in the sumps and in the cellars, wells have to be pulled and tanks have to be vented. Also, men make mistakes.

We can all imagine how fires can start and the majority of fires have very simple explanations. The three worst oil well fires that we have had at Springs occurred as follows: One was a well being drilled. The weight of mud in the hole proved to be unequal to holding down the pressure and when the crew observed the mud coming out of the hole, the boilers a few feet away were immediately shut down. When gas and oil started to blow, oil began to run to the fire boxes of the boilers. Effort was made with extinguishers to prevent ignition but they failed and the fire resulted. Another well came in unexpectedly. A steel derrick was in place and for twenty minutes or more the flow roared through the steel structure. An eye wit-

ness (the chief of the fire department) stated that he observed the ignition which occurred within the steel derrick and must have been caused by sparks from rocks striking the steel. The third fire was due to a double fault: an error in operation and one in design. The operating error was that of turning the full flow of oil and gas from a well into an oil tank and by passing the gas trap. The design error was in not providing an auxiliary relief on the tank of sufficient size to prevent bursting under such contingency. Then the tank burst oil and gas sprayed over the vicinity and took fire from some boilers. The resulting fire caused collapse of derricks, the breaking of flow lines under pressure, the ignition of other tanks and a mass of flame that made it impossible to reach valves to control the pressure lines. As to prevention of the three above fires—all were actually preventable. The first two could have been prevented by the proper installation of suitable blow out preventing equipment, and the third by not passing the trap. We seldom find a fire that could not have been prevented by some simple means and it is surprising how often the means that could most easily be adopted, lies in the proper handling of the oil and gas to start with, rather than correcting the source of ignition. In one of the three cases above, the source of ignition was beyond control; that of friction sparks from rocks in the steel derrick. Much stress, however, should be laid on the way the oil and gas are handled to start with.

Another example to show unusual ignition, occurred at a sump. Three men standing on the walls of this sump observed this occurrence. The sump contained mud and water to start with. A well was about to come in and 2½ inch piping was run from the well to the sump. Mud and water flowed into the sump with a gradually increasing amount of oil and gas and all under considerable pressure. The 2½ inch line terminated at the bank of the sump at an angle of 45 degrees and the flow was directed so as to cut slightly into this earthen bank. A small amount of oil had accumulated on the sump, when suddenly the entire sump ignited and the men on the banks who were watching the flow had to jump for their lives. There were no boilers near and no one was smoking. The cause of the fire was attributed to friction sparks from small rocks in the flow line striking others in the embankment. Many other examples of fire occurrence could be cited, but there is little need to go into details of obvious causes with which we are all familiar.

Means of Prevention

The prevention of these fires lies in the proper handling of the oil and gas and in the elimination of sources of ignition. We are never perfect and so we find oil and gas escaping to the ground and atmosphere and frequent sources of ignition exist. We might take up a few of the more prominent possibilities in some detail which will typify others which we do not have time to go into.

In the case of the oil well we have a hazard present throughout its life. Wells of the gusher class, where pressures are involved, should be equipped with blow-out preventers and hydraulic fittings and valves well in advance of penetration of the oil sands. The drillers should of course exercise great care in their work and be prepared for bringing in the well. We know of several cases where wells have blown in out of control due to lack of blow-out preventing equipment and insufficient weight of mud in the hole. Occasionally defective equipment is responsible for failure, and the only way to guard against this is to apply suitable hydraulic test to doubtful equipment before installation. This applies particularly to "home made" welded jobs.

Welding is frequently done on casings and fittings of the wells and since here we have a source of ignition that is most necessary, the only thing to do to prevent fire is to make sure that no oil or gas is present. We have often found it advisable to spread foam liberally in the cellar before doing welding work. Welding is a frequent source of ignition in all branches of oil field work and should be carried on under the supervision of men familiar with fire hazard possibilities.

After a well has been placed on production, it is of itself a comparatively safe affair usually. The dangerous periods, aside from exposure fire, are at the times when work has to be done such as changing of flow beams, pulling tubing and the like. Numerous fires have been caused by oil spraying to boilers or open fires, defective wiring, etc., from rods or tubing pulled into the derrick. Derricks are sometimes cased on two or more sides for this reason and there are devices on the market for washing the oil from rods and tubing as it is drawn from the well. At best oil is most liable to spread over the derrick floor and run around outside to some extent particularly when tubing is plugged and the stands are full of oil. Small earthen embankments outside of the derrick are often of value to keep oil from boilers or other source of ignition, and the derrick sheathing mentioned above is often not necessary. Men frequently build small wood fires to melt rabbit close to wells—a bad practice in most cases. Quiet old pumping wells sometimes give trouble as in one case where the well sanded up and stalled the walking beam causing the belt to slip on a wooden pulley until friction caused the pulley and belt to take fire. In another instance a back fire from a gas engine ignited escaping gas. Sparks from electric wiring are a source of danger throughout the life of the well. We use conduit and vapor proof fittings for this reason. Oil left in the cellar gives much fuel for a fire, should one occur and cellars as well as the surrounding area should be kept free from oil. Sumps should be as small as practical, should never be filled to the top and should be kept skimmed. Tanks should be used in preference to sumps as much as possible. Good house-keeping should prevail. As to smoking, we require "no smoking within 100 feet of sources of oil or gas" which includes wells as well as all other operations in the field.

Oil storage tanks are a fruitful source of fire. They should be made tight to start with and kept so. Roofs should be of steel and provided with self-closing gauge hatches and suitable vents. If subject to possible excessive flow of vapors, beyond ordinary venting capacity, emergency vents should be provided. If possible, tanks should be connected up to a vapor recovery system and a dry gas return line installed. This is usually a money making proposition and at the same time is a fire prevention measure since it insures a minimum amount of vapor blowing to the air and keeps a vapor mixture in the tank that is too rich to burn, eliminating, to a large extent, the explosion hazard. Needless to say, piping should be secure and provided with swings for settlement and expansion. A levee is usually advisable, particularly in congested areas.

Absorption plants and compressor stations are special problems. Skilled labor is of material assistance in the fire problems found here altho actually the original plant design plays the largest part in fire prevention, since the operations are more or less cut and dried with little, that is excusable, to cause fire other than failure of apparatus—and this is often not excusable. A few actual instances of fire in absorption plants will serve to illustrate typical weaknesses to be guarded against. In a number of cases pressure storage tanks have failed; frequently look-boxes have liberated large volumes of vapors thru glass breakage; gauge glasses break oftentimes; once in a while a pump breaks and sprays gasoline about; surge tanks overflow, etc. During repairs and extensions, possibilities for fire are greatly increased. It seems particularly risky to break into a line since even the pressure be relieved and the line drained, a small amount of oil is most likely to spill out. We had one man severely burned when about a cup full of oil ran onto a superheater from a supposedly dry line. This point should receive careful supervision of the plant superintendent. All cases where lines have to be broken into should receive his OK.

We prohibit the use of electric drills within both absorption plants and compressor stations. Portable electric extension cords and fixtures are hazardous to operate as a regular daily occurrence and should only be used under emergency conditions; not as daily routine, and not even then, when other arrangements can be made. Gas testing equipment requiring the use of motors driven by electricity should receive

careful attention as to sparking hazards. Electric motors are used to a large extent and the type best suited to the job should be used; explosion proof, vapor proof or induction. Gas engines also are used and the exhaust, ignition and fuel arrangements should all be of a construction to minimize the hazards involved. In the case of gas compressors, particular care should be exercised to prevent liquid getting into the cylinders. Numerous heads have been blown from compressors because of this and a fire usually results.

The above is by no means a complete list of the points to be guarded against but it is thought that enough has been said to cover things in a general way. The prevention of fire is the thing to strive for, but its accomplishment is usually something under 100%. We should bear in mind that flammable material kept away from fire sources, will not ignite; and also that sources of ignition should be held to a minimum through intelligent study.

Extinguishing Methods

An oil or gas fire may or may not be easily extinguished. We have seen a 55,000 barrel tank of oil extinguished in less than one-half hour and a comparatively small stream of oil from a broken overhead line burn for several hours before extinguishment could be effected. Oil well fires of large proportions burn for long periods under some circumstances while in others they might be extinguished in a comparatively short period. The gusher fires at springs have been handled by controlling the flow of gas and oil while the fire continued to burn. It would not have been safe to extinguish these fires in their congested locations and allow the gas and oil to blow free for even short periods since ignition would be sure to occur sooner or later and possibly cause great spread of fire over a large area upon re-ignition. In fact a pilot light consisting of a two inch gas line was used at one of the fires to insure its re-ignition at the well in event it were to sand up temporarily and then break loose again. Methods used to handle the flows from these wells without first extinguishing them consisted in tunnels driven to the casing underground where suitable connections could be made into the casing or tubing for conducting the flow away safely and also in the use of hood or valve devices for setting over the flow at the ground surface. This latter arrangements were swung into place with a crane and when in position the fire was automatically transferred to the top of the stack on the hood and men were then enabled to make tight connections at the casing above ground and the wells finally put back on regular production through conventional Christmas Tree fittings. Thus the oil and gas was taken away from the fires and the fires extinguished from lack of fuel. In locations where a flow of oil and gas will not endanger surrounding property if ignited, such fires as these may be extinguished by blows with steam, mud water, etc., and by other novel means described in various government and other bulletins.

In the extinguishment of oil pools, sumps, tanks, etc., foam is the safest and best medium to use, in most cases. The method of application of the foam is of utmost importance in efficient extinguishment. A large surface of oil exposed to the air will burn with great heat and unless the foam is applied gently, progress in extinguishment is slow. In the oil fields we find crude oils of all degrees of gasoline content from that fresh from the well, to the tarry mass that accumulates in sumps over long periods. The light crudes burn quickly and are easily ignited and difficult to extinguish, while the heavy sump oils do not ignite quickly though they burn fiercely once under way, they are comparatively easy to extinguish—assuming, of course, that the gasoline content is very low and that we do not have a serious heat wave formation to contend with. We find that a sprinkle of water will often extinguish the heavy oils as soon as a slight heat wave has formed so that it forms a froth on the surface when the water hits it. It is the surface sprinkle that counts—not water under the oil, and nothing but fine sprays of water are of much value in any oil fire extinguish-

ment. The greater the gasoline content of the crude, the more difficult it is to effect extinguishment with water sprays, because the froth referred to, will not form in the light oils and dependence must be placed in the spray itself to exclude air and oxygen from the oil surface. Special nozzles are necessary for suitable sprays. We have made a great many experiments in the extinguishment of oil fires during the past six or eight years, using foam, water and other methods of control and we are satisfied that water, intelligently used with the right equipment has a very important place in oil fire work. One striking example of the intelligent use of water with ordinary equipment, occurred at Santa Fe Springs during a fire in a battery of 1500 bbl. tanks. One tank burning adjacent to another not as yet ignited, was extinguished repeatedly by the spray of water that was formed by the splash of a heavy water stream played against the tank of oil that was not on fire and which had to be kept cool. Cooling one tank and extinguishing another with one water stream is something for any fire department to be proud of and conditions must be more or less set for its accomplishment. The repeated extinguishment was due to re-ignition from flowing oil ground fires from a line break.

In the use of water on crude oil fires, much care must be used to avoid a boil over. A gentle fine sprinkle of water on the surface for a very short period; a few seconds usually; is all that should be attempted. A strong flare-up usually follows this sprinkle as steam is formed in large quantities. Much of this steam is trapped in the froth formed and no doubt assists in the extinguishment. If no more water be sprinkled on the oil than will be evaporated at or near the surface, it is obvious that a boil of serious consequence cannot result. However, it is so easy to put on too much water that there is a real boil over hazard involved and excessive caution is necessary when a deep heat wave has formed. Heavy streams of water are never to be used for this work; nothing but very fine spray sprinkling. Heavy oils respond nicely but light oils of greater gasoline content are difficult to handle with water. Foam is the medium for the lighter oils usually. The heat wave referred to, is a term applied to the layer of hot oil that forms on the surface of the oil as the fire continues to burn. This hot layer gradually deepens until eventually it may reach the bottom of the tank and if water be present on the bottom it usually is evaporated with such rapidity that oil is forced out with the steam causing the "boil over."

Regarding the use of foam; as mentioned above, a gentle application is most essential. In the fields, dependence is, for the most part, placed in portable equipment. Over-shots for conducting foam into an oil tank should be equipped with a deflector plate or splash plate to prevent the solid stream of foam from forcefully striking the oil surface.

In the case of large tanks, the asbestos tube with its basket, as developed by the Standard Oil Co. of California, is of great value for extinguishment. Its use is of greater value where the foam has to be conducted through the longer drops to the oil surface.

The conventional round nozzle on a hose delivers a solid foam stream that is frequently advisable to make a spray of this sort of stream by using the hand or other means to break it up. In one instance the men used short sticks of wood to make a spray of foam to control a gasoline ground fire after failure with the heavy nozzle streams. Special nozzles are of value for spray streams and have a valuable place with any hose equipment. It is true of course that the spray nozzle breaks down foam to a greater extent than the conventional nozzle does, but the superior work that it will do under certain circumstances more than offsets the objectionable features.

Another type of fire frequently occurring in the fields, is the one in which a flow of oil or gas issues with force from a break in piping or pressure apparatus, vents and the like. Usually the pressure can be relieved in some manner or other and extinguishment is then comparatively easy. Forceful streams of foam and mud, water or steam, together or separately may be used since the idea is to "knock" the fire out by forming a gap in the flow which the fire will not jump across and thus

be extinguished for lack of continuous fuel. When such a fire is complicated with other fires near at hand, the others must of course be extinguished first. A fire of this sort occurred in one of the absorption plants due to breakage of a lock box glass. Vapors flowed 225 feet to boiler fires and the general flash that followed ignited a number of places. Among others, fittings on the three pressure storage tanks became involved and casing head gasoline spread about the ground making a serious situation. This fire was finally controlled by flooding the ground with foam about the tanks and after knocking out the tank fires, the lock box near by was finally extinguished.

Above are cited a few typical examples of oil field fires. Many others could be mentioned but in general the methods of control of the larger fires follow the lines enumerated. Any one fire may combine the various types mentioned and to handle them efficiently requires skill and intelligence. Those who have the fire problem to contend with, should first do all that is economically practical to prevent the occurrence of fire and then see to it that the basic principals of fire control are understood, by those who will have active charge of fire fighting procedures.

CHAIRMAN DONOVAN: Mr. Lyuch brought some pictures with him on this fire fighting, and we'll show these now.

(A moving picture of fire fighting in the oil fields was shown.)

CHAIRMAN DONOVAN: Last year we had some committees appointed, and I am going to ask for reports of those committees now, or one committee in particular.

E. J. SENNE (Vacuum Oil Co., New York): As no doubt the members here will recall, at the last year's session of this Section there was quite a discussion on the matter of compiling accident costs. The chair, at that time, appointed a committee to make a study and prepare a report to be presented at this time. Unfortunately, due to circumstances beyond the control of the committee, we were unable to prepare the report. The committee, however, did give the matter thought and study, and had some correspondence. I feel that the matter is of such great importance that a further study should be continued; and it is preferable to undertake this through conferences of a committee rather than through correspondence. I move you, Mr. Chairman, in order that we may continue this work, that you appoint a new committee, preferably of members who are so located that they can connect—from the one locality.

(The motion was duly seconded and unanimously carried.)

CHAIRMAN DONOVAN: I think Mr. Senne would like to see those in New York appointed on that committee so that they could get together and have conferences, and I'm going to appoint to that committee Mr. J. W. Myers, Mr. E. J. Senne, and Seth Candee, to work that out.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



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Tuesday Afternoon Session
September 30, 1930

S. H. SLAYMAKER, Chairman
Fairbanks, Morse & Company, Beloit, Wis.

The first session of the Power Press Section of the Nineteenth Annual Safety Congress convened with S. H. Slaymaker, Fairbanks, Morse & Co., Beloit, Wisconsin, presiding.

CHAIRMAN SLAYMAKER: The first paper today will be on a subject we haven't in the past touched on, as I remember, and the speaker will be Mr. W. E. Widdell, Chief Machine Designer, American Can Company, Cincinnati.

Press Clutches

By M. E. WIDDELL
Chief Machine Designer, American Can Company, Cincinnati, O.

In discussing press clutches, we will confine ourselves to clutches used on medium size presses, approximately 10 to 65 tons capacity. Up to 1923 the American Can Co. used on these sizes of Presses almost exclusively the straight pin type of clutch, but with greater demand of production and consequent higher speed required of these Presses, the repair costs on the pin clutch became so great that it was decided to design a different type of clutch, and the result was what we call the Canco style of clutch.

To begin with, we will endeavor to explain the difficulties with the straight pin clutch which were mainly responsible for the designing of the Canco clutch, which is of the hinged pawl construction.

Figure No. 1.

This drawing shows a plain view looking from the Press side through the clutch collar on the shaft of the so-called pin clutch. It will be noted that with the striking pin (1) in the fly wheel and the locking pin (2), it is not possible to arrange for more than three striking points, which at high speed production is not sufficient, as while the press fly wheel may be running at considerable speed, nevertheless, the time lost between the tripping of the latch (3) and the engagement of the clutch pin with the striking pin is considerable. If the operator happens to trip the latch in such position of the fly wheel that it is necessary to wait one-third of a revolution before actual engagement between the fly wheel and the clutch takes place, and it has been proven by actual experience that with two operators of equal efficiency, the operator using a Press with the new Canco style of clutch having six engagement points produced so many more pieces per day, that the operator using a press having

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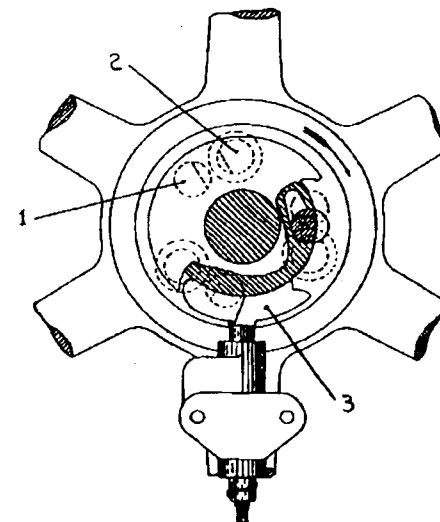


Figure 1

three engagement points asked for more money per thousand pieces unless she was furnished a similar Press which her neighbor operated. It was then decided to switch the two operators and the result was found to be the same, the press having six striking points in the clutch mechanism produced considerable more work with the same effort.

Figure No. 2.

This drawing shows a sectional view of the pin clutch in which (1) is the clutch pin proper, (2) is the striking pin and (3) the locking pin. The disadvantage of the straight pin clutch is mainly that it has an overhanging striking point and is difficult to lubricate. After being operated for some time, the hole or bearing in which this clutch pin operates becomes somewhat elongated at the point marked "A". There is also a slight tendency of this pin to emboss itself on the upper inner end marked "B". When this embossing becomes too great, it is harder to keep the pin lubricated and as the fit of the pin itself becomes looser, it also makes it harder for the latch (4) to pull the clutch pin out of engagement with the striking pin (2) and quite often causes the breakage of either the latch itself or the bracket in which the latch operates. The press also becomes harder to operate, as it requires more power to pull the latch out of engagement with the pin, in starting the Press. Another disadvantage with this clutch pin is that sometimes, depending on the mo-

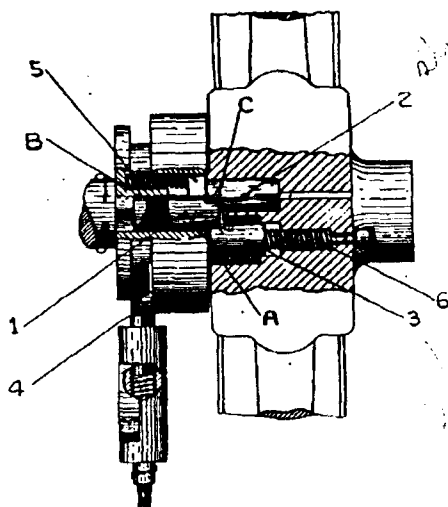


Figure 2

ment at which the pin is disengaged by the latch, there is not a full engagement between the clutch pin and the striking pin, the result being that the corners on both the clutch pin and the striking pin at "C" chip off and shorten the life of these parts, as after these corners have been rounded off to a certain extent, the clutch pin might again slip out and over to the next striking pin, which is a loss of time to the operator. The locking pin (3), which is being used to prevent rebounding of the slide when deep drawn work is used, is mounted in a steel bushing. Nevertheless, these pins have to be replaced quite often, due to the rebounding action of the slide trying to push the crank shaft up at a greater speed than the fly wheel is actually operating, on account of the cushion under the die used with deep draw work.

The two springs (5), which operate the clutch pin proper and (6) which operates the locking pin, must also be properly balanced so that spring (6) is not too strong to allow the spring (5) to work the clutch pin into full engagement with the striking pin. This is usually properly done at the machine shops building Presses, but when repairs are needed by the users of the Press, there is not always suitable springs on hand and if the locking pin spring (6) is too strong, it will prevent full engagement between the clutch pin and the striking pin, and cause both of these parts to wear out too fast.

Figure No. 3.

For the safety of the operator when doing such work as may require manual location, either by hand or the use of certain tools which sometimes come under the

die, it was found necessary to use a so-called automatic latch release or safety trip. With this arrangement the treadle is connected to the release-latch (1) instead of as ordinarily, to the clutch pin latch (2) and the clutch collar is provided with a cam groove as shown at "A", which, after the automatic latch (1) has depressed the pin clutch latch (2) properly through the engagement as shown at "B", same is automatically disengaged by the cam action of the shaft against the roller (3), which action holds the automatic latch release (1) out of engagement with the pin clutch latch (2), until the crank shaft has made almost one complete revolution, at which time the cam roller (3) again descends into the cam groove "A" and permits a new engagement of these two parts, provided the operator has released the treadle suf-

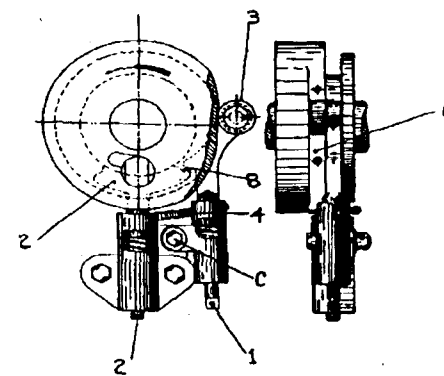


Figure 3

ficiently for the automatic latch release to engage the pin clutch latch properly this engagement being effected by a coil spring (4), as the bearing or bracket into which the latch release (1) proper operates, is hinged at C. There are numerous other safety devices used and while they all work more or less satisfactorily, they nevertheless to some extent reduce production, as the operator must give the foot treadle a full stroke between each operation of the Press, which is not always done on certain classes of work, where the operator, after becoming proficient, sometimes will let the press make several consecutive revolutions before stopping, therefore, a safety latch of this type is not used on Presses where it is not actually necessary.

Figure No. 4.

This is a general view of the so-called Canco clutch showing the striking pawl (1) with the locking pawl (2) disengaged by the latch (3) from the driving ring (4), which is securely fastened to the fly wheel, and shown partly removed, to give a clearer view of the general construction of this type of clutch. This view also shows how it is possible to have more engagement points between the fly wheel and the clutch proper than can be conveniently arranged for on pin clutches, as previously

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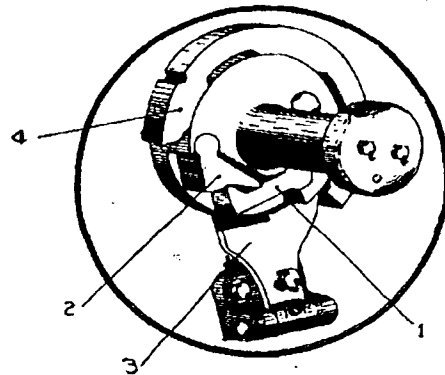


Figure 4

explained. Incidentally, we might mention that the effective striking and bearing surface of the striking pawl (1) is from 50 to 80 per cent greater than it is possible to obtain on a straight pin clutch within the same space and all the bearing surface is 100 per cent effective, due to there not being any overhanging parts of either the striking pawl or the locking pawl.

pg 25

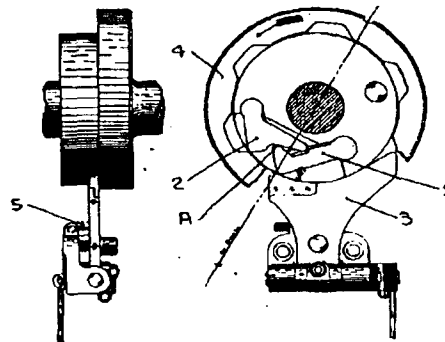


Figure 5

Figure No. 5.

This clutch on Figure 5 with the striking pawl (1) and the locking pawl (2) disengaged from the driving ring (4), shows at point "A" how the striking pawl (1), while being disengaged by the latch (3), also automatically disengages the locking pawl (2). A locking device (5) consisting of a small block or cam is so arranged that when turned over as shown on drawing, it is impossible for the operator to trip the latch accidentally or willfully when this latch locking device is in position, as shown.

pg 25

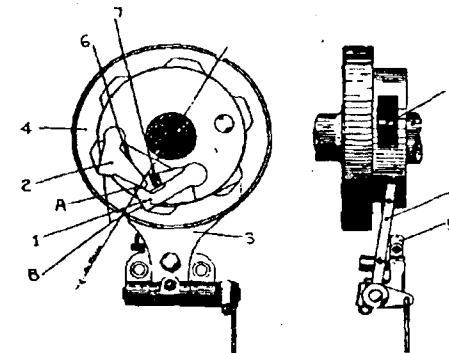


Figure 6

Figure No. 6.

This drawing shows the Canco clutch latch locking device No. 6 disengaged and the hinged latch (3) swung into position to allow the striking pawl (1) and the locking pawl (2) to engage the driving ring (4) as shown. When the latch is in this position, the striking and locking pawl engage into the driving ring by pins (6) and (7), which are actuated by a coil spring behind same, not shown on drawing. The pin (6), operating the pawl (2) would be sufficient for engaging both pawl (2) and (1) due to their contact at "A", but for the sake of greater durability, and quicker action, it has been found convenient to use one spring for each pawl. The pin (8) is provided for the purpose of backing up the press, as will be shown more in detail on Figure 7, and is necessary, due to the close engagement between the striking pawls (1) and (2) and the driving ring (4), as shown at "B".

Figure No. 7.

As the engagement between the clutch pawls and the driving ring in the fly wheel is a rather close fit, when setting dies and turning the press over by hand, it is necessary to have some play for the striking pawl to gain sufficient momentum of the fly wheel to carry the punch past the die and also means to back up the slide. For this purpose, a pin (8) has been inserted in the clutch in such manner that it

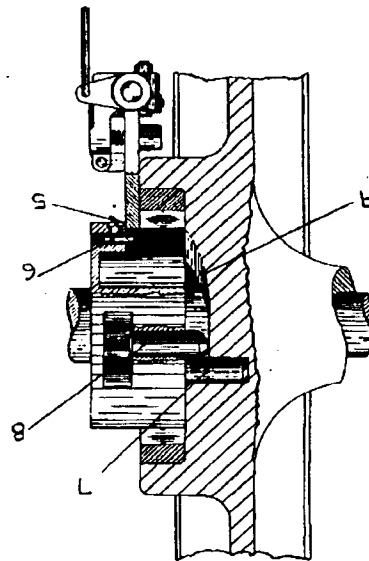


Figure 7

can be pushed into engagement with striking pin (7) in the fly wheel and permit backing up of the crank shaft. There are also provisions made not shown on these drawings, so that the locking pawl (2) previously referred to, can be locked into disengaging position and the striking pawl (1) used to carry the punch over, which means that parts (7) and (8) shown on this drawing are only used for the purpose of backing up the crankshaft. The backing up pin (8) is automatically released from engagement when the fly wheel is turned sufficiently forward, due to the curve in the fly wheel, as shown at "A", which pushes the pin (8) into disengaged position. Both striking and locking pawls can simultaneously be locked into disengaging position with pin (6) by locating same as shown extending behind the striking pawl, which prevents operation of the press under power. Counter sinks are provided for the head of screw (5) in the clutch collar for the proper locating of pin (6), which must be located out of engagement with clutch pawls when Press is being operated.

Figure No. 8.

The automatic latch release shown on this drawing for the Canco clutch is in principle the same as that described for the pin clutch. The clutch collar as shown at "A" is provided with a cam groove which allows the latch connection (1) to

engage with a notch in a lever (2), which in turn is connected to the foot treadle, and when in position as shown, the combination connecting rod and cam lever (1) is by a spring actuated pin (3) pressed into engagement with lever (2) as shown at "B". When in this position, the lever (2) may be pulled downward by the treadle connecting rod (4), causing the latch (5) to be tilted into position, as previously shown on drawing (7), thus allowing the pawls to engage the driving ring in the fly wheel. As soon as the crank shaft starts revolving, the latch connection (1) is pushed backward thus allowing the latch (5) to return to its disengaging position of the clutch pawls, and it is not possible for the operator to effect another engagement of the latch until the pawls have been fully disengaged from the driving ring

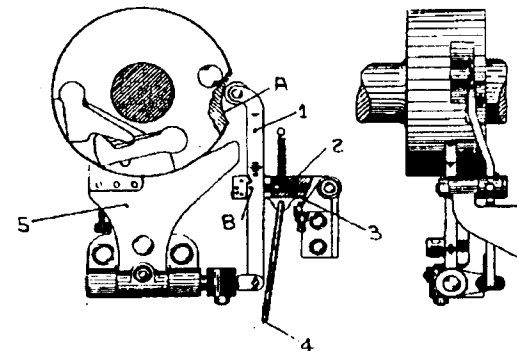


Figure 8

in the fly wheel and the crank shaft again is in position. The treadle connected lever (2) must be returned upward to full height position before another engagement to trip the Press can be secured. This lever is lifted to its proper position by spring (3) and can only be lifted to its proper height as gauged by stop pin (4) in the combination cam and treadle connection (1).

Advantages and Disadvantages

From the foregoing description of these two different styles of clutches it would appear that the Canco clutch is of the better construction. This has also been proven in practice, in that it is faster, more positive, has larger and better bearing and striking surfaces on the clutch parts, and is also easier to keep lubricated. A five year test has proven that it is more durable than the pin clutch, inasmuch as during the five years we have built these clutches and installed them on a number of Presses, some of which have been in operation slightly more than five years, we have not yet been requested to furnish a single clutch pawl, as a repair part, and we have not had the complaints of accidentally repeating Presses that have been received on Presses equipped with the pin clutch, which conditions are usually due to faulty lubrication or improperly fitting clutch pins. While we consider this clutch as safe as any press clutch we have been using, it is not so fool proof that it is impossible to encounter

accidents, if same is not properly used. For instance, one demonstrator who was anxious to demonstrate the advantages of this clutch, put a bar in the opposite end of the crank shaft and turned same around, until the striking pawl had passed by the range of the latch, at which time the Press naturally engaged and the bar with which the demonstrator was turning the crank shaft, was taken away from him and thrown clear through a window out of the building, fortunately not injuring anyone. In this case the demonstrator most likely forgot that there was a locking device for

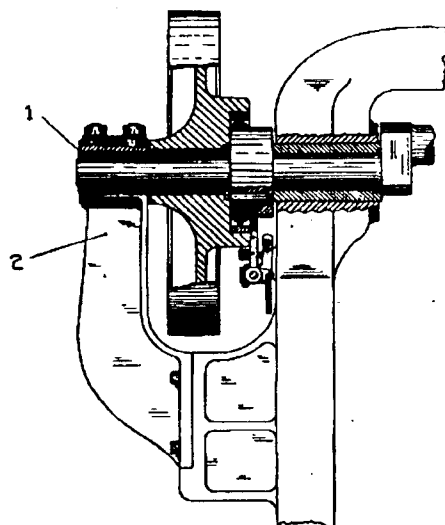


Figure 9

the striking pawl, as shown on Figure 7, which should have been engaged before the bar was inserted in the end of the crank shaft for the purpose of turning same.

Figure No. 9.

While no doubt most accidents on punch presses are due to either worn out parts in the clutch or carelessness of the operator, as well as the mechanic who usually sets the dies being reluctant to remove the belt from the fly wheel, there is, nevertheless, one factor which might cause repetition of the Press, namely that of the fly wheel bearing cutting and seizing on the end of the crank shaft. This is usually due to negligence of lubrication or to a poor grade of lubricant, but something that cannot be blamed to carelessness of the operator or the mechanic setting dies. It should therefore be a strict ruling that the belt must be taken off the fly wheel, or

if a motor driven machine, the motor should be stopped. Under no conditions should any adjustments on dies be allowed with the fly wheel running when it is necessary for the mechanic to put his hands or tools under the punch or slide. This ruling is frequently violated and probably the most frequent cause of Punch Press accidents.

Referring again to the fly wheel cutting on the end of the crank shaft, we are showing on Figure 9 a construction which eliminates this danger as follows:

The fly wheel end of the crank shaft has been lengthened and a bushing (1) inserted between the crank shaft and the fly wheel. This bushing is securely keyed and clamped into the bracket (2), therefore, cannot revolve, and should the fly wheel bearing for some reason cut into this bushing, it will not revolve the crank shaft, as otherwise happens when this bearing seizes. The crank shaft, when the clutch is engaged, revolves inside of the bushing (1). This construction also furnishes an extra support for the fly wheel end of the crank shaft.

CHAIRMAN SLAYMAKER: Toward the latter part of Mr. Widell's talk he mentioned the mechanic who sets the dies. He is a fellow we haven't talked about much in the past so we have chosen him as the subject for our next paper. We have a man to tell about him who is very close to him, Mr. George Miller, Supervisor of Tools, Metal Stamping Department, Westinghouse Electric and Manufacturing Company, East Pittsburgh.

The Opportunity of a Die Setter

By GEORGE MILLER

Supervisor of Tools, Metal Stamping Department, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

Many able speakers and writers over the years have covered in a masterful manner the very interesting subject of guarding presses and press tools by mechanical means. Ingenious and effective guards, screens, etc., have been illustrated and described. You have listened long and profitably, and it is not my intention to detract one single atom from anything that is designed or calculated to in any manner prevent an accident.

Plant managers, factory superintendents and press department foremen long ago found that the best way to approach the accident problem is to prevent its occurrence.

All mechanical guards, feeds, magazines, carriers, etc., are good with the proper application, that is, a die or press guard may be 99 per cent efficient when working with a bender die but could be and often is a 100 per cent flop when worked with a draw die.

Now, I am going to introduce to you another and entirely different safety guard. This guard is not a stranger to most of you, but some of you possibly have never thought of making use of it. This safety guard (the one with the brain) is the hard worked, greasy, patient, retiring, unnoticed *die setter*.

Let me explain who or what the die setter is. He is sometimes (but very rarely) a machinist, seldom if ever is he a tool or die maker. Usually he has acquired his knowledge and ability to set dies by running a punch press. He knows just how hard a punch press stool can get about four p. m.; knows that a punch press, like the captured and caged "bob cat", is never tamed; he knows that of all moving machinery, the punch press is among the most cruel, ruthless and crushing; that its action is flash-like, and, like the rattle snake, when it strikes and hits, some one suffers.

The die setter must be sober, truthful, accurate, cool and of sound judgement; must have command of his temper; must take an interest in his work; be quick to decide; must know his job, and his contact with press operators in his group must be pleasant but business-like.

While the die setter, in most shops, takes his general instructions from his foreman, he (the die setter) directly represents the safety department to the workers. He is the logical man for this mission, because he is the closest to the worker who is the prospective victim of the accident menace.

The die setter's first duty is to instruct the worker, particularly the new worker, in the safe use of the machine or tool, and of every job as well. He should be warned of the hazards peculiar to the punch press and to keep his hands outside of the danger zone. If safety appliances or attachments are used, the worker should be made familiar with their use and purpose.

It is not the intention, however, to place the burden of all safety work upon the die setter. He must have the help of his foreman as well as of the safety department.

By this is meant, in addition to the usual items included in such a category, studies such as we have made with the object of minimizing the fatigue of the operator, but in making this statement, we are not prepared to say that anything very positive has thus far been accomplished by us.

Such studies have included the design of seats, the adjustment or stacking of material, both before and after the operation, and the elimination of movements by the operator through the use of air blasts and gravity.

Punch press hazards are commonly known, but we would tabulate them about as shown below. If we repeat, it will do no harm; if we add a new one, it may save an accident of that kind in some shop; and in considering this listing, we shall place emphasis on the fact that it is the duty not only of the die setter, but of every one from the big boss down, to do his utmost in every way to prevent them.

- 1— Riding the trip treadle with the foot.
- 2— Repeating clutches.
- 3— Operation of presses that require repairs.
- 4— Operation of presses on which the safety device needs repairs.
- 5— The "blocking" of safety devices by the operator to increase production.
- 6— The use of worn out hex head clamp screws and ill fitting open end or socket wrenches.
- 7— Handling thin metal sheets, scrap or remnants without hand leathers or forks.
- 8— Feeding "lay in" bender operations without the use of pliers.
- 9— The use of gloves on "lay in" operations.
- 10— Non-use of goggles where there is a possibility of flying particles.
- 11— Greasy dies.
- 12— Loose nuts and bolts of all kinds.
- 13— Flowing neckties, and wrist length sleeves.
- 14— Non-use of lifting eyes on crane handled dies.
- 15— Careless and indifferent stacking of finished work, such as large circles, segments, and rings from thin material.
- 16— Careless and improper placement of materials and tote pans about presses.
- 17— Failure to clear press-bed and die from wrenches, clamps, bolts, etc., before starting press.
- 18— The habit of parking dies on the floor instead of the bench.
- 19— Inattention to the scratch or small cut, and possible infection.

To the man responsible for accidents in the punch shop, it would at times seem that all things combine to create and make possible accidents from causes that border on the ridiculous, if it were possible to consider an accident in other than a serious manner.

Dies under the lift limit of weight, with guide or liner pins, should be fitted with tie bolts. We all know that, yet how common it is to go into the average punch shop and find such dies in the take-out, or ready for return to die storage, minus these tie bolts. It is the very natural thing to do, to lift such dies by the top or

upper shoe, and in about nine out of every ten lifts, the lifter gets a mashed foot unless he has taken the precaution to wear safety shoes, in which case he may escape, but in the bounce off, the die may then land on the foot of his helper.

Dies should be plainly marked with their weight and the lift limit be clearly established, and thoroughly understood; then the ambitious strong man caught displaying his strength should be summarily dealt with; because we know, that of all things the safety department has to contend with, the "back strain" is the most difficult to detect if counterfeit.

Accident prevention, in a large punch shop is an important part of the organization and before any progress in accident control can be made, a department of safety must be organized. This department must establish a definite program to follow if lasting results in the reduction of accidents are to be accomplished.

We suggest the organization of Sectional and Departmental safety committees, where the size of the shop warrants, in order to establish a definite Safety Program.

The plan is to have sectional committees, meeting at least monthly for the discussion of accidents, hazards, and safety activities within each section. Minutes should be maintained of all meetings, each item discussed, numbered and such numbered items appear in the minutes of each successive meeting until disposed of. A full attendance should be particularly stressed.

In addition to the sectional safety committees, there should be a departmental safety committee, composed of one member from each sectional committee and certain members of the supervisory force. All matters which cannot be brought to a satisfactory conclusion by the sectional committees should be referred to this departmental committee which should also meet at least monthly. The die setter should, therefore, be represented on all committees. His close contact with men and tools makes him a very important factor.

There should be also a committee for the purpose of making regular inspection trips through the shop, recommending improvements and changes which will tend to improve conditions, such as section layouts, condition and type of equipment, cleanliness and orderliness, safety congestion, material handling methods and movement of materials. This committee should be accompanied by each foreman as it passes through his section. All findings and recommendations should be numbered and reported in writing to the superintendent. It has been found by us that this activity is a great help to the die setter in promoting safety in his department.

Die design should be broadened to include the consideration of items which in the past have not been thought of as safety devices; for example, chute feeds, feeding slides, lifting eyes, moving gauges, mechanical lifts, making guards integral parts of dies, etc. All dies, before being put into production, should further be passed upon by the die setter, inspector, and rate man, for quality and safety.

The fact, we believe, that stands out most prominently in any shop is the instruction and education of the worker as to the press itself, the job and the appliances that go with both tool and job.

P. G. HUNTER (Motor Wheel Corp., Lansing, Mich.): I am wondering if Mr. Miller advocates that the die-setter convey all the information to the operator on how to run the machine.

MR. MILLER: Yes. The die-setter in our department is more or less responsible for quality; he is responsible for quantity, getting it out on time, and I think we all hold him more or less responsible for safety. He can get closer to the man than the foreman. But if the man does not pay any attention to him, then it is his duty to get in touch with the foreman. But I think when you get an enthusiastic man, working for his immediate supervisor or superintendent, he will do his utmost to prevent accidents and teach the men. We have a rule that when the man goes to work the foreman tells him the hazards of the punch machine, but he depends on the die-setter to teach the man.

MR. HUNTER: What has the safety man to do?

MR. MILLER: The safety man has a big part to play. You can't expect one safety man to take 1200 employees and teach safety to them individually. You have to delegate part of the responsibility to one other person and there is nobody better fitted for it than the die-setter who is directly in contact with the men. If anybody should know about safety, I think the die-setter should.

MR. HUNTER: I agree with you in what the die-setter does, but when you shoulder the responsibility of safety on the die-setter—there are usually one or two working together and they have anywhere from ten to fifteen presses to set dies on—how are they going to see that every man does his part right?

MR. MILLER: I can't see any other way out of it than that the safety man in any shop should be around the shop ninety-five per cent of the time and see all this work himself.

MR. HUNTER: Does the die-setter set all the dies?

MR. MILLER: Yes.

MR. HUNTER: We teach the operator to set all the dies.

MR. MILLER: We do that, too. Some of the operators set dies during busy times when the die-setters have their hands full setting dies alone. A large percentage of our operators set dies.

MR. HUNTER: I still cannot see why we should saddle onto the die-setter something that he should not have.

MR. MILLER: In your plant isn't everybody a safety man? I can't see that you are saddling anything more on the die-setter than you are on anybody else. Our die-setter should be represented on these committees that I talked about. They should carry to the men on the floor things that have been discussed and talked about.

JOHN WALTERS (General Electric Co., West Lynn, Mass.): Perhaps he could be considered a connecting link, because the die-setter has contact with all the machines or at least with a large percentage of the machines and he has a more thorough knowledge of the safety and the working conditions of the machine. He also has greater contact with the men on the floor and is therefore a more logical man than the foreman.

However, I do not think that the die-setter should be held absolutely responsible for the safety conditions unless he is vested with the same power that the supervisor has. If a man has to carry the same responsibility he should have the power it brings. I do not think that any of us would consider giving a die-setter the power of discipline, neither do we want to make out of him a tale-bearer. However, the average die-setter has a personality which his work seems to bring out and therefore I think he can put it across without carrying tales by putting pressure on the operator to convince him that if he does not behave himself he is going to put himself out of a job by crippling himself.

E. E. CLARK (Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.): What Mr. Miller means is what I have seen. The new employee coming into the building is turned over to a group over which the die-setter has charge. He is first interviewed by the foreman. He gives him as much time as he can, which in times of good business is not much. If he is a good foreman, he is busy looking after his department so the new man is turned over to this die-setter who is in reality a group foreman. He is really the first employer that the new man comes in contact with. We will admit that this man knows nothing about the punch press. He has got the job and he is instructed by the die-setter or foreman as to the danger of the machine under certain circumstances. This is explained to him again when he is told how to set dies. A great many accidents are caused by improper setting of dies and as many are caused by other reasons. We find that it is for this reason that the die-setter is a very important safety man.

M. J. MCCARTHY (Fisher Body, Detroit, Mich.): Don't you hold your die-setter directly responsible for the set-up of the job?

MR. CLARK: Yes.

MR. MCCARTHY: Is the die-setter in your shop directly under the foreman or over the foreman?

MR. CLARK: Under the foreman. My thought is that the safety man is not responsible for the accidents. The plant management can promote plans for safety and he can carry them out.

MR. HUNTER: The fact that we are all safety men and that we are here signifies that the plant management is behind us so let's leave them out of it.

Suppose an accident happens and you want to find out what caused it. The die-setter is responsible. He is supposed to see that the machine is in good shape. I agree with the gentleman that the die-setter should be responsible until such time as the operator takes that responsibility. I do not, however, believe in adding any burden to the die-setter. His duty is to see that the die is properly set and in running condition, but as far as instructing the operator goes, that is the foreman's job, and it is the safety man's job to see that the foreman is in it wholeheartedly.

J. L. BARTON (International Business Machines Corp., Endicott, N. Y.): I happen to be one of the old men in this business. I started as a punch press operator. In a year and a half I became a die-setter and in about three years I became foreman and handled 150 men. I am now employment manager with a few other side lines. I am responsible for the safety of two thousand men in our plant. I therefore think I can speak with a little authority.

I agree with Mr. Miller that the man who sets the dies is responsible for the operation of that job.

MR. MILLER: I believe that the foreman has to delegate responsibility just the same as a superintendent. The foreman delegates it to the die-setter and then to the men. In our shop if there is an accident a report must be made. The foreman is the man who makes out the report and submits it to the superintendent. After the injured man is back on the job he reports on his view of the accident. This is also given to the superintendent who turns it over to the works manager and the safety department.

I fully believe that the management of our department through the work that they are doing with the die-setters, is largely responsible for our safety record. The foreman is responsible for accidents but he delegates this responsibility to the die-setter. Our foreman is responsible just the same as the superintendent is responsible to the works manager for accidents, but they all delegate this responsibility.

E. J. CLARKER (Termostadt Mfg. Co., Detroit, Mich.): I have had a little bit of experience with punch-setters, job-setters, foremen, safety men, and so on. It has all been agreed and passed on by the National Safety Council and its representatives that about eighty-five per cent or more of this problem of accident prevention is education. Now education is the only thing that will prevent accidents on any machine. I don't care how well equipped it is, unless you have supervision that takes the place of education you will have accidents. The two are so closely related that you can hardly say they are separate. We sell a safety idea to the safety man who passes it on to the foreman. We do it possibly through improving his production. If we cannot improve his production, we sell it to him on the basis of fifty-fifty, because if he has an accident in his department he will have to stand that. It will be marked up against him.

We have then contributed to the education of the foreman. The foreman being sold on it, passes it down to the job-setter, the assistant, or whatever he may be. Finally it goes to the man who actually sets the job on the press.

The whole thing is a question of education and it is up to the safety man to sell each and every department right on down and to sell them the idea that they are responsible for carrying out these principles. That is the only way you will get safety. Do your job right and pass it down just as far as you can on a selling basis. We have no authority. I don't want any authority. However, we can do things;

we can have men removed. But you can't display authority and get anywhere. We are all human beings and we have got to treat the other fellow the way we would like to be treated ourselves. The sales idea is the way to do it and the only way that will do any good. If you get the resentment of the men, you won't get any cooperation. If you treat them right and try to help them, then you will get results. The question of responsibility is just how far we have done our job and assumed that responsibility.

R. A. POWELL (General Electric Co., New Kensington, Pa.): I should like to know what is meant by education. The best way that I can see to get results is by action.

MR. MILLER: I think education goes a long way, not education alone, but cooperation. If your manager or supervisor is sold on an idea and he has the personality or whatever it is to get the man who is immediately under him working with him, and he spreads that down the line and gets everybody working in step with him, you don't need to resort to the dollar to put this thing across.

Now in a punch shop, I still stick to the idea that if the supervisors work with the safety department and have these meetings that I talked about here, the die-setter can get across what those fellows are trying to promote. I believe in our department we do it and it is very seldom that we penalize anybody for violating safety rules.

T. I. PHILLIPS (Westinghouse Electric & Manufacturing Co., East Pittsburgh): My idea of safety enforcement is very much the same as the question of quality in production. You hear a whole lot about cost nowadays and the need for meeting dates and qualities, and we try to build up our organization so they are conscious of their responsibility. We ask them to be cost-minded, and quality-minded and safety-minded. I don't believe that Mr. Miller intended to convey the idea that we put the responsibility of safety into the hands of our die-setters instead of our safety men, but we expect them to be safety-minded along with the other responsibilities that they have.

G. W. STARLING (Harrison Radiator Corp., Lockport, N. Y.): This discussion, gentlemen, has been very interesting. The question of delegating the responsibility of safety to the die-setter is in the final analysis nothing more or less than a matter of personal opinion. I think that we have lost sight of some of the fundamentals of a safety man's job.

Each one of you gentlemen that are in this room who has any connection with safety work was chosen by the management because you had some exceptional ability, and if an executive is chosen for ability, he is chosen for leadership. The managers of the various manufacturing plants throughout the country do not devote their time to details. They devote their time to the fundamentals of leadership.

I believe that if each of you who have charge of a plant in regard to safety and accident prevention would analyze the cause of your accidents and leave no opportunity go to further the spread of your safety campaign throughout the shop, we would get farther in accident prevention.

If each one of you men are good safety men, you have more duties to take care of than just to spend your entire time in the punch press department. You have to take care of numerous questions with the management. You have to spend some of your time in other parts of the shop. This question of delegating the responsibility to the die-setter is just the same as the question of delegating the responsibility of the foreman to the operator. It is just a question of how far you yourself want to carry your work throughout your organization, how many members of the organization would you want to get interested in the safety program. It is very, very foolish, men, to think you can do it all yourself. You can't. You can't do any fraction of one per cent of the job yourself. You have got to have your organization with you.

ADJOURNMENT

Wednesday Morning Session October 1, 1930

JOHN E. WALTERS, Chairman
General Electric Company, West Lynn, Mass.

The second session of the Power Press Section convened with Chairman S. H. Slaymaker, Fairbanks, Morse & Co., Beloit, Wis., presiding.

CHAIRMAN SLAYMAKER: The first business of the meeting is the annual election of officers. Some time ago we appointed a Nominating Committee, to submit a slate of officers for next year. I will call on the Chairman of that Committee now, Mr. Meisner, for his report.

Report of the Nominating Committee

T. O. MEISNER (American Can Co., Chicago, Ill.): The Nominating Committee wishes to make the following report of recommendations for officers for the Power Press Section:

General Chairman, JOHN E. WALTERS, General Electric Company, West Lynn, Mass.
Vice-Chairman, in charge of program, F. G. STAHL, Transue & Williams Company, Alliance, Ohio.

Secretary, A. L. KAEMS, Simmons Company, Kenosha, Wisconsin.

Chairman Poster Committee, CHARLES R. BRYANT, American Can Co., New York, N. Y.

Chairman Health Committee, DR. C. F. N. SCHRAM, Fairbanks-Morse Co., Beloit, Wis.

Chairman Membership Committee, E. J. SMITH, Western Electric Co., Chicago.

Chairman Publicity Committee, C. H. GERDING, Western Electric Co., Chicago.

Chairman Statistics Committee, W. J. LARSON, Clum Mfg. Co., Milwaukee, Wis.

Chairman Engineering Committee, G. S. THOMPSON, Detroit Insurance Agency, Detroit, Michigan.

Chairman Health Committee, DR. C. F. N. SCHRAM, Fairbanks, Morse & Co., Beloit, Wis.

Chairman Committee on Slides and Safety Kinks, P. G. HUNTER, Motor Wheel Corp., Lansing, Michigan.

News-Letter Editor, W. J. GRAVES, Michigan Mutual Liability Co., Detroit, Michigan.

Members Executive Committee at Large—

LOUIS BORAKS, Liberty Mutual Insurance Company, Boston, Mass.

R. G. MARTER, National Enameling & Stamping Co., Milwaukee, Wisconsin.

S. H. SLAYMAKER, Fairbanks-Morse & Company, Beloit, Wisconsin.

J. W. HENNING, Automatic Electric Company, Chicago.

J. E. ROCKOFF, Detroit Steel Products Co., Detroit, Michigan.

J. B. GIBSON, Western Electric Company, Chicago, Illinois.

T. O. MEISNER, American Can Company, Chicago, Illinois.

CHAIRMAN SLAYMAKER: Are there any further nominations? If not, the Chair will entertain a motion to close the nominations.

J. D. LYLE (Fisher Body Co., Cleveland, Ohio): I so move.

CHAIRMAN SLAYMAKER: It has been moved and seconded that the nominations be closed. All in favor signify by saying "Aye"; contrary minded "No". Motion carried.

Allow me to introduce our newly-elected general chairman Mr. John E. Walters, Safety Engineer, General Electric Co., West Lynn, Mass., who will now take charge of the meeting.

CHAIRMAN WALTERS: Mr. Slaymaker, gentlemen, I'd like to try to express my appreciation of the honor you have conferred upon me in choosing me as your Chair-

man. All I can say is that I hope that with the assistance of the officers that have been elected with me I shall be able to do as good a job as my predecessor.

After all, the whole object of the safety movement is the elimination of accidents.

Now our subject for next year will be accidents, and we are against them. Let's see what we can do to carry out that program. The human element is the one we have to deal with mostly. Guarding, we know, in all the principal plants, and advancing very rapidly with the assistance of the insurance companies in the smaller plants, is an accepted thing, but due caution and thinking power on the part of the employee is what we must stress.

Our first speaker this morning is going to outline to us, as he sees them, the trend of accidents at the present time in the Power Press Section. I know of no one more able to do that than Mr. E. J. Smith, safety director of the Hawthorne Works of the Western Electric Company, Chicago.

Accident Experience of our Members During 1929

By E. J. SMITH

Safety Director, Hawthorne Works, Western Electric Co., Chicago, Ill.

The 1929 accident experience of our members, engaged in fabricating, forging, stamping, and machining numerous metal products varied little from previous years, even though, as in other sections, plants were active and new employees were hired frequently during most of the year. Lost-time accidents per million hours worked increased slightly over 1927 and 1928, but their severity, as measured by the days lost per thousand hours worked, was less than for 1928 and just equal to 1927. Unfortunately, the frequency of permanent partial disability accidents rose to the highest level in three years. On the other hand, our frequency rate for temporary disability cases was the lowest for any year of this period. Our 1929 fatality rate was less than for 1928, but higher than for 1927.

The trend of accidents in metal working plants since 1927 has not been entirely in line with the experience of industry as a whole. The combined records of organizations in all sections show a drop of 11 per cent in the frequency of all lost-time accidents but an increase of 5 per cent in their severity from 1927 to 1929. Our 1929 frequency rate, you will recall, was slightly higher but our severity rate remained the same as for 1927. The higher severity rates in industry as a whole resulted from an increase in the frequency of fatalities during 1928 and permanent partial disabilities in 1929.

Our experience with serious accidents has been similar. The rise in frequency of serious accidents in industry obviously deserves particular attention by all sections.

These conclusions are based upon the experience of plants that have reported to the Council in each of the last three years. The records of the same plants are used from year to year, to avoid including high or low records by establishments that report one year and fail to report the next, thus making annual comparisons unreliable. Metal-forming industries were represented by 160 plants that have reported in each of the last three years, with an annual exposure of about 140,000,000 man-hours.

Numerous explanations can be advanced to account for the increase in serious accidents. Is industry concentrating on the elimination of causes of minor accidents and overlooking major conditions? Some safety engineers claim that safety receives less attention from the operating force during periods of high production; that supervision and training of new employees are apt to be neglected at such times. A safety director of a large company whose operations were rapidly expanded during 1929 found that new men were transferred from an hourly to a piece work basis before they were capable of handling the work safely and efficiently. Furthermore, are we

keeping more accurate accident records, and is there less hesitancy in reporting serious accidents? The situation deserves study.

A majority of plants had unfavorable experience during the past year. Reductions in the frequency rates of metal-working establishments were achieved by 73 establishments but 91 had higher rates. Higher severity rates were reported by 84 plants in comparison to 77 with lower rates. The experience of this larger group of plants during the last two years, therefore, was very similar to that of the three year identical plants.

Some excellent records nevertheless, were established during 1929. Organizations with these records have set marks for other plants in their industry to shoot at, by demonstrating what can be accomplished in accident prevention. Fabricators of structural steel had the highest frequency rate, 62.9, of any metal forming group during 1929 which makes the record of a company reporting a rate of only 12.0 particularly outstanding. In three years, this plant, employing about 250 men, reduced its rate from over 100 lost-time accidents per million hours work to the low figure of 12.0. One of our stove manufacturing plants reported a sharp increase in employees for 1929, which probably accounts for a slightly higher frequency rate than for 1928, but the 1929 record, nevertheless, was an outstanding one. This plant reported 29.37 lost-time accidents per million hours work for 1926, a rate which, even then, was less than the 1929 average frequency rate of 34.65 for stove manufacturers, but for 1929 their rate was only 5.0. Plants producing drop forgings had the high average frequency rate of 51.25 for 1929 and the highest severity rate, 6.53, of any group of metal forming plants, but one of our members in this classification has cut accidents from 77 per million hours worked in 1927 to 30 in 1929. Another plant, producing metal stampings, and employing approximately 250 men, has not had a frequency rate higher than 5.0 during the last three years. Furthermore, they have had only one case in which an employee lost a finger in their presses during this period.

Though accident rates varied widely according to the type of operations performed in metal-forming plants, frequency rates less than 10.0 were commonly reported in most classifications. I have previously told you that structural fabricators had the highest average frequency rate of any metal forming group, 62.9, but 16 of the 23 establishments in this classification reported rates less than this average. Similarly, 10 out of 17 forge shops had rates less than 45.0, though the average for the entire group was 51.25. Boiler shops and plants manufacturing bolts and nuts, tubular products and stoves, had about 34 lost-time accidents per million hours worked, but individual records show that, with the exception of boiler shops, rates less than 20.0 were frequently achieved. Jewelry establishments had the lowest frequency rate of any metal forming group, 13.77, but their average severity rate, 1.18, was higher than for bolt and nut manufacturing plants with a rate of .81, and companies manufacturing wire products with a severity rate of .95. Irrespective of the hazards of the different groups, we find that every type of metal-forming plant is represented among the 178 plants with rates less than 20.0.

The average frequency rate for all types of plants was 26.14 which is somewhat higher than the average of 25.53 for all sections. Our severity experience, on the whole, compared favorably with other industrial groups during 1929. Severity rates ranged from .81 for bolt and nut manufacturing to 6.53 in forge shops, but averaged 1.67 days per thousand man-hours for all metal-working plants in comparison to 2.23 for industry as a whole. The only other group besides forge shops to have an average severity rate over 2.0 was structural steel fabricators with a rate of 3.89, though 13 out of 23 shops had rates less than 1.0. Low severity rates were more common than the average group rates would indicate as also shown by 8 out of 17 forge shops with rates less than 3.0. Furthermore, favorable severity experience among all types of metal forming plants is shown by the fact that 60 per cent of all reporting establishments had rates less than 1.0.

Though temporary disability accidents do not appear to be more serious in one type of metal-working establishment than another, the severity of permanent partial disabilities varies considerably. Accidental injuries of this type averaged 539 days of lost-time for all metal-working establishments, 607 days for structural steel fabricators, 747 days for wire drawing plants, and 336 days for jewelry establishments. Fatalities were more frequent in forge and structural steel fabricating shops than in any other plants.

Though many of our members have made excellent progress in accident prevention work, there is still much room for improvement. The interest which members in our different industries are taking in their accident problems is constantly increasing as shown by the steadily increasing number reporting to the Council each year. Reporting members in metal-forming industries increased from 229 in 1928 to 347 in 1929. This increase means that the accident figures for our various groups become more and more reliable each year. It is essential that every member realize the importance of reporting his experience every year. Do not report for 1929, miss 1930, and report again in 1931 because, as I have previously indicated, the records of consistently reporting establishments give the best measure of improvement. Your sectional officers appreciate the hearty response to their requests for accident reports for 1929. This cooperation is evidence of your support in their efforts to develop reliable accident figures for this section. We expect 1930 to be bigger and better than 1929. Be sure to send your 1930 accident report some time during January of 1931.

CHAIRMAN WALTERS: The State of Wisconsin, gentlemen, is in the forefront in safety work, and it is indeed a pleasure to be able to present to you a gentleman who can lay the problems as they see them, and as they have been able to analyze them, before you this morning. Mr. Knutson, a member of the Industrial Commission of Wisconsin.

Wisconsin's Method of Punch Press Guarding

By HON. R. G. KNUTSON

Member, Wisconsin Industrial Commission, Madison, Wis.

It is not my hope to present to this group anything radically new, but merely to collect and summarize what has been said by various persons at various times relative to this matter of punch press guarding. The discussion will be illustrated by the experience in Wisconsin and the history of the Industrial Commission of Wisconsin in its attempt to procure better guarding of punch press operations.

Only the problems peculiar to punch presses will be considered. In other words, it will be taken for granted that the general problems involved in securing safety, such as the selection of the proper type of individual for the work to be done, good housekeeping, lighting, discipline, and intelligent supervision by foremen, are well-known and may be taken for granted as entering into the problem of the prevention of punch press accidents just as they enter into all accident prevention work.

In Wisconsin, out of 22,630 cases settled under the Workmen's Compensation Act during the year 1929, metal working presses were responsible for 354; 244 out of the 354 occurred on power driven punch presses; 167 of the 354 cases caused permanent disabilities. Weighting these permanent disabilities according to the standard table, we may say that these permanent disabilities caused 111,387 days of lost time, whereas the 187 temporary disabilities caused lost time of 3,724 days. In other words, a little less than one-half of the punch press accidents caused permanent disabilities of a serious character and a little more than one-half caused minor temporary disabilities.

Our statistical data in Wisconsin covering metal working press accidents run back to 1918. These data show that the absolute number of metal working press accidents

have been decreasing considerably since 1918. However, the number in proportion to machine accidents, while showing a decline from 1918 to 1924, has increased slightly since that time. Of course, the reason why the number in proportion to all machine accidents has not shown a consistent proportionate decrease is that the total number of machine accidents has been declining.

A study of the manner of occurrence of metal working press accidents since 1915 shows that the percentage occurring at the point of operation has varied from 69 per cent to 87½ per cent. The proportion increased from 1915 to 1926 and has been decreasing since then. The fact that the data show a large percentage of accidents occurring at the point of operation, immediately suggests that the safe guarding of the point of operation is the main problem involved in preventing press accidents. The problem of guarding the point of operation is a complicated one because of the great variety of objects produced on the machines and the great variety in the kinds of machines used. Thus, we have slow acting presses and quick acting presses. In some of the light forming operations, an experienced operator can obtain a speed of 1500 or more operations per hour. When it is realized that for every single operation he may be obliged to place his hand in proximity to the danger point twice, that is, once while inserting the material worked upon and once while removing the finished product, the possibility of accidents would seem to be tremendous.

Since 1912 the Industrial Commission has had an order (Number 30) requiring that the "tool of every power press used for such work as punching, stamping, blanking, shearing, or embossing must be guarded." There are advantages and disadvantages in a blanket order of this kind. It will be noted that this order does not specify the manner in which the tool must be guarded but leaves it to the ingenuity of the employer to devise an effective method of guarding. However, there is nothing in the order that suggests what the commission considers would be an effective guard. Therefore, the employer is left without a guide or clue. The alternative to a blanket order of this kind is the development of a safety code for presses such as has been recommended by the American Engineering Standards Committee.*

It is my personal opinion that a safety code should constitute a handbook to safe practice. In other words, I believe that safety codes should be specific enough so that the employer knows what he must do to comply, and what is considered full compliance. This is especially important in a state like Wisconsin where the employer is required to pay 15 per cent increased compensation if an accident to an employee is due to his failure to comply with a safety order of the commission. The figures of the Industrial Commission for the eight year period, 1922-1929, show that of 4,217 cases where the employer was required to pay increased compensation, 1002, or 24 per cent, were attributable to violations of Safety Order No. 30 relating to power presses. While it may not be desirable to attempt to prescribe in detail the requirements for guarding power presses, certainly it should be possible to include in the code descriptive material and illustrations indicating in order of preference the various ways of guarding power presses so as to comply with the general safety order.

Of course, the automatic press which feeds itself and ejects the finished material does not constitute much of a problem so far as guarding is concerned. Usually the ram can be completely enclosed. Neither does the semi-automatic press constitute much of a problem since it is not necessary to place the hand in the danger zone in order to feed and eject the material. Therefore, in this type of press the ram may also be completely enclosed. It will be seen, therefore, that the chief problem is involved in the manually fed machine. Of course, the most desirable way of guarding is to devise ways and means so that the hands of the operators are not placed in the danger zone at any time. The second best way is to develop ways and means for making certain that if the hands of the operators must be placed in the danger zone at any time, they shall be removed before the ram descends.

In the early days of the commission, the two-handed tripping device was accepted and undoubtedly prevented many accidents so long as everything was normal. How-

*Bulletin of the U. S. Bureau of Labor Statistics, No. 430, Washington, 1926.

ever, it was easy to "beat" by tying down or resting an elbow upon one lever so that it could be used as a single-handed trip. Under these circumstances the hand used in feeding the material was left free, so that any failure in the synchronization of the movements of the operator and the machine was disastrous and the purpose of the double trip was defeated. Moreover, this type of protected device gave no protection in case the press "repeated" because of loose brakes, broken latch-spring or latch-pin. The mechanical sweep guard was also accepted as compliance with the safety order, but this, too, was found not to be 100 per cent protection under all circumstances. The sweep guard was, of course, intended to strike the hand of the operator out of the danger zone before the ram descended. However, many times the guard was not properly attached, being either too high or too low, so that the operator could work above or beneath it or at the side of it. In fact, accidents have been reported to the commission indicating that the sweep guard itself was responsible for the accident. For example, one accident was caused by reason of the fact that the sweep guard caught the man's hand and held it between the dies while the upper one descended. Another accident was reported due to the fact that the sweep guard carried the hand under the die.

In addition to the sweep guard and the double tripping device, the two-push button system has often been used. Sometimes the push buttons are operated mechanically and sometimes electrically. However, in the case of all these guards, that is, the double trip device, the sweep guard, and the two-push button system, the fact remains that they do not prevent the operator's hand from entering the danger zone but merely undertake to make certain that the hand is not there when the ram descends. They are, therefore, not only subject to improper manipulation by the operator but may sometimes fail to function properly. Therefore, it is highly essential that constant and careful supervision be exercised at all times.

Of course, one way of eliminating the need of the operator to place his hands in the danger zone was to provide special tools for inserting the blanks and removing the finished pieces. These instruments might consist of pincers, picks, suction tools, or electro-magnets. Obviously this represents the least satisfactory way of guarding since reliance is not placed upon any mechanical device but upon the actions of individual workmen which, of course, are oftentimes capricious and in the nature of the case cannot be foreseen.

This was the situation in 1917 when one of the commission's deputies, A. L. Kaems, undertook to develop methods of getting the material into and out of the press even on manually fed presses without placing the hands in the danger zone. At that time there had, of course, already been developed the complete enclosure type of guard so arranged that there was just enough clearance to place the material in the dies but not enough for the operator's fingers. This type of die is still in use to a considerable extent and gives 100 per cent protection where it can be used. However, unfortunately in the great majority of operations it cannot be used satisfactorily.

Mr. Kaems gave primary attention to the construction of the dies themselves. He found that in many cases the die could be constructed to allow for a shield for the hands or fingers by attaching obstruction guards to the die itself. He also found that many times reversing the positions of the dies or tilting the position of the dies so that the material automatically ejected itself by the force of gravity, made it possible either to feed the machine or to withdraw the finished product, or to do both, without the hands entering the danger zone. He also found that it was often possible to attach suitable feeds such as dial, sliding, incline, roll or chute feed, or to construct sliding, swinging, or revolving dies or to attach devices for automatically ejecting, picking off or blowing off the piece after the operation was completed. There was an added advantage in working out this sort of safe guard since it not only increased safety but also usually increased production.

The progress from hand operations to the perfectly synchronized mechanical operations has been rapid, so that today, though the production volume is huge, there is a minimum accident ratio.

With metal stamping operations, on the other hand, different plants vary widely in their methods. The punch or power press is designed for safety, but the special tool for making the formed or stamped parts are made according to the individual in charge of the die manufacturing division, who usually first considers cost, next the most efficient and simplest way to make the part, as determined by the stroke of presses owned by the company. Added to this the designer endeavors to eliminate as much as possible, extra steel (which costs considerable). These experts know the cost of a die by instinct and the steel cost, as well as the actual time for making same, but in the past, tended to overlook the safety cost.

The time now seems to have arrived for a standardized metal stamping code for die design, which includes safety features. The trend toward absolute safety in present metal stamping plants can no doubt be aided by continual thought towards "Elimination of Accidents, or One Hundred Per Cent Safety Design." The first step when designing new dies would be to show the extra financial amount required to obtain safe conditions, as compared with the loss by dies lacking the safety features.

The mind must be receptive to the newer thought of no accidents in the metal stamping division instead of it being said "we have done pretty well as compared with past experience." Psychologically, it must first be believed that this division can operate without accident in order to expect and obtain no accidents.

Most machine manufacturers have incorporated reasonable suggestions in the necessary design; however, it must be left to the individual stamping plant to consider the proper use of all equipment as well as such items as proper piling, scrap handling, light, aisles and cleanliness.

The chief advances in die design that may be cited are automatic dies, specially equipped multiple dies, and slides and chutes for putting work in and out of the press.

The designers of power presses have caused certain changes to be universal, such as removing the brake away from the friction clutch, thus eliminating constant repair and repeating of the press. On large presses, brakes are being installed on the large fly wheels in order to stop same after power is off. Other improvements included are: oiling systems which are efficient and safe, motor drives for raising or lowering the stroke, level controls on the press which allow any kind of a die to be used, and the use of brackets for supporting individual motor drives. Complete guarding of gears, clutch, and in small size presses, the screening of spokes of fly wheels, are other developments.

The vertical method of press design or the placing of every thing above, with the thought of conserving floor space, has been an important factor in obtaining safety in stamping plants.

The leading employers of our state have cooperated with the Industrial Commission in its attempt to bring about better safeguarding of presses, and they all now seem to be agreed that particular attention should be given towards the construction of the dies for the presses and a close cooperation between the management and safety department with the tool makers in the construction of the dies and the testing of them against hazards in operation before they are actually turned over to the operator of the press for production work.

As I stated at the outset of this paper, I do not flatter myself that I have presented any new material. However, I do trust that I have emphasized the basic principles that have been found to be essential for proper press guarding and that the results that have been obtained in Wisconsin will serve as an encouragement to all of us to continue with the good work.

CHAIRMAN WALTERS: Gentlemen, it has been my pleasure to serve as Chairman at a good many meetings, but I can recall none where it has been my good fortune to present two gentlemen who have placed before an audience as much meat as we have received this morning. We are going to throw this meeting open to discussion on anything you want to talk about.

C. JOHNSON (Motor Wheel Corporation, Lansing, Mich.): I'd like to hear what the fellows think of saddle guards for trips to punch presses.

C. L. KLEIN (Westinghouse Electric and Mfg. Co., East Pittsburgh): Our latest achievement is that we have all our foot pedals, and treadles all protected with safety guards. We had a few accidents this way, and we gradually got wise to this fact, that they should be protected. We have them protected about 100 per cent now.

CHAIRMAN WALTERS: Did you find out that your saddle guard eliminated those accidents that you had?

MR. KLEIN: Since they were attached, we have not had any more accidents.

CHAIRMAN WALTERS (General Electric Co., West Lynn, Mass.): Has anybody found any bad points in that saddle guard? Let's get both sides of it.

E. J. CLARKE (Turnstead Mfg. Co., Detroit, Mich.): I think the gentleman wants to know what is the character of a guard generally used on a pedal. What has brought that about has been the fact that wrenches, parts of dies, etc., might be dropped on the pedal while the belt is still running. That, of course, would serve the same purpose as tripping the press by foot.

Another objection, and cause of accidents, was where trucking was performed in the neighborhood of a press; that they were liable, while the operator had the pedal down, to shove a truck or move it over, and that it got over the top of the pedal, and the pedal couldn't come up and release the latch.

Those things, with the question of Mother Necessity, and the idea of covering it up, lead to the problem of preventing such accidents. It had no other purpose, that I am aware of, than the prevention of accidents.

The method of covering was sometimes with a piece of formed sheet metal, that covered over the top and two sides, rigidly attached to the leg of the press. We have recently developed a cover or guard for the pedal in which we have at one side a rest for the foot.

You probably all realize that it is a bad practice for a press operator to ride the pedal; in other words, to keep his foot on the pedal, giving that thrust as necessitated by the feeding operations. We cause them to remove the foot at every stroke of the press; take the foot off, for the reason that impulse acts as a factor when their foot is on the pedal. They get that impulse and trip before they can control their foot, because that foot tripping the press has become a mechanical fixture, so to speak.

In other words, they don't use their brains in tripping the press after two or three months' operation of a foot press; they do it purely mechanically. If they must place their foot back on the pedal, it gives them an opportunity to grasp themselves, and not trip, provided the piece is not properly located in the die.

Now this rest prevents a certain amount of fatigue of the operator. Where they used to take their foot clear off the pedal and put it back, it represented a certain amount of useless energy being consumed, so to speak. When we put that rest there, they simply moved the foot under the guard over on to that rest, back and forth. The only thing that appeared necessary was to have the pedal slightly higher than the rest, so that the foot would not inadvertently slip over on to the pedal and cause it to trip, by the operator getting out of balance.

We have found that the operators very much desire this foot rest in connection with the pedal guard, and we are supplying them as fast as we are able, taking off the old guards and applying the new ones. We will be glad to send a sketch of the device to anybody who desires it.

C. JOHNSON (Motor Wheel Corporation, Lansing, Mich.): Do saddle guards ever cause accidents or not?

D. V. WATT (Western Electric Co., Norfolk, Va.): We have recently designed saddle guards for pedals on large presses. It isn't precisely a power press application, but I think it is about the same condition. We made those saddle guards of quarter-inch material, and the treadle has quite a large travel, and there will be the possibility of the operator injuring his shoes against the front of the stirrup top

forging of the guard, so we put a 3" piece of felt around the front and bound it so that the operator couldn't injure his shoes. It seems to work very well.

MR. KNUTSON: The only way that I know of that accidents occur with the use of a saddle guard, is that quite often they are not strong enough to withstand the weight of material dropped on them.

G. E. SANFORD (General Electric Co., Schenectady, N. Y.): I don't know of any accidents caused by saddle or treadle guards, but on some small presses the trip rod runs alongside on the outside of the press frame, and where you have a press of that kind adjacent to an aisle, it is highly advisable to cover the whole length of that trip rod, to avoid any material from trucks, or trucks being pushed out and just catching over that rod.

M. J. MCCARTHY (Fisher Body Co., Detroit, Mich.): I'd like to get the consensus of those present as to what they think of running toggle presses—I am talking about the larger ones, not the small presses—running toggle presses on the hop. Is that done any more, or is it obsolete, or are most people doing it?

H. R. WHITNEY (General Industries Corp., Elyria, Ohio): We have some toggle presses, but maybe your presses are larger than ours. We have the U. S. 66, and we are running those with the Possons' Safety Device, and have been running them a long time; we are feeding those presses without stop with the Possons' Safety Device. They are a slow-running press.

MR. MCCARTHY: I want to ask Mr. Knutson what his experience has been in Wisconsin. Do you have anything in your Code that permits them to run a toggle press on the hop, or don't they permit them to do it?

MR. KNUTSON: Our Code makes no distinction between any type of press. It is just with general reference to any press. However, we do know the type of presses that you, no doubt, are referring to, but we have not yet been able to devise any guard for them.

MR. MCCARTHY: I am glad to hear that. We haven't been able to find any either, and we are still running our toggle presses on the hop. The other things are pretty fairly well licked, but we have been unable to cut down the accidents on our toggle presses. We don't get them so often, thank God, but often enough to worry us. We have come to the point where we think we ought to be able to cut out running toggle presses on the hop. To do that we will have to not only increase the equipment, but also the space occupied by the press, to handle the proposition. I just wanted to know whether you thought it practical from a production standpoint to cut out running them on the hop. However, ours are a whole lot larger than the ordinary presses.

R. H. LUBENRACH (Budd Manufacturing Co., Philadelphia, Pa.): This fellow is right after my own heart, here. Even though he is one of our competitors, maybe we can get into this thing together. We have a number of toggle presses, some of the largest ones, I guess, that are made; and we have yet to find a good guard to apply to a toggle press. I think this gentleman will agree with me, too, that the shape of the material, the size of same, and the manner in which it must be placed into the die, prohibits any guard on the market today. We have had, however, very few accidents on the toggle presses, and I credit that result entirely to the fact that we slow down the speed of the press. As a rule they are rather fast for a turnover job, such as he refers to. We have, therefore, reduced the speed. By reducing the speed and putting it on a turnover basis, in many cases we have increased the production.

However, on some jobs, where the material is extremely large, like the whole side panel of a car, a Dodge side panel, it is impossible to turn over, on account of the bulk of the piece, which weighs in the hundreds of pounds.

J. D. LYLE (Fisher Body Co., Cleveland, Ohio): I'd like to ask the gentleman from Budd whether they run the presses on the fly or not.

MR. LUBENBACH: Yes, we do run lots of presses on the fly.

MR. LYLE: Toggle?

MR. LUBENBACH: Yes, sir. Come and see it. We'll be glad to show you how we do it.

T. O. MEISNER (American Can Co., Chicago, Ill.): What free space do you allow in the operation of your toggle presses?

MR. LUBENBACH: A 54" gap.

MR. MILLER (Westinghouse Electric & Mfg. Co., East Pittsburgh): I'd like to ask the man from Fisher Body Company if they use that automatic friction clutch control sold by a Detroit firm.

MR. MCCARTHY: Yes, we use it. We haven't got it installed on all our presses yet.

MR. MILLER: How do you find that?

MR. MCCARTHY: Very, very good. We'd like to be able to get the Hamilton people to build them fast enough for us, but they can't do it.

MR. MILLER: I was under the impression that you used them on all your toggle presses.

MR. MCCARTHY: No, we haven't a thing on our toggle presses. We have the control you speak of, one in Detroit and one or two now installed in our Cleveland plant.

MR. MILLER: Do you intend putting them on your toggle presses?

MR. MCCARTHY: We have an awful lot of toggle presses, and to incorporate this on all of them means a lot of money.

MR. MILLER: They don't cost much, do they?

MR. MCCARTHY: The cost is about \$600,000—\$600 per press; and by the time you get them installed, they run to \$1,200 per press; the installation costs more than the outfit itself.

MR. LYLE: What is the comparative cost between an ordinary die and a die that is built for a slide feed?

CHAIRMAN WALTERS: If Gus Krems were here he could tell you all about it. Gus will tell you that you can put in a die from anywhere around 60c and up. He will tell you, at the same time, that one of the cheap dies, for intermittent operation, where you have a constant change on your die, will pay for itself on a single day's work; and he has figures and facts to show you, as I think my friend from Wisconsin will bear me out, that he has increased production anywhere from 30 to 300 per cent. In other words, forget the first cost, because the thing is going to pay you back.

J. H. REYNOLDS (New York Indemnity Co., New York City): How many supervisors keep a weekly or a monthly record of their inspections on their presses?

R. W. HARDING (Old Motors Works, Detroit, Mich.): We keep a complete record of inspections by the Erie men in certain divisions, and we are quite proud of our record of twelve months without a lost time accident in our Press Division. The electrical work, the oiling system, in fact everything on the press is all checked up before the press is put in operation on Monday morning. Those records are filed, and kept open for inspection at any time by anybody who wishes to see them. We feel it has done a lot of good; enabled us to keep our presses as we have them at the present time.

T. W. BOOTH (Burroughs Adding Machine Co., Detroit, Mich.): We trip every press in our factory, where it is the second-operation press, every day, before it is operated. Before the man does any operation on the press, he trips the press several times. He is instructed to do so. We inspect every press in our factory every week. It is gone over and checked back on everything, and all repairs are made over the end of the week; and we keep a careful record of the repair requirements on each press.

CHAIRMAN WALTERS: I am going to call, Mr. Sanford, to explain the tripping device for the operator that I spoke of.

G. E. SANFORD (General Electric Co., Schenectady, N. Y.): I am not making any sales talk at all, because I don't know any prices, don't know any delivery dates, or anything else, except some information that our company, General Electric, issued only last week.

We have what we call an Operator, for want of any better name. The device at the present time is made in three sizes, a small one, which gives a stroke of 3" at 150 lbs. pressure (the operating time is approximately one second through the 3" stroke); a larger size, with a 6" stroke at 600 lbs. stall pressure (and about 2½ seconds, as I recall the time trip).

If anybody is interested in getting further information we'll be glad to see that information is sent to you. I thought that possibly might be of interest where you had the large presses, and where you know it takes, sometimes, 50 pounds or more of pressure on a treadle in order to operate it.

This device of ours has a push button control, and you can put as many push buttons in series on that as you have a mind to. You know the hands are out of the way when that press is coming down.

CHAIRMAN WALTERS (General Electric Co., West Lynn, Mass.): I want to thank you, gentlemen, for your interest, for your assistance, and for the valuable information that has been brought out at this session.

ADJOURNMENT

Thursday Morning Session
October 2, 1930

JOHN E. WALTERS, Chairman
General Electric Company, West Lynn, Mass.

The third session of the Power Press Section convened with Chairman Walters presiding.

CHAIRMAN WALTERS: Gentlemen, it is with a great deal of pleasure that I present to you Mr. W. D. Christian, general superintendent of the James Manufacturing Company, Fort Atkinson, Wisconsin.

Why Safety is a Paying Proposition

By W. D. CHRISTIAN
General Superintendent, James Manufacturing Company, Fort Atkinson, Wis.

I had intended to talk to you on another subject, which could be outlined by words like these: "Let us walk down the road together safely." But I want to change my original thought a little. For as I have sat with you men of the Council in these sessions during the last few days I have heard more statistics and other information about safety and the material results of safety work in all parts of this country than I ever thought it possible to know.

I am going to divert my thought and ask you this question: "What does it mean to make a paying proposition of safety?" What are we here for? What do we live for? And I know that as there are many men, there are many minds, and your thoughts will run in various channels. But be that as it may, there are a few common fundamental things that we all must consider. Can you imagine a few years ago a gathering like this in Pittsburgh or anywhere else under the caption of safety work? I can't.

I have a great many friends of my boyhood days who are limping around without a leg, or part of a foot or hand or some other part of the body, and all they got was a dishonorable discharge from employment for being careless. We have passed that stage now and I hope we will never see it again. That factor of safety work comes home to me far more forcibly than it does in dollars and cents. I presume that there are men in our great institutions today who are safeguarding machinery and the various hazards of our industries that we may get a better rating and thus save money. But I believe fundamentally, and the spirit of this Congress demonstrates the fact that there are far more important things than the money part attached to this great work. I would not have spent the time coming from Fort Atkinson down here to talk to you on that subject because I know that there are men who could give you statistics and talk much better than I can; but somehow I felt that I had a message that ought to go home a little farther and a little more sincerely than it has gone (according to my experience at least) and that is the humanitarian side, that we play the game of life as we associate together in our manufacturing industry.

I can imagine an audience coming together for an occasion like this twenty years ago, but I ask myself, what is it all about? The answer comes back to me, because we fundamentally are interested in the welfare of one another, whether we express it audibly or not. Then I went back over my own experience. I went back very far and tried to get to the fundamental principle of it, and I said: What is it all about? I said, It is true that men have been searching and searching, everlastingly searching for something in the ages that have gone by. And you ask me, What

were they searching for? And I answer, For those things that are of common interest to you and me.

And so we have come to search deep and far enough in our safety work to realize that the man who toils with his hands and brain must have all his faculties if he is going to make good in life. I go back in my thinking and see how far this would reach in my own experience. I went back to the time when I was a boy on a farm. I had a sweetheart then, and I remember those country roads—we did not have automobile roads as we have today—and I remember how careful I was as I took her by the arm and strolled down these country roads, how carefully I guided her so she would not fall into one of the ruts and become injured.

And thinking of this, I scratched my head and said, Why did I do that? Somebody said, "Oh, that is the funny feeling of youth." But I have gone deeper than that. I believe that there is a fundamental principle involved. That fundamental principle is the spirit of love. I don't mean the kind that parks out on the highway until all hours of the night. I don't mean the kind that chases around town until twelve, one or two o'clock in the morning, and goes home and thinks what a wonderful time they had.

I do mean that fundamental principle that puts an urge in men to be careful of a girl the way I used to, and today, thank God, I still do for she is my wife.

You and I must realize that if we are going to reach the highest lights of safety work we must cultivate that feeling of intense interest and love for our fellowmen. You and I who rub shoulders day by day with the man at the machine must realize that we must come down farther than just taking care of a man's finger or an eye—because I have seen men without eyes who seemed to be getting more joy out of life than you and I with two good eyes. I have seen men who had lost an arm who seemed to have a higher and finer philosophy of life than you and I who have two arms. Why? Because way down the line they have come in contact with an attitude in life that has put the sunshine in them—that our chairman told us about.

I am wondering this morning if your experience has been somewhat like mine in safety work. I have been associated with some firms where the safety engineer had an idea that he was a little tin god, that nobody else knew anything about safety work or its application or how to get by without getting hurt except by an iron-clad rule and that must come from him. There was no semblance of a spirit of cooperation in that attitude toward life.

But the question is, How shall we succeed in our safety work? What terms shall we figure when we talk about safety work and its payment? And I am thinking this morning of men who speak in a broken dialect. Sometimes we call them Polacks. Shame on you! Sometimes we call them Ginnies, and it is a disgrace to America to have men in our industries talk that way of men who cannot speak our language, who have been born in other parts of the world. If the atmosphere is not there, the spirit of safety cannot grow, and it certainly cannot grow in an atmosphere of ridicule.

Shall I take long enough to tell you about an experience of mine a few years ago in the city of Buffalo? I was general superintendent of the Buffalo Forge Company. There was a fellow of Italian extraction who worked on the bench right near the main aisle. He seemed like a genial chap, a fellow almost human, if you please—sometimes we feel these men are not. It used to be my privilege to grab him by the coattail each morning, and then walk by, never letting on that anything had happened. After doing that for some time, I heard him say one day, "De bigga boss lika his joke, too." And what happened? I am telling you men that that little act did more to put me in favor and in good standing with the men than any demand I might have made for their respect because of my position and all the executive ability that I might have endeavored to bring to bear on those people.

But how are we going to succeed in our safety work in the years that are to come, say in the next ten years? To me it seems that there are but two ways that

it can be accomplished. One is to do as a good sales organization does—go out in the fields where safety work has not been developed as it has in some of our more cultivated places. And by the application of metal guards, by strict discipline, and this fundamental principle, build up another territory where safety work will flourish and grow and where many lives will be saved. We say we have done a pretty good job in safety work in the past year. We have done a pretty good job, but I believe that we have not scratched the surface of safety work in the places where we have been working for years. I say this out of my own experience.

I have not come here to you this morning to be eloquent, but to call your attention to that fundamental principle of life that we all neglect, and that is the outward expression of interest in the men we associate with. What should we do for these employees in our workshops. You say, "We pay them for their production."

Until industry becomes shot through with that atmosphere of good will and a mutual understanding, my convictions are that safety work cannot possibly come into its own. And so I say, "Let us walk down the road together safely."

I have so many experiences come back to me that I am tempted to reminisce. A little, fat, German woman worked on a punch press under my supervision. It did seem a shame that a motherly-looking woman like that could not stay at home and take care of her home and children. But there was a reason behind it. The time came around for our seasonal depression and we had to reduce the operating manpower. This old, German woman came to me and said, "Mr. Christ, could I speak to you?"

"Surely," I said.

"I understand that you lay off some people tonight or tomorrow."

I said, "Yes, we haven't published it yet, but we are."

She said, "Please, Mr. Christ," and the tears came to her eyes, "Let me tell you my story. I have a boy and I am sending him to school, and I have a girl and she is going to business college. I work on the punch press hard all day and I come home at night and I wash and scrub and cook to try to make ends meet so that my boy and girl will have a better chance in America than I have."

And I am saying to you that though she was not the most efficient operator in the shop, the order went forward that she should remain. Why? Because the fundamental principle of life was there, those things that somehow or other put an urge into us that nothing else can. There is nothing that makes me feel more at home, and that is why I am always at the plant at six-thirty in the morning. I like to see the wheels go round. I like to sense the atmosphere. I like to say, "Good morning, boys," as I walk down the aisle. That is the experience that puts life and care and fun into our everyday life.

Then one cold winter night as I pulled out of my garage, comfortable in my warm car, I saw a little form with a shawl over its head. It was a terribly cold night and I pulled over to the curb and said, "Where are you going, lady?"

She said, "I go to the car line if God spare my life to get there."

I opened the door and said, "Jump in." It was the same German lady struggling for that thing in life that means more than dollars and cents, so that her boy and girl might go forth with sound faculties to be better citizens—that old lady plugging away doing those things that money can't buy. I said, "Where do you live?"

She said, "Way down under the hill on the east side, but I take the car. Take me to the car line. I get home somehow."

When I pulled up to the side of the little cottage on the east side of the city and opened the door and helped her out and opened the gate, I said, "Have a good night's rest and if you don't feel like coming back tomorrow, you don't have to. Take care of yourself; your job will be all right."

And she said, "Thank you. God bless you, Mr. Christ."

A few days later that woman was taken to the hospital with double pneumonia and the news came to the office that her life was ended. Do you mean to tell me

that a pang didn't come into my life? Wasn't there something too big for money to buy in the soul of that woman who had given her life so that her children might have a bigger chance in life?

So I say to you men this morning, "Let us walk down the road together safely." Let us not be afraid to take this fundamental principle into our life and into industry, because then we are accomplishing those things that will help to offset that common idea of, "It is all right so long as you get away with it." You know about that idea if you have bucked against men who do not think. We all know supervisors who do not take time to talk to their men, but with a lash and a whip and a cuss and a damn, drive from morning to night.

Let us walk down the road together for just a few more minutes. Let us see that little cottage; let us see those kiddies at play; let us see that shop where somebody toils under our supervision in an endeavor to make a home for Molly and the baby. Let us not forget that love finds a lurking place in the heart of the man that lives there as well as in your home and mine. What will happen to that little boy if Daddy is taken home some night minus an arm or leg or an eye? He may not even have the opportunity of the boy and girl of the German woman. He will be just one more boy subject to the spirit of Bolshevism that is filling our country today.

So I say to you, let us walk down the road together safely. We have today old man Scrooge who is looking for that 40 per cent from the widow Zerkler. We have Carlos who is trying to spoil a lover's plan; and we have Uncle Him whose pockets are bulging and yet whose life is empty because those fundamental principles are not there, those principles that make life worth while.

I would as soon go through life with my finger off or with my eye out as to go through life feeling sour and blue and that no one cares for me. We can enjoy life if there is sunshine in it; but if there is no sunshine, who wants to live in the shadow with two legs and two eyes.

Possibly you will call this a sermon. We must make statistics. We must make metal guards. We must enforce discipline. We must do all these things. But we must talk Turkey to a man, take him aside, if he takes any chances. We are losing the joy of life when we see something that someone is doing that is thoughtless and careless and we do not go to him and tell him the whys and wherefores.

You do have eyes and you do have ears. Use them. That is my slogan—use them. But do more than that. That thing that is covered up here with flesh and blood and behind the ribs where nobody sees it, cannot ever be seen except in our daily life, so have a heart and be to your fellow workers not a domineering snob, not a fellow that says, "I'm the boss and you do as I tell you." Thank God for one thing, in my twenty years of foremanship I have very seldom found it necessary to tell a man to do a thing. We all resent being told; but where is the man with intelligence who will not welcome a suggestion?

So that is all life is, after all. I can't do the things that you want me to do if you try to make me. I write left-handed because I was born that way. The teacher used to clap me on the knuckles with her ruler and tell me to use my right hand. And I said, "You can't make me do it." I am not a bit different from you fellows. We all resent being told and that resistance will never be broken down. Unless there is that urge that comes from within and reaches out we will get that attitude that "it is all right if we get away with it."

So I say, "Let us walk down the road together safely." Let us live so that when somebody says, "It is all over, Bill is gone," there will be at least some who will say, "I am one who is glad that he lived."

CHAIRMAN WALTERS: Mr. Christian has brought us a line of thought that we are very, very apt to drift away from in this prosaic age of the almighty dollar. We have to face those problems and we have to handle them, but thank God, as he says, we can handle them humanly.

The next thing on our program is a motion picture, "The Mechanical Marvel."
(The Power Press members thereupon gathered with the Automotive Section members in a joint session, and the motion picture "The Mechanical Marvel", supplied by the A. O. Smith Corporation, Milwaukee, Wis., was shown to the entire group.)

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL

Public Utilities Section

Officers 1930-31

- General Chairman*—E. S. BRAUMONT, The Peoples Gas Light and Coke Co., Chicago, Ill.
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Vice-Chairman in Charge of Electrical Interests—G. A. DOELLER, Columbia Engineering & Management Corp., Dayton, Ohio.
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Chairman, Fire Prevention Committee—H. B. HARMER, The Philadelphia Electric Co., Philadelphia, Pa.
News-Letter Editor—Wm. M. DICKSON, The Bell Telephone Co., of Penna., Pittsburgh, Pa.
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 D. B. McCULLOCK, Bureau of Safety, Chicago, Illinois.
 C. HOWARD STEWART, The Laclede Gas Light Co., St. Louis, Mo.
 H. F. WEBB, The West Penn Power Co., Pittsburgh, Pa.
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 H. L. MEADE, The Ohio Bell Telephone Co., Cleveland, Ohio.
 J. L. VANDEGRIFT, The Chesapeake & Potomac Telephone Co., Washington, D. C.
 NATIONAL ELECTRIC LIGHT ASSOCIATION REPRESENTATIVE.
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Tuesday Morning Session
September 30, 1930

J. L. VANDEGRIFT, Chairman
The Chesapeake & Potomac Telephone Co., Washington, D. C.

The first session of the Public Utilities Section of the Nineteenth Annual Safety Congress convened with J. L. Vandegrift, The Chesapeake & Potomac Telephone Company, Washington, D. C. presiding.

CHAIRMAN VANDEGRIFT: This is the opening meeting of the Public Utilities Section of the Nineteenth Annual Safety Congress.

I take this opportunity to thank our membership and the Executive Committee for their fine support given during the year. We have had the reports of the Executive Committee combined into one and this will be presented by our Secretary, Mr. Kreh, of the Duquesne Light Company, Pittsburgh.

SECRETARY KREH: This is a "healthy" report these fellows have put over.

Annual Report of the Executive Committee

By E. J. KREH
Duquesne Light Co., Pittsburgh, Secretary

The Executive Committee met four times during the year as follows:

October 3, 1929—Stevens Hotel, Chicago, Illinois.

November 14, 1929—Offices of the Ohio Bell Telephone Company, 930 Huron Road, Cleveland, Ohio.

February 24, 1930—William Penn Hotel, Pittsburgh, Pa.

May 2, 1930—Racquet Club, Washington, D. C.

An average of thirteen at each meeting indicates good attendance.

The success of the year's activities was insured at the initial meeting when each member was asked by the chairman to give consideration to the formation of policies, objectives and activities for the section. As a result of the proper consideration of these fundamentals, definite policies and objectives were adopted, and all activities predicated upon them.

Policies

The following is the fundamental policy of the Section:

It shall be the purpose of the Public Utilities Section of the National Safety Council to further the interests in accident prevention of member utilities, consisting of the electric power and light, gas, telephone and telegraph, and water power and supply.

The fulfillment of this purpose should manifest itself in conservation expressed by the following factors:

1. To prolong the life and the period of productivity of the worker.
2. To promote social welfare, and to increase the capacity of the worker to enjoy life.
3. To increase the efficiency of the worker and to promote production.

The Public Utilities Section advocates:

1. That accident prevention is an executive responsibility and that management should give the same direction and control to the reduction of accidents to employees and to the public as is given to other important factors of production.
2. That the Section bring to the attention of its member companies the necessity of improvement in safety performance as a vital step in the strengthening of their industrial position in the community.
3. That uniform terminology and standard records be adopted so that all accident data will be compiled on a nationally comparable basis.
4. That the Section secure, compile and analyze accident statistics for the purpose of determining the lowest accident rate possible of attainment for its respective industries.
5. That the management of industries having high accident rates initiate measures to obtain the lowering of such rates at least to the low rates obtained by other plants of their industry.
6. That the Section endeavor to secure such action on the part of executives of its industries as will result in each plant having the lowest rates obtainable.
7. That the Section make available to its member companies the successful developments in accident prevention upon which to base action for further advancement.
8. That the Section continually endeavor to extend the scope of its influence to all such public utilities companies which can profit by its assistance or which can aid in promoting these objectives.

9. That the Section cooperate with other Sections of the National Safety Council with other safety organizations and with the safety sections of trade associations in the interest of accident prevention.

Objectives

The methods which are used to attain the objectives of a comprehensive policy must necessarily continually change to correspond with the advancement in understanding which comes with developments.

Accident prevention, like all industrial endeavors, has passed through pronounced stages of progress. The present stage seems to demand constructive and positive treatment. Accident prevention is an important feature of production; in fact the relationship of the two is so distinct that it may be stated that "maximum productivity is dependent upon the reduction of accidents to an irreducible minimum". The factors which will assure satisfactory production are, therefore, essential to Safety. The most important of these production factors which should be concentrated upon at this time are selection, training, education and supervision.

The program of activity for the immediate future should feature selection, training, education and supervision for the purpose of making available to the constituency of the Section the recent approved developments in this respect. The mediums of the Section, such as the News Letters, published articles, conference papers, safe practice pamphlets, bulletins, posters, etc. should constructively and in a positive way, be based upon these factors.

These conclusions are derived from the following assumptions:

1. If the selection of employees is based upon the mental, physical and moral requirements of the job.
2. If the workers are trained properly in the occupational and technical requirements of the job (with consideration of the use of the proper methods of operation to avoid accidental injury).
3. If the supervisors of the workers are trained in the proper methods of supervision (with due regard for intensive supervision at critical operating points).

Then the majority of avoidable accidents will be eliminated.

The policies and objectives adopted by the committee are respectfully referred for adoption by incoming committees, so that the work undertaken may be successfully continued.

Committee Reports

Vice-chairmen—The duties of vice-chairmen include:

Advising the committee concerning the problems of the industries which they represent.

Cooperation with the trade associations of their industries with respect to the matters initiated by the Section.

Assisting the committee chairmen in carrying out the objectives of the committees.

Service as counsellors on the Executive Committee.

The reports of the three vice-chairmen, which are as follows, indicate faithful adherence:

Vice Chairman in Charge of Telephone and Telegraph Interests—H. L. Meade

In the telephone and telegraph interests, emphasis has been placed upon the fact that the same factors which control and improve quantity and quality of production, also control and improve the safety record. These factors are primarily proper selection, training and competent supervision of employees. The necessity of job analysis, proper planning and proper organization of men, material, equipment and tools, and determina-

tion of the fundamental cause of any accident have been pointed to as an essential requirement in any successful accident prevention program.

Vice Chairman In Charge of Gas Interests—E. S. Beaumont

Service on the Accident Prevention Committee of the American Gas Association has enabled us to correlate the work of both of these committees, preventing overlapping of activity. As chairman of the Poster Committee of the American Gas Association, we have worked with Mr. Oldfield in the development of posters for the gas industry. Our efforts are also being directed toward the development of safe practice pamphlets by the American Gas Association covering detailed job operations in the gas industry.

Vice Chairman In Charge of Electrical Interests—I. L. Scott

Service on the Accident Prevention Committee of the N. E. L. A. has enabled us to foster better understanding of the aims and objects of both organizations to the end that maximum benefit will result to the industry. The collection of accident statistical data by both organizations has been simplified.

Publicity Committee—C. B. Boulet, Chairman

The policy of the committee sets forth that articles obtained for publication should be in line with objectives of the section and should emanate from leaders of the industry, having special reference to selection, training and supervision. C. B. Boulet, chairman, Publicity Committee, has adhered to the policy outlined as evidenced by his report as follows:

Publication to June 13, 1930

Author	Subject	Published in National Safety News
H. J. BURTON, Consumers Power Co., Jackson, Mich.	"The Dear School of Experience"	February, 1930
D. E. VAN AXEN, Associated Gas & Elec. Co., Oneonta, N. Y.	"Accident Prevention in Electric Public Utilities"	February, 1930
C. C. GOINGS, Louisville Gas & Elec. Co., Louisville, Ky.	"Safety Education of Foremen"	June, 1930
A. B. DETWILER, Bell Telephone Co. of Pennsylvania.	"Training for Safety"	April, 1930
E. J. PLUNKET, Penn Central Lt. & Pr. Co., Altoona, Pa.	"The Foreman's Contact with his Men"	April, 1930
A. J. VAN BRUNT, Public Service Co. of N. J., Newark, N. J.	"A Definite Plan of Accident Analysis"	May, 1930
R. L. ZINSTINE, Penn-Ohio System, Youngstown, Ohio.	"Foremanship and Accident Prevention"	To be published
E. G. MARTIN, Public Service Co. of Colo., Denver, Colorado.	"Training Employees in Safety Practice"	To be published

Poster Committee—A. A. Oldfield, Chairman

It was generally agreed that the posters should correspond with and assist in carrying out the objectives and policies adopted; that the public utility posters now carried in stock by the National Safety Council should be inspected to see that none are derogatory to the interests of the industry; that a definite check on all public utility posters initiated by the National Safety Council be made before they are published. A. A. Oldfield, chairman, Poster Committee, submits the following report:

1—In conjunction with the National Safety Council, a review was made of all photographs and drawings available in the Poster Division's files which were suitable for public utility section posters. Arrangements will be made to bring these posters to the attention of the utility members.

2—A schedule of posters, scenarios and copy for future posters for the electrical branch of public utilities section has been developed. This was done in such a way as to provide one strong poster for each month.

3—Through the efforts of E. S. Beaumont, vice-chairman of gas interests, posters of interest to the gas industry are being developed. Mr. Beaumont has also undertaken an analysis of the occupational hazards of the industry as a guide in meeting future poster requirements. Similar work will be undertaken with the help of Mr. Webb, with respect to the water works branch of the section. With the assistance of Mr. Webber, a series of posters are being worked up for the telephone and telegraph group.

4—No material has been used excepting that which has met with the approval of the committee, either collectively or individually and it has been the aim to direct all of the posters to the workmen on the job rather than to the management.

5—It is the opinion that the next twelve months will see the production of a most carefully worked out series of public utility posters and the National Safety Council, through Mr. Kershaw, in charge of the Poster Division, endorses this expression.

6—Arrangements have also been made to have the Kite Flying Poster included in the forthcoming series of school posters which will receive wide distribution among the schools.

Membership Committee—C. E. McBride, Chairman

A definite program was outlined whereby a member representing each state would serve on this committee, this committee representative to submit the names of non-member utilities to the National Safety Council, who would in turn make contact direct to encourage membership. The activity of the Membership Committee has borne fruit as indicated in the report of C. E. McBride, chairman, as follows:

Year	Number of employees of members	
1928	852,575	
1929	904,933	
1930	913,075	
Number of Members in section to date.....		
	393	
Year	Number of New Memberships secured	Number of employees involved
1928	43	40,798
1929	33	52,358
1930.....(to June 17th)....	22	8,142
Total	98	101,298

Film Slide Committee—Howard Shaw, Chairman

Mr. Shaw reports that three film strips have been prepared, having special reference to safe practices on the part of the workmen. They form a basis of lectures. To

carry on the work of this committee, Mr. Shaw has appointed a subcommittee from each group representing the electric, gas, water and telephone interests so that they may gather for the Film Slide Committee chairman material which can be used in the development of film slides.

Fire Prevention Committee—J. J. Barada, Chairman

The object of this committee has been to draw attention to fire fighting apparatus which can be used advantageously in public utility work, to the special fire hazards which are peculiar to the public utility industry, and to the remedies which can be applied. J. J. Barada, chairman, has kept the News Letter editor supplied with data on this subject. It has been published monthly, and without doubt, has served the industry well.

Statistics Committee—G. A. Doeller, Chairman

The Statistics Committee had three primary considerations:

First—Coordination of statistical reports and records of the National Electric Light Association, American Gas Association and the Telephone Industry with those of this Section.

Second—Public Utilities Safety Contest.

Third—Study of the growth of the Section and evaluation of the progress made. The report of the chairman, G. A. Doeller, is encouraging and indicates much progress.

The 1929 edition of "Industrial Accident Statistics" published by the Council is a veritable storehouse of data. Five pages of tables and charts are used to tell the story of the accident experience of the public utilities industry. A very interesting graph is included which shows the trend in frequency and severity for a group of 107 establishments who have reported their accident experience for the past three years. The significance of this is perhaps not fully appreciated by all of us. While it is true that certain individual companies have records of accident experience for periods of ten or more years, we know of no other data which discloses the trends over a period of years of such a large group made up of the same companies from year to year.

The frequency rate for these 107 establishments has decreased from 28.37 in 1927 to 21.98 in 1928 and to 20.02 in 1929. Severity has decreased from 3.74 in 1927 to 3.52 in 1929. There was a rise in the Severity Rate in 1928 to 3.84.

The 1929 data represent the experience of 231,437 employees and 589,150, 210 man-hours exposure. Natural gas operation included 8,401 employees and 20,863,490 man-hours. Manufactured gas operation included 31,548 employees and 103,331,735 man-hours. Gas and electric companies included 61,875 employees and 133,155,932 man-hours. Electric light and power companies included 114,943 employees and 295,370,170 man-hours.

For the past few years, our Section has sponsored contests which extended over six month periods. Your Executive Committee at its May, 1930, meeting voted to conduct a contest from July 1, 1930, to June 30, 1931.

It is our belief these contests have encouraged much interest in accident prevention. Cooperation with trade organizations, such as the A.G.A. and N.E.L.A. in the collection of statistics has resulted in the gradual development of a plan which, we believe, eventually will simplify the work of collecting accident data.

Engineering Committee—H. B. Harmer, Chairman

The advisability of listing all of the job hazards in the public utility industry and then developing safe practice pamphlets covering each specific operation has

been recommended and has received the earnest consideration of this committee. Mr. Harmer, chairman, reports that he has an incomplete list built up and that work in this direction is progressing. Recommendation is made that it be carried on during the coming year with the aid of the N.E.L.A., the A.G.A. and the telephone interests. The latter organization has developed this idea to a considerable extent and is in a position to aid very considerably the other utility interests. A bibliography of safe practice pamphlets already issued has also been undertaken in cooperation with the A.G.A. and the N.E.L.A. A pamphlet covering the storage and use of rubber gloves has been completed and will soon be issued. A pamphlet on the loading and unloading of poles is also in the process of formation.

News Letter—A. R. Gray, Chairman

The excellency of the News Letter prepared by A. R. Gray, the editor, needs little than itself to commend it. Favorable comment has been frequent; in fact, it has been classed as the best publication of its kind issued by any section. It was edited in accord with the policies adopted by this committee. To insure success, a definite assignment was made at the beginning of the committee year so that each member would contribute.

Program Committee—H. F. Webb, Chairman

The quality of the program which will be presented at this Convention is evidence in itself of the good work accomplished by the Program Committee chairman, H. F. Webb. It was built around the policies adopted. The development of this feature consumed a large part of the time of the chairman, the Program Committee and the various members of the Executive Committee.

A review of the minutes of your executive committee carries the following recommendations, which are passed on to the incoming committee:

Adherence to the policies and objectives adopted.

The adoption of a "Continuing Program" is important so that the change in personnel of the executive committee will not affect the effectiveness of the work already started.

It has been suggested that there is more than a casual relationship between health and accident prevention. Consideration of a health program is recommended by the formation of a health subcommittee.

That closer contact be maintained between the councilors and the active members of the Section. To further that movement during the past year, C. B. Scott served in the capacity of contact man between the Section and the councilors. It is the recommendation to the incoming committee that a chairman of councilors be selected by the Nominating Committee, and that he in turn assign each councilor to some active duty which might include such things as service on the Nominating Committee, service on the Program Committee and service on the Policy Committee. Because of their past experience, the advice of these men is invaluable.

Enlargement of the Executive Committee. This committee recommends to the incoming chairman the advisability of more representation on the Executive Committee. One method proposed is for each subcommittee chairman to appoint not less than three nor more than five men to his committee and then train, develop and keep them actively engaged in the affairs of the Section, it being understood that they would not be required to attend all of the Executive Committee meetings.

Understanding the job. The booklet entitled "Organization and Activities of Industrial Sections" presents an outline of minimum activities that have become standard for officers and committeemen of all sections. It is urged, however, that a com-

mittee be appointed to review this booklet and make any additions that may seem to be desirable from the standpoint of our particular section.

Nominating Committee appointments have been made, as follows: Chairman—H. F. Webb; H. B. Harmer; B. B. McCulloch; and H. M. Webber.

CHAIRMAN VANDEGRIFT: That annual report is a formidable statement. The Executive Committee started out this year with the immediate purpose of laying down long-term policies for the Section. Those policies are set-out in the annual report.

Our first objective is to "debunk" safety and get down to brass tacks.

Our second objective is to tie up management a little tighter and our third is to have a very definite set of objectives for managements. Managements must select their employees giving serious consideration to the mental, moral and other physical qualifications of the worker. They should definitely realize the responsibility of properly training these people and see that supervision is complete.

The next business is that of selecting officers for the ensuing year. I am going to call on the chairman of the nominating committee for his report. Mr. Webb.

H. F. WEBB (West Penn Power Co., Pittsburgh, Pa.): Mr. Chairman and Gentlemen: The Nominating Committee is pleased to present their report, and we hope for your approval and subsequent election of the following officers:

Report of the Nominating Committee

General Chairman—E. S. BEAUMONT, The Peoples Gas Light and Coke Co., Chicago, Illinois.

Vice-Chairman in Charge of Gas Interests—GORDON WILSON, Management and Engineering Corp., Chicago, Illinois.

Vice-Chairman in Charge of Electrical Interests—G. A. DOKLER, The Dayton Power and Light Co., Dayton, Ohio.

Vice-Chairman in Charge of Telephone and Telegraph Interests—F. M. PEPPER, Illinois Bell Telephone Co., Chicago, Illinois.

Secretary—JOHN J. BARADA, The Laclede Gas Light Co., St. Louis, Mo.

Chairman, Poster Committee—A. A. OLDFIELD, Wisconsin Power and Light Co., Madison, Wisc.

Chairman, Membership Committee—C. E. MCBRIDE, Northern Indiana Public Service Co., Fort Wayne, Ind.

Chairman, Publicity Committee—A. R. GRAY, The Peoples Natural Gas Co., Pittsburgh, Pa.

Chairman, Program Committee—C. B. BOULET, Wisconsin Public Service Corp., Milwaukee, Wisc.

Chairman, Statistics Committee—E. J. KREN, Duquesne Light Co., Pittsburgh, Pa.

Chairman, Engineering Committee—R. A. BLOOMSBURG, New York Power and Light Corp., Albany, N. Y.

Chairman, Committee on Slides and Safety Kinks—HOWARD M. SHAW, North American Light and Power Co., Chicago, Ill.

Chairman, Fire Prevention Committee—H. B. HARKER, The Philadelphia Electric Co., Philadelphia, Pa.

News-Letter Editor—WM. M. DICKSON, The Bell Telephone Co. of Penna., Pittsburgh, Pa.

Councilors:—

C. B. SCOTT, Bureau of Safety, Chicago, Illinois.

H. M. WEBBER, Illinois Bell Telephone Co., Chicago, Illinois.

B. B. MCCULLOCH, Bureau of Safety, Chicago, Illinois.

C. HOWARD STEWART, The Laclede Gas Light Co., St. Louis, Mo.

H. F. WEBB, The West Penn Electric Co., Pittsburgh, Pa.

Geo. C. A. OPP, The Detroit Edison Co., Detroit, Mich.

H. L. MEADE, The Ohio Bell Telephone Co., Cleveland, Ohio.
 J. L. VANDEGRIFT, The Chesapeake & Potomac Telephone Co., Washington, D. C.
 National Electric Light Association Representative.
 American Gas Association Representative.
 Foreign Representative—C. B. PARKER, Compañía Cubana de Electricidad, Havana, Cuba.

G. L. HILL (Chesapeake & Potomac Telephone Co., Washington, D. C.): I move the acceptance of the Committee's report, that the nominations be closed, and that the secretary be instructed to cast the unanimous ballot of the Public Utilities Section for the election of these officers.

(The motion was seconded, put to a vote and carried.)

CHAIRMAN VANDEGRIFT: It is with a great deal of pleasure that I introduce Mr. Ernest Beaumont, our new general chairman.

CHAIRMAN ELECT E. S. BEAUMONT: Mr. Chairman and Gentlemen: It is an honor and a privilege to be selected chairman of the third largest section in the National Safety Council and there is certainly a great responsibility. It is not a one-man job by any means, and I hope that the cooperation that Mr. Vandegrift has spoken of will be expanded even in the year to come.

CHAIRMAN VANDEGRIFT: We can assure Mr. Beaumont of the hearty and complete support of the entire section.

If you want to get the "low-down" on how to sell your executives, it must come from executives.

We looked the field over to select one who was amenable to discipline, who had a real interest in safety work, and who still remained an executive. He is the Vice President of the Consolidated Gas Company of New York, Chairman of the Accident Prevention Committee of the American Gas Association. His subject is, "Safety—An Executive Responsibility." I take pleasure in introducing Colonel John H. Stilwell.

Safety—An Executive Responsibility

By JOHN H. STILWELL

Vice-President Consolidated Gas Company of New York, New York City

My subject is a good one but not worded in a way to place upon you and me enough of the responsibility for safety work. I prefer to speak to you on, "Safety—The Executive's Responsibility", because unless you understand that safety is primarily the executive's responsibility, you will remain under the impression that safety is everybody's responsibility and, therefore, nobody's.

Please get the distinction between responsibility for a movement and the deriving of benefit therefrom. It is, of course, to the advantage of both labor and industry to prevent accident, for labor will suffer less if there are fewer accidents, and industry will operate on a lower cost basis. The question as to where one shall place responsibility must be resolved by determining who the individual is without whom the safety movement must collapse and with whose help the safety movement cannot fail. Whether or not the employees choose voluntarily to cooperate is not of paramount importance. A strong executive can induce the men in his employ to do as he wishes, if his object is a good one, regardless of their private opinion of the work that he is carrying on. The strong executive can so intrench himself, by virtue of his authority, and more particularly his logic, that he can completely change the morale of his organization of men and women. But on the other hand, no matter how enthusiastic the employees of a plant may be for improvement in safety and

accident prevention methods, unless the executive responsible for that plant believes in the safety movement, the safety work at that plant will not prosper.

So, although everyone benefits from safety and accident prevention work, the responsibility for it must rest with the executive, who alone determines by his attitude and conduct whether the work will fail or succeed.

It is a source of great pride to me that I am associated with an industry which has always taken a foremost part in safety work. In fact, I feel that I am entirely within the truth when I tell you that the public utilities were the first group of industries to take a concerted stand for safety. Today, with everyone engaged in this healthy competition for the improvement of working conditions, the public utilities are more than ever pioneers, constantly seeking new ways of educating men and women to avoid accidents and sparing no expense to remedy the remaining physical hazards of labor. We are not content with improving conditions among ourselves, but have reached out into other fields of industry and have offered, without charge of any sort, the service of our emergency and resuscitation crews. The newspapers constantly carry stories of the heroic efforts our men have made to restore to life victims of their own carelessness. We have offered to industry generally, instructors to teach all employees proper methods of resuscitation. In the large centers of population, we have emergency equipment that we make available to the police and hospitals. No other industry is more wholeheartedly devoted to accident prevention.

But we must not feel that our work, thus far, has been sufficient to enable us to rest on our laurels. Each of us must carry a continually renewed determination to assume fully and without reservation the entire responsibility for the success of the safety movement in his plant. Other speakers will tell you what have been the most successful methods used in promoting their safety work. It is not for me to invade their province. My concern is rather to point out to you the commonest traps into which the executive wanders because he does not realize the importance of the manner in which this work must be carried on.

Safety work is to a great extent educational; and where a work is so largely abstract as educational work must be, we must recognize the fact that the men who are responsible for the movement must be inspired and inspiring leaders. The selection of a safety director is the first, and easily the most important, phase of the executive's responsibility. Too often the safety director is appointed out of a group of employees whose usefulness in other departments has been diminished by a change in working conditions. These men undoubtedly feel that safety is a very good thing. There is no question that they are doing everything within their power to promote the work to which they have been assigned. But there is lacking in them that vocational urge which makes for inevitability. They are, in a manner of speaking, not born to their work, and their efforts to transfer an enthusiasm and inspiration which they themselves obviously cannot possess are necessarily doomed to failure from the outset.

The safety directorship of a plant should never be made a shelf for superannuated employees—whether that superannuation result from the pressure of years or from changes in personnel or operation that have left certain individuals unprovided for. If you have such people in your employ and can do nothing else with them, pension them; but I conjure you by your responsibility to your associates, to your consuming public, and to your employees, not to allow these men to become your safety directors; they will unquestionably retard the progress of the work among the employees, whom they cannot inspire, and among your associate executives, who will see only failure in a work so weakly conducted.

In approaching the second common mistake that we executives and safety directors make, I want to digress for a moment to give you a very homely simile. I once heard an old friend say that an employee is like a tack or a nail—useful if he has a good head and if he is pointed in the right direction, but capable of going only as far as his head will let him. Are we doing everything within our power to procure

the most intelligent labor obtainable at current rates of wage? And are we giving to our labor, as its foremen and supervisors, the most intelligent leaders that we can procure?

When my friend made this very sage remark, he was thinking of the difficulty all of us have experienced in fitting the right man to the right job. It is our responsibility to supervise the work of our personnel and employment managers and to assist them in procuring the right kind of men and placing them in jobs that are within their mental and physical limits. The more intelligent our labor, the more easily will it absorb not only safety and accident prevention information but general production ideas, as well. Much could be said about the specific kinds of employees that we should have for specific jobs, but we are all aware of the nature of our individual problems, and so I shall content myself here with this general word of caution on the subject.

Some of us are in a more intimate sense public servants than many of the men and women who hold office by virtue of election at the polls. Upon the manner in which we discharge our duties depend the health, comfort, and welfare of the entire nation. If our plants do not operate efficiently and continuously, disease will spread its wings over entire communities, the darkness of night will engulf streets and homes alike, and tired communities will be deprived of indispensable refreshment in places of wholesome amusement. If we discharge our responsibility fully in this vital matter of accident prevention, we have made it virtually impossible for any catastrophe to cause interruption of our service to the communities in which our plants are situated. To be sure, we have also saved the life or limb of the employee who might otherwise have been involved in catastrophe. We have saved, in addition, the cost to our particular plant of nursing the injured man back to health and supporting his family or dependents in the meantime. Thus by throwing ourselves into the safety movement, we recognize a responsibility which we as executives have toward the public that looks to us for light, heat, and power; above all we guarantee the safe return of our faithful subordinates to their wives and children after their daily tasks.

Modern industry is organized on a tremendous scale and is geared to perform huge tasks. Mergers are everywhere making for economy of operation. These consolidations improve productive service only in so far as we in our executive capacity are able to maintain discipline in our armies of workers. A plant is like a military unit: it is no better than its leadership. If an executive is lax, the entire organization under him reflects that laxity. If an executive is exacting but just in his demands upon his subordinates, his organization is the very mirror of efficiency, willingness, and precision. Discipline is the *sine qua non* of efficiency in production, and safety consciousness is of the very essence of discipline.

To the executive who maintains discipline but has not yet learned to see the value of safety work, or who has failed to recognize his personal responsibility along safety lines, I make this statement: Try out for a reasonable length of time as extensive and intensive a safety campaign as your situation permits, and you will be amazed to find that the discipline in your plant—which up till now has had to be enforced from above—will be sustained among the men in an amazingly sympathetic and understanding manner. Subordinates in industry are exactly the same as subordinates in our army and navy; they are essentially good sports and only too eager to help sympathetic superiors in the exercise of their responsibility. You will find that men who now are doing things because they fear to lose their jobs will then begin to do the same things better, in appreciative response to your effort, as their superior, to make *them* safety conscious and *their plant* a safer environment in which to perform their work.

CHAIRMAN VANDEGRIFT: That was the most satisfying, substantiating speech we have ever heard.

Here is a management that realizes management's responsibility. They say that

safety is an integral part of production; that you can't get maximum production at a minimum inconvenience and hazard to the worker without planning it, without supervising it, without teaching it, and that is exactly what we are after. Thank you Colonel Stilwell.

We have been fortunate in securing a man who is an authority on the subject of gasses in manholes and the prevention of accidents from that source. You Pittsburgh men know him. Mr. Perrott is our next speaker.

Explosion Hazards in Street Manholes and Sewers

By G. ST. J. PERROTT

Supervising Engineer, Pittsburgh Experiment Station, U. S. Bureau of Mines

The streets of every city cover a maze of pipes and wires which carry water, sewage facilities, gas, steam, electric power, and telephone to the business workers in the buildings above. These vital arteries of the modern city are sealed in by gas-tight pavements except at manholes spaced at suitable intervals. Underneath this seal, flammable gases may leak from gas mains, be generated by electrolysis or by the decomposition of sewage, or be produced by the vaporization of flammable liquids which have been discharged into the sewers. These gases find their way into manholes or any pockets which exist below the paving. If a suitable concentration of flammable gas or vapor and a source of ignition are present simultaneously, a disastrous explosion may result capable of doing great damage to life and property. The problem is not a new one. The British Board of Trade Lighting Acts, 1882-1888, state as follows:

"All street-boxes shall be regularly inspected for the presence of gas, and if any influx or accumulation is discovered, the undertakers shall give immediate notice to the authority or company whose gas mains are laid in the neighborhood of the street-box."

Yet in Holborn, London, there occurred in 1928 a disastrous explosion in an old tunnel, used as a conduit for electric light wires, which killed one man, injured thirteen, and caused a property loss estimated at half a million dollars. As early as 1887 the citizens of New York City were so alarmed that they termed manhole covers "death-dealing projectiles." While this hazard has long been recognized by fire-protection engineers, the average person still has little conception of the potential danger lurking underground in all our cities.

It is the purpose of this paper briefly to recall a few of the explosions of this type which have occurred recently, discuss the factors responsible for such explosions, and consider the best means for their prevention in the future.

Three Disastrous Street Explosions

Three explosions, which most of you probably remember, occurred during the past two years were: London, England, on December 21, 1928; Boston, Mass., February 14, 1929; and Newburgh, N. Y., September 16, 1929. These and others are described in an article on "Manhole and Sewer Explosions" published in the National Fire Protection Association Quarterly² and this source has been used liberally in this paper.

²Published by permission of the Director, U. S. Bureau of Mines. (Not subject to copyright.)
Manhole and Sewer Explosions, National Fire Protection Association Quarterly, vol. 23, pp. 402-426, 1930.

1. London, England, December 21, 1928.

A triangular area half a mile long in the heart of London presented the appearance of a shelled town in war-time, after a series of explosions which occurred in an old iron-plate tunnel used as a conduit for electric wires. It was built more than 60 years ago and originally used as a pneumatic-tube package delivery system. Years ago it was taken over by the Post Office Department, which also operates the telephone and telegraph systems, and used as a conduit for wires. It was one of the many conduits, gas mains, water mains, and sewers which virtually honeycomb the space beneath the surface of the city.

At about 7:45 a. m. three workmen arrived at a manhole in High Holborn to start the motor-driven fan in the tube to clear it of sewer gas. To operate the blower it was necessary to enter the tube and connect a plug attached to the lead from the blower to the socket at the switch.

The cover of the manhole was removed and one of the workmen descended the iron ladder to attach the plug to the socket in the tube. Scarcely was he out of sight when the other workmen heard a "boom" and a flash of flame rose almost to the top of the manhole. As the flame receded, the workman in the tube rushed to the ladder and as he reached the top of the manhole he was caught by the blast of an explosion and enveloped in flame. He was so badly burned that he died six days later.

Almost simultaneously with the first appearance of flame in the tube and before the first violent explosion, the flash of fire traveled along the tube 90 yards in each direction. The surface was not damaged except at the manhole itself. After this, an explosion wave appeared to have been produced, and a considerable length of the tube was wrecked, also the paving on the street above was completely demolished. Gas and water mains were fractured and serious damage was done to private vaults and cellars under the road. The conclusions of the commission of inquiry² are as follows:

Conclusions

The explosion was due to a mixture of coal gas and air. We have not been able to trace the precise source of the gas, but it was probably a gradual accumulation of leakage from neighboring gas mains extending over a considerable period, increased by some larger untraced escape within a short time of the explosion.

It was probably due to the use of a petrol lighter in the manhole by one of the workmen who unfortunately received fatal injuries.

Recommendations

1. Any structure forming an underground cavity of any considerable size should be adequately and continuously ventilated or, if disused, filled in or removed. All chambers such as manholes or duct or pipe lines constructed for a man to enter and work in are included in this recommendation.

2. The whole of the existing Post Office tube should be examined at once and an adequate system of continuous ventilation should be installed where it does not at present exist.

3. The employment of some form of continuous detector to give warning of the presence of gas in places such as the Post Office tube or important underground chambers is worthy of consideration.

4. The Gas Light & Coke Company should strengthen its organization so as to bring the work of leakage detection under the control of some responsible officer as his primary duty.

5. Consideration should be given to the following questions:

a. The use of subways for pipes and mains.

b. The depth at which gas and other mains should be laid, with special reference to the effect of modern traffic conditions in increasing vibration.

c. The possibility of coordinating the control of underground services in London.

²"Report of Commission of Inquiry into the Holborn Explosions and Fires," His Majesty's Stationery Office, London, 1929.

2. Boston, Massachusetts, February 14, 1929.

Four heavy explosions, accompanied by numerous lesser explosions, sent twenty-nine persons to hospitals, resulted in a score of minor injuries to others, damaged sixteen buildings, frightened hundreds of store employees and late afternoon shoppers in the vicinity of Summer and Chauncy Streets.

The first heavy explosion occurred shortly before 5:20 p. m. in the underground electrical distribution system, and was followed by two others within 20 minutes. The fourth and final explosion occurred at 4:00 o'clock in the morning. The exact cause of the explosions was not discovered, but the following possibilities were suggested by officials who investigated the disaster: (1) Illuminating gas or sewer gas may have leaked into the conduit system and become ignited by a short circuit; (2) flammable vapors such as gasoline may have been present in the sewerage system and leaked through the ground into the conduit; (3) a short circuit may have decomposed sufficient paper and oily insulating material to form combustible gases.

3. Newburgh, New York, September 16, 1929.

One person was killed, about twenty-five were injured, and damage estimated at approximately \$200,000 was done to property in a series of explosions which took place in the downtown section of Newburgh along the Third Street sewer and its lateral connections. The explosion was thought to have been caused by the ignition of illuminating gas which found its way into the sewer. The sewer in question flows into the Hudson River and the outlet is submerged. There is practically no ventilation in the sewer, hence, it is not difficult to see how an explosive mixture may have been formed.

A feature of particular interest in connection with this occurrence is the fact that on August 24, 1928, a similar explosion took place in the same part of the city and along the same sewer. At the request of the City Manager, the U. S. Bureau of Mines made an investigation⁴ of the causes of the second explosion. The evidence indicated that illuminating gas was the combustible substance that caused the explosion, and the elimination of gas leaks, regulation of disposal of flammable liquids, and the ventilation of sewer systems was recommended as the best means of preventing further explosions. A report by the Independence Bureau of Philadelphia stated gasoline to be the cause of the explosion.

Dangerous Gases Found In Manholes

The dangerous gases which might conceivably find their way into street manholes, according to a report of the U. S. Bureau of Mines⁵, can be grouped into three classes: (1) poisonous, (2) suffocating, and (3) explosive, although some fall in more than one class. These gases and their principal sources are listed below:

Dangerous Gases Found in Manholes, and Their Principal Source**Poisonous gases:**

Ammonia	Refrigerating plants.
Benzol	Motor vehicles, storage tanks.
Carbon monoxide	Manufactured fuel gas, flue gas, products of combustion, exhaust gases from motors.
Gasoline	Motor vehicles, storage tanks.
Hydrogen sulphide	Sewer gas, coal gas.
Sulphur dioxide	Burning insulation.

Suffocating gases:

Carbon dioxide	Products of combustion, sewer gas.
Nitrogen	do
Natural gas	Natural gas mains.

⁴Jones, G. W., The Explosions in Newburgh, New York, September 16, 1929, Newburgh News, 1930.

Explosive gases:

Benzol	(See above.)
Carbon monoxide	(See above.)
Ethane	Natural gas, manufactured fuel gas.
Gasoline	(See above.)
Hydrogen	Artificial fuel gases, electrolysis of water.
Methane	Natural gas, manufactured gas, sewer gas.
Unsaturated hydrocarbons	Manufactured fuel gases.

Gas Analysis of Manhole Atmospheres.

While any or all of the gases listed may at times find their way into manholes, actual gas analyses show that the most frequent combustible gas present is city gas, either natural or manufactured. In districts using manufactured gas, this will be shown by analysis to contain carbon monoxide, whereas in districts where natural gas is burned, the gas will contain considerable quantities of methane and ethane, and no carbon monoxide. Sewer gas can be distinguished from other gases by high proportions of carbon dioxide. The following table gives results of analyses made in four cities in the eastern part of the United States by the Bureau of Mines:

Composition of Gases Found in Street Manholes

Test No.	City	Sample taken in	Composition of atmosphere, per cent by volume							
			CO ₂	O ₂	CO	Illu- minants	CH ₄	H ₂	N ₂	
3	A	Manhole	1.5	16.2	4.7	1.4	3.8	4.9	62.5	
6	A	"	2.1	16.6	0.2	0.4	1.2	0.0	79.5	
1	B	"	0.3	11.4	..	..	38.5	..	49.8	
3	B	"	2.7	15.3	..	..	10.2	..	71.8	
7	B	"	0.5	19.2	..	..	4.0	..	76.3	
9	B	"	1.6	18.6	..	..	1.2	..	78.6	
1	C	"	1.8	11.2	3.3	1.7	14.1	18.2	49.7	
2	C	"	0.6	9.7	2.5	1.8	15.8	12.5	57.1	
3	C	"	0.7	19.3	0.2	0.2	0.6	0.3	78.7	
4	C	"	1.3	18.5	0.4	0.4	1.1	0.9	77.4	
5	C	"	7.7	8.2	0.0	0.2	2.4	0.0	81.5	
6	C	"	3.2	16.4	0.0	0.0	0.8	0.0	79.6	
7	C	"	5.5	13.2	0.0	0.2	0.4	0.0	80.7	
8	C	"	3.0	12.3	0.0	0.3	4.2	0.0	80.2	
9	C	Electric light pole	2.6	13.4	1.0	1.5	12.3	0.0	69.2	
2	D	Vault under street	3.7	14.8	5.3	2.2	3.1	4.0	66.9	
3	D	do	0.5	20.6	0.3	0.2	0.1	0.6	77.7	
4	D	Manhole	2.7	11.3	10.3	4.0	5.8	12.4	53.5	
8	D	Steam valve box	2.6	16.8	1.4	0.9	1.7	1.8	74.8	
9	D	do	0.9	18.9	0.2	0.5	0.5	1.6	77.4	
19	D	Manhole	2.6	16.0	2.7	1.0	1.8	1.2	74.7	

In cities A, C, and D the gas used was manufactured gas, while in city B, natural gas was distributed. A number of the samples in city C show the gas to be sewer gas, most of them non-explosive, however, due to the large proportion of carbon dioxide. Many hundreds of manholes were tested which contained no combustible or less than 0.1 per cent thereof, and the table should not be taken to imply that all street manholes contain combustible gases.

*Katz, S. H., Meier, E. G., and Bloomfield, J. J., Gas Hazards in Street Manholes, Reports of Investigations No. 2710, Bureau of Mines, 1925.

Recommendations for Elimination of Explosion Hazards in Street Manholes and Sewers

The following practical recommendations for elimination of explosion hazards in manholes and sewers are suggested:

1. *Systematic inspection.*—A systematic inspection of all manholes (including sewer manholes) should be made at least once each month to ascertain whether combustible gases are accumulating. If such conditions are found in sewer manholes, all manholes in the district should be uncovered and water run into them from hydrants in as large a volume as possible. This seems to be the quickest and most feasible method to apply in an emergency. If combustible gases are found in other manholes, the covers should be removed and forced ventilation provided by means of a blower. The source of the combustible vapor should be determined by gas analysis and the cause eliminated as soon as possible.

2. *Elimination of city gas leaks.*—Investigation by the Bureau of Mines has shown that illuminating gas is the most common source of combustible gas in manholes. Before the era of paved streets, gas that leaked from mains followed the path of least resistance and usually found its way to the surface of the streets and passed off harmlessly into the air above. At present, there are few outlets in the streets and the gas must follow the path of least resistance which may be into manholes, sewers, or through porous cellar or basement walls into business houses or residences adjoining the street where the leaks exist.

3. *Proper disposal of flammable liquids.*—Gasoline and oil from filling stations, garages, and automobile repair shops, and flammable liquids used in home dry-cleaning are often discharged into the sewers and present another explosion hazard. All establishments that use flammable liquids in quantity should be required to maintain approved containers or underground tanks for the retention of all waste material, and the city should maintain a place for the disposal of waste flammable liquids at a safe distance from the business districts. Under no conditions should these liquids be discharged into the sewers. The sale of gasoline, cleaner's naphtha, and similar combustible liquids to household users should be discouraged.

4. *Ventilation.*—The Commission of Inquiry into the London explosion recommended—

Any structure forming an underground cavity of any considerable size should be adequately and continuously ventilated or, if disused, filled in or removed. All chambers such as manholes or duct or pipe lines constructed for a man to enter and work in are included in this recommendation.

The writer is in complete agreement with this recommendation, but realizes that forced ventilation of a series of manholes is not always feasible. However, adequate ventilation is probably the only sure means of maintaining a non-explosive atmosphere in any underground chamber, and it should be seriously considered wherever possible. In the city of Newburgh it was found possible to ventilate by natural draft a sewer whose discharge end was under the low tide level of the river. This was done by construction of a relief sewer to be above the high tide at all times and serve as a ventilator for the sewer system. This produced a rapid ventilation by natural draft which effectively eliminated explosion hazards in this sewer. Similar expedients are undoubtedly feasible in other cities.

5. *Precautions in entering manholes.*—The London explosion was probably initiated by a workman using a cigar lighter in a manhole. While there are many sources of ignition beyond the control of the utilities owning manholes, it is certainly inexcusable that any employee of these utilities should be responsible for initiating such an explosion. Safety precautions may be set forth briefly as follows: (1) No open flame lights; (2) no smoking; (3) use of a gas detector* before entering manhole; (4) ventilation of sewer or manhole; (5) use of hose mask whenever it is necessary to work in an atmosphere suspected of being asphyxial.

6. *Filling in unused underground cavities.*—The City of Newburgh contained a number of old stone drains which were unused and offered an easy path and pocket for escaping combustible gases and vapors. Probably other cities contain underground pockets which are not used. These should most certainly be filled in.

7. *Repairs to basement walls and floors.*—Frequently, basement walls and masonry partitions dividing cellar floors are not gas-tight. These chambers provide further pockets for the entrance of combustible vapors and add to the explosion hazards. All such walls, floors, and partitions should be made as gas-tight as possible by filling all cracks and openings with cement or other suitable material.

8. *Investigation of complaints of odors.*—Records should be kept of all complaints of odors from residences and business houses of the city, and a prompt investigation made of each complaint to determine the cause of such odors. The complaints are an additional check upon the inspection system and often, if followed up, result in the detection and repair of leaking gas or other source of combustible vapors.

9. *Cooperation of City and Utilities.*—The foregoing recommendations can be carried out best if there is concerted effort by the city officials and all utilities owning manholes. Such cooperation is strongly urged and is essential if future explosions are to be prevented.

Discussion

CHAIRMAN VANDEGRIFT: Thank you, Mr. Perrott. That was a practical talk on a scientific subject. Are there any questions?

FRANK SCOTT (Hamlin & Co., Insurance Dept., Consolidated Gas Co., New York City): How do you detect the source of the gas?

MR. PERROTT: The most frequent poisonous gas is carbon monoxide, and several detectors have been developed for that purpose. I have one of the ampoule type here. This detector consists of a small glass tube containing a solution of palladium chloride, enclosed in a cotton bag. It is broken in the fingers, and then let down into the manhole. By matching the color against a comparison card, the amount of carbon monoxide can be estimated.

Another detector known as the hoolamite detector, consists of a bulb and a small tube containing iodine pentoxide and fuming sulphuric acid on granular pumice which turns blue in small traces of carbon monoxide. This bulb is squeezed and the atmosphere is run through the tube, and from the depth of the blue color matched against a standard series of colors, the percentage of carbon monoxide can be estimated. Those two detectors that are most useful for portable work.

CHARLES L. MEX (Public Service Co. of Northern Illinois, Chicago, Ill.): Does the experience of the Bureau of Mines show that the explosions in manholes chargeable to illuminating gas are more frequent in those territories where natural gas is distributed?

MR. PERROTT: We have no evidence that the frequency of explosions is greater in natural gas districts. The characteristic odor of manufactured gas tends to be absorbed by passing through the ground and hence is not as good an indicator of underground leaks as might be thought. However, good statistics on these explosions are not available and my statement is based on explosions sufficiently spectacular to be recorded.

S. M. PRATT (The Edison Co., Philadelphia, Pa.): What is your experience in the use of palladium chloride ampoules as to the psychological reaction of the man in the field as to the action of those ampoules. Do they actually see the difference between the original color and the color they get when they take it out of the manhole enough to make it a practical warning? I want to know whether they have been found either successful or unsuccessful with the average man in the field.

*Perrott, G. St. J. and Yant, W. P., *Safety Investigations and Approval System of the United States Bureau of Mines: Their Application to the Chemical Industry*, Trans. National Safety Council, 1930. (Contains description of gas detectors.)

MR. SCOTT: The United Electric Light & Power Company of New York City is using them. They have been using them for sometime and find them satisfactory.

MR. LANGMAN (Illinois Bell Telephone Co., Chicago, Ill.): If the concentration of gas is strong enough to explode will it be strong enough to gas the workman in the manhole? Is it possible to have an explosion without the danger of gassing the workman?

MR. PERROTT: You are assuming manufactured gas rather than natural gas? Natural gas is non-poisonous except in very high concentrations. You can go into an explosive mixture of natural gas with perfect safety as long as you don't strike a match, or push an automatic cigar lighter. I should say that with manufactured gas containing poisonous carbon monoxide, it is not possible to have an explosive mixture without that mixture being very poisonous.

CHAIRMAN VANDEGRIFT: Our next speaker is a leader in Educational work. He is the head of the Industrial Relations Department of the University of Pittsburgh, Professor Hallock!

Training Foremen to Become Genuine Safety Leaders

By PROF. JOHN W. HALLOCK

Department of Industrial Engineering, University of Pittsburgh.

Industrial safety has been said to consist of a combination of engineering, organization and education. To this definition might be added the words "applied in the reduction of human waste." Certainly no human activity presents a greater challenge to modern industry than that reducing the frequency and severity of injury to human beings. Regardless of the motives which bring about the application of safety measures—whether mercenary or purely humanitarian—the safety engineer occupies a position of the most intense interest.

My subject would seem to concern itself mainly with the third point of our definition—namely, education. Yet the amount and character of education necessary are so dependent upon organization that I shall encroach upon this second item of our definition before touching upon the purely educational side of the subject. In fact, any organization may be so thoroughly worked out and the duties of each executive set forth so clearly that relatively little education of minor executives is necessary. Conversely, the duties and functions of the organization may be so loosely related as to require very great stress on education and training. Before any educational program can be outlined, therefore, it is necessary to know just how thoroughly organized the industry or company is.

No one, I am sure, will deny that the safety of the worker is a responsibility of management. It becomes necessary then to outline so clearly the functions and duties of the various elements of management that there can be no misunderstanding on the part of any individual as to his duties in the organization—not alone with respect to safety but in the performance of any and all duties. It would be superfluous to discuss the uses of an organization chart with such a group as this. I am convinced however, that to reach the top root of any educational or training program, some consideration of this is necessary.

By far the most common form of organization of industry today in this country is the "line and staff." The real owners of the industry are the stockholders. Since policies can seldom be fixed by the stockholders themselves, their authority is usually vested in a board of directors, with necessary and appropriate officers to carry out the wishes of the directors, and therefore, in most cases of the stockholders. Subordinate to these higher officials is a group of specialists who act as advisors in a technical capacity. Typical of these are the chemist, the sales analyst, the chief engineer, the legal department, and so forth. The higher officials with these specialists comprise the

administration of the enterprise, as distinguished from the management. It will be noted that so far the organization functions principally to lay down broad operating policies and to co-ordinate the efforts of subordinate units in the organization. The actual *doing* of the things necessary to make the organization a live organism is in the hands of a group of executives and workers known collectively as the management. Note the distinction between administration and management. The former lays down policies and the latter carries out the policies.

What then comprises management? Management consists of all those individuals in the organization who control the work of others. It may be argued that the highest official of a company belongs in this group. It must be remembered, however, that the higher officials are most frequently concerned with fixing policies and not concerned with the carrying out of the policies. On the other hand, management, as a group, is sufficiently immersed in details of execution to have little time for the determination of broad policies. It is true that in many organizations, especially smaller ones, the line between administration and management is difficult to trace.

Just as soon as we select one individual from a group of workers and give him the authority of a straw boss or foreman, we have removed him from labor and placed him in a position of authority in the management of the enterprise. Before his promotion, his duty was the actual performance of physical work. After his promotion, his duties are largely the directing of the work of others. The qualifications for his former work do not apply in the case of his new position. As a mere workman, he required a certain manual dexterity and skill along a particular line. As a foreman, he must have certain attributes in addition to those of the workman. If we can discover just what these attributes are which a foreman or executive must have, over and above those required for the manual worker, we will have gone far toward knowing something of the foundation upon which we may build an educational program for the foreman and as well for the worker.

E. H. Schell has said that there are three qualifications which every worker in industry must possess*. They are:—

1. Physical vigor.
2. Moral uprightness.
3. Given level of intelligence.

These, of course, are general requirements. The employment manager analyzes and interprets them in terms of individual jobs. When it comes to the selection of an individual to assume authority over a group of workers, certain additional qualifications should govern. Schell lists these as:

1. Interest in and affection for people.
2. Power of personality.
3. Scientific trend of mind.

It is not my purpose to discuss each of these qualifications or to defend their importance. I am convinced, however, that they form an excellent basis for the measurement of the fitness of an individual to command others. If a number of foremen, for example, have been selected because of having possessed an interest in the doings of other people and because of a power of personality which they possess, their education as real safety leaders is much easier of accomplishment than if they had been made foremen from some other motive or reason.

It is not always possible to select a group of foremen who possess uniformly these qualifications. In fact in very few of the many industries which I have touched in programs of foreman training have I seen any uniformity of selection of foremen. I have seen, in a single group, men who have pursued graduate courses in engineering colleges and men who still owe the grade schools several years. Perhaps such a situation should be discouraging as forming the basis of outlining an educational program. Conversely, it invariably gives promise of much more interesting discussions

*"Technique of Executive Control." E. H. Schell, Second Edition.
McGraw-Hill Book Company, Inc.
New York, New York.

than if all possessed the same educational background. I have seen in such groups, men who left the sixth grade of the public school thirty-five years before and have heard such men give utterance to a philosophy of life that has done much good for the younger and more sophisticated members.

In preparing for the training of a group of foremen in safety, I am convinced that a certain ground work must be laid. There are a number of possible angles of approach in the laying of this foundation. Personally, I have found the economic approach more productive of results than any other. And by this I mean the approach through the ordinarily dry conception of pure economics. What is labor? Is it, as originally conceived, a penalty of an angry God, imposed upon man because of moral laxity? Or is it the natural outlet for man's restless desire to do something? What is wealth? Such questions as these lead very naturally to a discussion of wages, interest, rent, taxes, costs of doing business and a host of others. These must all be so clearly and impartially set forth as to rouse and hold the interest of every member of the group. There are many dangers, of course, that the discussion of such subjects will become stilted or pedantic. The leader of such a group must always bear in mind the members of the group. Care must be taken to avoid personalities and to confine discussion to principles. Any application of principle to specific problems must be clear-cut and devoid of any appearance of "taking sides."

Following the laying of the foundation in economics, a discussion of some simple problems in industrial organization and management will lay a further foundation for safety studies. Such subjects as types of organization for ownership—the individual, the partnership and the corporation—types of organization for management, qualifications of men for executive positions, functions and duties of executives and a host of other subjects are of unfailing interest to foremen. I have seen foremen who, at the beginning of a course of study and discussion of this kind, were suspicious, skeptical and sullen, and after a few impartial discussions have themselves taken part in the discussions and have contributed much constructive comment. Foremen who can thus be made to realize that they are themselves in executive positions will take a real interest in trying to absorb many of the principles discussed and will unconsciously apply them to their own work.

It may seem that I am still a far step from training men to become genuine safety leaders. I am convinced, however, that to make foreman training in safety genuine and lasting, this ground work is necessary. Safety is a management function and the foreman must be made to feel first that he is a part of management. It is surprising how naturally and logically a study of safety may follow the laying of such a foundation. As this is the ultimate objective of this training, I shall attempt to outline certain steps in this part of the training. In doing so, I shall divide the subject into five sub-topics as follows:

1. Subject matter; 2. Time of meetings; 3. Place of meetings; 4. Personnel of group; 5. Discussion leader.

1. Subject Matter.

There is such a wealth of material available for instruction in safety that the difficulty is to select that material which will serve the purpose best. So much of the written matter at hand seems to consist of "Don'ts" that I would say, the first thing is to eliminate the negative instruction. Safety instruction should be positive and constructive rather than negative and critical of present practices. In the second place, make the subject matter broad and deep. I have seen safety instruction built solely on a consideration of mechanical safeguards. While such instruction is necessary and invariably productive of much good, it is only a small part of the information that should be in the hands of every foreman. The broader we can make the horizon of the foreman in safety matters, the greater the benefit to be derived from the instruction. I am giving below a list of subjects which I feel should be included in the foreman's course. Many of these topics will have to be viewed more superficially for

the foreman than would be the case in the training of safety engineers. Nevertheless, I feel that all are necessary if only as a perspective. The subjects are:—

1. Purposes of Safety Work in Industry.
2. Origin and Growth of the Safety Movement.
3. Agencies and Organizations in Safety Work.
4. Industrial Hazards.
5. Management's Responsibility in Employee Safety.
6. The Safety Engineer.
7. The Safety Committee.
8. The Foreman's Place in Safety.
9. Safety Education for the Worker.
10. Study of Individual Accident Cases.
11. Accident Reports in the Industry.
12. Accident Records—Individual Cases, Causes, Costs, etc.
13. First Aid and Hospitalization.
14. Accidents not Resulting in Human Injury.
15. Accident Classification.
16. Employee Safety Record.
17. Checking Results Obtained.
18. Safety and Production—Machinery.
19. Safety and Production—The Human Factor.
20. Design as Affecting Safety.
21. Safety Codes—Origin and Authority.
22. Safety Codes—Adapting to Specific Needs.
23. Safety Codes—Putting Them Over to the Worker.
24. Safeguarding the Working Place.
25. Standardization as Affecting Safety.
26. Employee Incentives.
27. Inspection.
28. Materials Handling.
29. Workmen's Compensation—Origin and Effects.
30. Workmen's Compensation—Rate Making.
31. Related Activities—Employee Betterment.
32. Methods and Results in Typical Industries.

No doubt the subjects suggested may seem much broader than necessary for foremen. Indeed in many cases the list as given should be materially altered to meet specific needs. If there is a question as to whether a subject should be included or omitted, my advice is to err on the side of breadth of material rather than the reverse. The foreman is an executive, the safety engineer is a staff officer and the foreman must put into practice the principles set down by the safety engineer. He must therefore be conversant with every phase of the subject.

No discussion of subject matter would be complete without a consideration of text material available. I know of no single textbook which can be used if the wide range of topics suggested is to be covered. There are several very excellent texts which cover specific phases. These should be available for reference or assigned readings, as should also many bulletins and pamphlets issued by the numerous organizations contributing to this great movement. Even a bibliography of the subject would be a volume by itself; numerous are the sources of material. The well-organized and well-outlined course will refer the individuals in the group to appropriate sources for necessary information.

2. Time of Meetings.

Meetings for purposes of instruction must be either on company time or on the foreman's own time. Much may be said in favor of either period selected. Likewise each has certain disadvantages. These have been ably summarized in a report on foremen training published in 1924 by the Pittsburgh Personnel Association.

To quote from this report:—

"Advantages of holding meetings on company time:

- Tends toward better attendance.
- Gives foremen the feeling that the company is behind the proposition.
- Company reaps the benefit and should sacrifice the time.
- Does not interfere with flow of production.
- Distinctly a business proposition.
- Makes it part of his job.
- Men are usually keener in the morning or daytime than at night.
- Makes it easier to sell to the supervisor.

"The chief disadvantage of holding meetings on company time is that in some industries it may interfere with production.

"Advantages of holding meetings on foreman's time:

- Meetings may be held after dinner.
- Men feel more like talking after dinner.
- Meetings can be longer if necessary.
- Does not interfere with flow of production.
- Makes the foreman feel that it is for his own education and advantage.

"Disadvantages of holding meetings on foreman's time:

- Attendance not as good.
- It interferes with his evenings.
- May mean loss of time due to inadequate transportation after working hours.
- He is less alert at the end of the working day.

There is, of course, the possibility of combining the training in several neighboring plants. There is much to be said in favor of such an arrangement. It affords an opportunity for an interchange of ideas not possible in the one-company group. In this event, however, it is probable that meetings will have to be held entirely on the foreman's own time, with the attendant disadvantages outlined above. The whole question of the single or multi-company program would therefore seem to be one that can be decided only on the merits of the individual case.

3. Place of Meeting.

The place of meeting will doubtless depend largely upon the time of meeting. Meetings must be held either on company property or at a convenient center for the men. If the meetings are held on the foreman's own time, a meeting place convenient to the men's homes is highly desirable. In the case of the multi-company program, this may also be desirable. On the other hand, if meetings are held on company time, a conference room at the plant should be secured if at all possible. This serves the purpose of lending a business aspect to the sessions which is highly desirable. As in the case of time of meetings, the place of meeting is dependent upon circumstances in individual cases.

4. Personnel of Groups.

The membership of a group for safety instruction will depend quite largely on the immediate objective to be obtained. It may be that general foremen and supervisors should be included as well as the lower ranking executives. It may be that individuals not directly concerned with the application of safety principles should be included in order to overcome prejudices and secure cooperation. My only suggestion here is to avoid too wide a disparity in rank in the organization. If supervisors two or three ranks higher in the organization than the foremen themselves are included, the foremen will be slow to express opinions at variance with those of "the boss." It is the free, frank and open discussion of every man in the group which adds to the interest and broadens the perspective.

Disparities in educational backgrounds of the men comprising any organization should not influence the make-up of a group for instruction purposes. Reference has already been made to this point. It makes little difference how wide the varia-

tion in schooling so long as the group leader is conversant with the situation and adapts his remarks to the needs of the entire group.

5. Discussion Leader.

It is imperative that the leader of the group be wisely selected, for upon him will depend much of the success of the instruction. From the standpoint of mental equipment, the safety engineer is undoubtedly the logical man. He has or should have at his finger tips all of the specific information needed for instruction purposes. If in addition he is fair and impartial and has a keen sense of humor, he is almost certain to be successful in putting over the program. He must, of course, be a real teacher. It is not his own ideas or personality he is imposing on a group of receptive minds. It is the *subject* matter of an intensely human and absorbingly interesting topic that must be uppermost. Then and then only will the group be imbued with the spirit of Safety.

It may seem that I have talked a lot about instruction and training and yet have shot wide of the safety mark. It may be that I should have emphasized the *genuineness* of the training or that I should have dwelt upon the production of *leaders* rather than drivers in Safety work. I feel sure, however, that a program of education and training such as outlined will produce genuine foremen safety leaders.

CHAIRMAN VANDEGRIFT: The Section owes a vote of thanks to Professor Hallock. What he has given us is a textbook. It is something that we can formulate our company instructional policies on; it is the whole subject of foremen training. If you haven't started foremen training, you should get on the "bandwagon" because it is the solution of many industrial ills.

The next item on the program is a talkie movie of the application of first aid of artificial resuscitation. I am going to introduce Dr. Holtz, medical director of the Philadelphia Company.

Dr. W. M. Holtz (Philadelphia Co., Pittsburgh, Pa.): Seventeen employees of the Philadelphia Company and affiliated corporations of this city, today are the proud possessors of awards given to them for the saving of lives by artificial resuscitation. Frequently our employees are asked to demonstrate their methods before various public bodies.

Believing that a more uniform and more widespread instruction in resuscitation methods by prone pressure could be brought about by a film, we developed what we believe to be the only thing of its kind in the country, a slow-motion instruction picture, for teaching artificial resuscitation.

(Showing of picture.)

CHAIRMAN VANDEGRIFT: Thank you, Dr. Holtz, and The Philadelphia Company for this interesting picture.

ADJOURNMENT

Wednesday Morning Session

October 1, 1930

J. L. VANDEGRIFT, Chairman

The Chesapeake & Potomac Telephone Co., Washington, D. C.

The second session of the Public Utilities Section convened with Chairman Vandegrift presiding.

CHAIRMAN VANDEGRIFT: The first subject is, "Safety Inspection Methods." In the industrial processes, we have an analogy to the educational processes as you have learned in your foremen training work. After these people are taught the correct methods to be used on the job, there remains the inspection to determine whether those correct methods are being used.

The subject that we have before us this morning is the "double-check" of industry. It is important enough to be presented from the viewpoints of the three major divisions of public utilities. The first is electric and will be given by Mr. A. J. Hill, Jr., of the West Penn Power Company.

Safety Inspection Methods

By A. J. HILL, JR.

West Penn Power Company, Pittsburgh.

Periodic safety inspection of the physical properties, company and employee owned working tools for determination of hazardous conditions which if left undetected and uncorrected would represent a potential source of accident accompanied with probable personal injury, has become a well established factor in the public utilities field of operations. It is a recognized fact that the establishment of a safety inspection service in a public utility presents numerous problems which differ from those of practically all other types of industry.

The industrial safety inspector may pursue his work unhindered by the necessity of ranging over a wide territory in search of line construction crews or to reach power and substations and all other physical properties directly connected with the generation and distribution of electricity. Other statements which would prove the difficult position of the public utility safety inspector might be injected but such additional argument seems unnecessary.

It is not the purpose to discuss the personal qualifications of the inspector. Nevertheless, it may not be amiss to remark that he must be well equipped with knowledge of universal safety standards, state regulations, National Electric Safety Codes, etc., and should at least understand the basic principles of electrical and mechanical engineering in order that proper periodic inspections may be made of line work, power generation and sub-stations, shops, garages, new construction projects and miscellaneous physical properties. Therefore, let us consider the methods resorted to by the public utilities safety inspector who may be understood as having been carefully selected and trained for this work.

Methods of Inspection—Line Crews

It should be the practice of the inspector to visit the line crews at regular intervals of time wherever they may be found at work. After a proper friendly greeting and with the permission of the foreman he may proceed with the inspection of all equipment carried on the truck.

Rubber gloves should be given the simple air test and closely scrutinized for pin holes or defects of any kind which might prove dangerous to the lineman. The last date of dielectric test may be noted and if gloves have been in service beyond a specified time limit they should be recommended for return to the testing laboratory.

Rubber line hose, insulator hoods, and pigs should be checked for cracks, punctures, or defects caused by hot solder, paint, or hard substances which may have damaged the rubber. The date of last dielectric test is noticed and checked against the necessity for return to the testing laboratory.

Rubber blankets should be removed from the cylindrical metal cans provided for storage and protection and be examined for small holes, cracks, folds, burns from hot solder drippings, or other defects. If the inspector is not entirely satisfied that the blanket is safe for continued use he should recommend the return to the laboratory for dielectric test.

Digging bars and drills should be checked for mushroom heads and dull points; saws for proper alignment and sharpness of cutting teeth; draw knives for sharp cutting edge; chisels for sharp cutting edge and condition of handle; pike poles checked for evenness of wood, loose or dull spikes; ladders for condition of siderails, rungs, extension dogs, and non-slip devices. The foreman should be encouraged to paint or varnish pike poles to reduce the splinter hazard and he should also equip each ladder with standard non-slip devices. Axes, sledges, tamping bars, and all other line tools should be given a thorough inspection to determine the condition of handles, cutting edges of axes, and evenness of sledge heads.

First aid kits should be examined to see that they are well filled with supplies and, if possible, a brief lesson given in first aid to the injured. The entire crew should at least be checked on artificial resuscitation and arterial pressure points.

Personal Equipment

The inspection of personal equipment may be considered of greatest importance, as the lineman places entire dependence upon his body and safety belts.

The body belt should be carefully checked to determine whether or not the leather is in proper condition. If found to be dry, it is recommended that the leather be scrubbed with ivory soap and water, using a hard bristled brush. The belt should be permitted to dry in a room with a temperature of approximately 70 degrees Fahrenheit after which it is dressed with neat's foot oil. The drying belt must never be hung in close proximity to a stove or radiator, as the nearness or contact of the belt to heat may cause the glucose to form glue within the tissues of the leather in which case the belt would be unsafe for wear and subject to condemnation. The rivets, stitching, buckles, and D-rings should be checked for defects. Drop forged hardware only should be permissible and the use of brass and malleable iron D-rings in body belts discouraged. Metal tape chains, and plier holders should not be used. The substitution of raw hide tape keepers and leather holders will reduce the possibility of electric burns, if the lineman should come in contact with an exposed hot wire.

The safety strap should be checked for quality and thickness of leather, proper drop forged snaps, and standard construction. Attention should be given any abnormality in the number of holes punched through the leather as an excess materially weakens the strap. The use of friction tape on safety straps should be discouraged and whenever a taped strap is found it should be viewed with suspicion, the tape removed and the strap thoroughly inspected.

The general condition of climbing hook appurtenances should be carefully checked. An examination should be made to determine whether or not the gaffs are securely attached to leg irons, properly sharpened, and of sufficient and equal length to guarantee the lineman safety in climbing. Short or dull gaffs are liable to cut out. Therefore, the acceptance of gaffs under 1 1/4 inch in length, inside measurement, may be considered inadvisable. Linemen should be cautioned against sharpening gaffs on an

abrasive wheel as such method is liable to disturb the temper and cause a brittleness of the metal. Gaffs should always be hand filed on the underside. Leg pads and straps as well as foot straps should be inspected for determination of leather and buckle conditions.

Sub-Stations

The inspection of sub-stations should be done only in company with the operator. All electrical equipment should be checked for safety and recommendations made in accordance with the National Electric Safety Code. Permanently fixed ladders, stairways, wall and floor openings, moving machinery, and all other than electrical apparatus and equipment located in or around the substation should be guarded in accordance with universally accepted safety standards.

The station may be inspected for housekeeping, sanitation, and conditions which might cause the start of a fire. The battery room should be checked for proper type and adequate vents, and all lights protected by vapor-proof globes to prevent the possibility of explosion in case of lighted bulb breakage in this gaseous atmosphere.

Approved rubber matting is recommended for installation both in front and back of all switchboards to provide the employee with adequate insulation in case of accidental contact with exposed energized parts.

Before leaving a substation the operator should be at least required to demonstrate his ability in the performance of artificial respiration and location of arterial pressure points.

Power Generation Stations

The recommended procedure for inspection of power generation stations is that the inspector accompany the safety committee on their regular periodic tour of the plant. These committees are usually composed of from three to five men and the personnel is obtained by selection of one employee from each major department. The committee together with the safety inspector should make a complete interior and exterior inspection of the station, outside transformer bays, switch yard, and miscellaneous yard buildings. All electrical apparatus may be adjudged safe when it is found to comply with the National Electric Safety Code.

The mechanical department should be inspected and recommendations made in accordance with universally accepted safety standards. The power generation department usually has specific safety standards which set forth proper procedure in operation insofar as the manufacture and transmission of electric energy is concerned. In such cases the inspector should study these prescribed rules so that he may become familiar with the colored tagging system in vogue and recognize the significance of the application to various types of equipment.

The use of defective tool and equipment tags by placement on unsafe hand tools, jacks, ladders, etc., provides the safety inspector with a handy weapon of defense. This tagging system has been found to have many excellent merits, and experience in the use has shown that unsafe equipment tagged by the inspector brings correction without the usual delays caused by so-called "red tape."

In the case of all inspections, notes of recommendations may be written down by the safety inspector for later transmittal in proper report form to the officials in charge of the inspected properties.

CHAIRMAN VANDEGRIFT: Thank you, Mr. Hill. Are there any questions that you would like to ask Mr. Hill?

E. H. WORTHEN (Puget Sound Power & Light Co., Seattle, Wash.): What would you consider to be the proper length of the gaff?

MR. HILL: One and one-quarter inch is N.E.L.A. standard. If you are using cedar poles, you can go down as low as one and one-eighth. If you use chestnut poles, then one and one-quarter inches is required.

H. E. SHREDD (Appalachian Power Co., Bluefield, West Virginia): Where do you get the Neet's Foot oil?

MR. HILL: Any manufacturer of safety body belts should be able to supply you.

C. P. HUBBARD (Detroit Edison Co., Detroit, Mich.): I would like more information on the explosion in the battery room.

MR. HILL: The present type of batteries used in most substations give very little trouble. You need not be afraid of any explosions. The old type battery was very gaseous. If your electrical fixtures were not gas tight and lamps equipped with vapor proof globes, when the bulb was accidentally broken through weather conditions, you would probably have an explosion particularly if the proper ventilation was not supplied to allow the gases to escape.

E. H. WORTHEN (Puget Sound Power & Light Co., Seattle, Wash.): Mr. Hill, how do you take care of your rubber goods on your trucks? What is your system?

MR. HILL: The West Penn Power Company have a compartment at the top of the truck, where they keep the rubber goods only. If the inspector finds anything else, he calls it to the attention of the foreman because it is detrimental to rubber goods.

CHAIRMAN VANDERGRIFF: The next subdivision of the same subject from the standpoint of the gas industry, will be discussed by Mr. Barada. He is well qualified to tell you something about the inspection methods in the gas companies.

Safety Inspections in a Gas Company

By JOHN J. BARADA

Safety Engineer, The Laclede Gas Light Company, St. Louis, Mo.

In the time allotted it would be impossible to go into detail covering the necessary inspections that are made daily in the average gas company that manufactures and distributes gas.

The inspections in a gas company can be traced along, starting at the time a car of coal is delivered, until such time as it has been made into gas, pumped through the distribution lines and until it leaves the outlet of the meter.

One can picture the company's side tracks where the cars loaded with coal are spotted by the railroad companies and later on switched by company locomotives. The tracks and ties are examined daily to make sure that when these loads come in, everything will be in good condition, so that there will be no delay in getting the coal to its proper location or any hazards to the men handling the cars.

One of the first things done after the cars are spotted is to examine the contents for foreign matter visible on top of the coal, especially articles that may cause trouble with the conveying machinery. One of the first moves after a car is spotted is to put it on the scales to make sure that the weights are correct.

The switching, loading and unloading crews inspect all of their equipment each day for any defect that may cause a delay or endanger the men who are handling same.

Of course, it is understood the locomotives and locomotive and electric cranes are inspected daily by their operators in order to make sure that they too will function. The locomotives and locomotive cranes are pulled out of service at least every two weeks in order that the master mechanic may give them a thorough inspection to make certain they are in perfect condition.

All wire ropes receive a special daily inspection by the operator. With the conveying machinery it will be found that at the beginning of each shift the foreman in charge sees that this machinery is in good working condition. Special inspections are made to insure that there are no loose belts and that all of the idlers are in good condition.

All steam boilers are inspected at least once a year by the City Inspection Department. These boilers are also given a bi-monthly test by the insurance companies.

All motors and also electrical equipment are given daily inspections by someone assigned to this task and in cases where the location is unusually dusty, this equipment is dusted daily.

On the battery of the coke ovens the larry car, its tracks and the signal gong are inspected on each shift. Particular attention is paid to the brakes of the larry car to make sure that they function properly.

The gas pressures are watched constantly to prevent infiltration of air which might result in an explosion. The gauges for the different pressure readings are tested every four hours.

With the charging and discharging machines the ammeters and overload relays are tested on each shift.

All jambs, doors and walls of the ovens are inspected at each pushing for leaks which might result in burns.

The quencher cars, the locomotives that push same and the tracks upon which they run are inspected on each shift and particular attention is given to the brakes, switches, derails and safety couplings. It is one man's duty to keep the tracks and surrounding territory clear of falling coke, etc.

Combustion conditions are checked on every oven that is pushed. The oven temperatures are recorded continuously and are checked every half hour.

In order to operate a plant it is, of course, necessary to have a power house. It is quite natural that the power house has to have a certain number of daily and hourly inspections.

As mentioned before all boilers are frequently examined by both the insurance companies' agents and the Inspection Department of the City. A monthly examination is made of all boilers by the master mechanic.

The safety pop valves are tested daily.

Inspection of combustion conditions are made every half hour.

The coal handling apparatus receives a daily inspection.

The usual constant watching of the water and pressure is carried on by the firemen on duty and supervised by the engineer in charge.

An hourly check is made on all instruments and gauges in the power house to be positive that they are functioning properly.

All generators receive a general examination at least once a week.

After the gas is made our next step will be over in the by-products building where the various oils and gases are taken from the product that comes from the ovens. In this big building you will find a mass of machinery covering boosters, scrubbers, pumps and other machinery incidental to the separation of the various items from the products of the oven.

All of this machinery is inspected on each shift.

Any leak in piping is reported and repaired immediately.

All trenches and trench covers are inspected periodically.

The pressures and temperatures in this building are watched continuously and hourly reports are made of same.

Tank cars are also given special attention. Extra care is always given to the empty cars that previously contained flammable liquids and which have been set in for loading.

All devices that are used as danger alarms are inspected and tested daily.

Ventilation equipment is inspected periodically.

Safety vents in the benzol building are inspected and cleaned periodically.

There are several tests made hourly which would indicate any variation from the normal operation.

All containers that are to be used for explosives are given a rigid inspection before filling.

In addition to all other regular inspections the various plant buildings and structures are inspected within and without semi-annually for any defects and deterioration.

In addition to inspections in the manufacturing end there are, of course, other inspections that have to be made, such as checking up on fire extinguishers, especially of the soda and acid type to make sure they are in operating condition and at the same time marking same in such a way that one can tell at a glance that the extinguisher has been recharged within the last year. The mere fact a fire extinguisher is marked that it has been recharged on a certain date does not indicate it is still full. Inspections are made to verify the extinguishers have the required amount of solution in them.

The fire hose is given a visible inspection at least once a month and given the water test quarterly.

The general safety equipment such as gas masks, inhalators, safety belts, etc., are inspected periodically by one of the assistant superintendents.

Foremen inspect all tools under their jurisdiction daily.

The foreman is also a sort of inspector watching his men for illness, preventing accidents and drinking of intoxicating liquors while on duty. During the extremely hot spell experienced in St. Louis last summer not one man in the manufacturing department suffered from heat exhaustion and we feel this is due to the alertness of the foremen in keeping a close watch on the men in their charge. In the winter time the foremen make sure that their men are properly clothed.

Each man in every plant is considered a safety inspector and he must report to his foreman at all times any unsafe conditions that exist.

Interiors and exteriors of all buildings are inspected daily for cleanliness. This may sound like exaggerating, but it is a fact we have several plants where the windows never get a chance to get dirty. Of course, this inspection also takes in the yards and other properties surrounding the building and at this time we are happy to say that since a campaign was started several years ago we have not had a personal injury caused by anyone falling over some debris in the building or out in the yard.

The above covers the coke ovens but it is felt that over at the water gas department the outstanding inspections are those inspections made looking for leaks in the carburetor blast valve, the generator blast valve and back-run valve. While in operation this equipment is always under constant observation. It is felt that this is very important inasmuch as a serious explosion may be averted by regular inspections.

In the manufacturing plants a night watchman service is maintained. Manual boxes are pulled hourly to a central station. These boxes are also equipped for fire alarm.

In the distribution end inspections come first with the laying of mains. The tripods that are used in lowering mains are inspected daily for any defects that may cause a section of pipe to get away from the men while lowering same.

In cases where cement joints are made rubber gloves are also used in mixing the cement and the gang foreman makes a daily inspection to make sure these gloves are in good condition.

The gang foreman must also make daily inspections of all of his warning signs and at night see that a sufficient number of red lamps are placed warning passersby of the excavation. In some cases the excavation must be covered at night.

After the mains have been laid and later on a prospective customer wants gas service run into the premises, the necessary orders are written up and turned over to the service gang for completion. The city permit covering the address in question

is secured and turned over to the service foreman and one of his first jobs is to check the permit to verify the address.

In cases where a cut is to be made in a paved street an air compressor is brought to the scene and is used to cut through the concrete.

The foreman in charge has the task of seeing that all of the men on the job wear their goggles. He also examines the goggles to see that they are in a serviceable condition.

The air compressor and necessary tools are given a daily inspection for any defects. After the cuts have been made and the main uncovered the next step is the tapping of the main. This is done only by experienced men.

The particular type of tapping machine that we use at this time if properly adjusted allows no gas to escape. It is the foreman's job to make sure that these machines are properly adjusted before the tapping process begins.

Rubber saddles and gaskets are inspected before they are allowed to be placed on the main.

All fittings are inspected and tried before an effort is made to place same in position.

After the service is in and the gas turned on, before the pipes are covered, soap and water is used on all joints to make sure there are no leaks.

All tools used in the service gangs are given daily inspections and those unfit for use are replaced by the store room.

The service tool carts get a general house-cleaning quarterly and at the same time the wheels are greased.

Lanterns that are used as warning signals at night are given daily inspections.

Small stoppers and gas bags which are carried in the tool carts receive an examination before being put into service. The larger type is carried in the store room and is taken out only when necessary. These are inspected before leaving the store room.

When on a job it is a gang foreman's duty to have tools and other material placed in such a position that they will not be a hazard to pedestrians.

After the service gang is finished with its job, the next step is for the fitter to install the meter and to take care of the job from then on.

Usually there are two men on a truck, the fitter and his helper. It is the duty of the fitter to make a daily inspection of his tools and in the event he has any that need replacing they are immediately replaced.

In St. Louis in addition to our own rigid test and inspection every gas meter must bear a tag showing it has been tested by the City Lighting Department. It is the duty of all fitters to see that every meter they handle bears the City Lighting Department's tag, before they set same.

Men using company automobiles are instructed to be on the alert for any defects in the automobile assigned to them. These defects are reported on special forms provided for this purpose, when the machine is turned in for the day. Of course, if a defect is noted that requires immediate attention one of the trouble wagons is called and repairs made, as fitters are instructed never to drive an automobile that is not working properly.

After the meter has been set and the gas turned on the next thing the fitter does is to go through the entire house and make sure there are no leaks.

In premises where gas has never been used before the house pipes and fuel run are tested before the gas is turned on.

In cases where a fitter pumps the service or the line supplying the house, he must go back to these premises that day before he turns in to make sure no leaks have developed. This inspection is usually made at least two hours after the work has been completed.

Fitters are always on the alert watching for stop boxes that may be a tripping hazard to pedestrians.

Periodic inspections are made of all hotel appliances to make sure that the burners do not become clogged with grease and that they function properly.

Industrial appliances are inspected upon request of the consumer.

Heating appliances are inspected at least three times during the heating season.

At least once a month the general foreman inspects all first aid kits of the men under his supervision to make sure that they contain the proper amount of supplies.

Inspection of house pipes and fuel runs before going to work on a job in order to tell whether or not these pipes carry any electric current is a very difficult proposition and in order to make sure that the men will not receive the full benefit of any ground, we have devised a plan of placing a jumper on the pipe so that when they separate the pipe, they will not receive a shock.

It is the fitter's duty to inspect all appliances before he turns gas into same in order to make sure these appliances are in good working order.

Just a few words for the fleet of automobiles that serves the company.

Each night these machines are turned into the garage. The tires, springs and steering apparatus are given the once over to make sure that there are no visible defects. Three times during the night the tires are examined to make sure that there will be no flats in the morning.

The stop lights, head and tail lights of all automobiles are given a bi-weekly test in addition to the observation of the driver.

At least once a month all wheels are checked for alignment.

As each machine is gassed at night the oil level is checked. The oil is changed and likewise is the machine greased after each 500 miles.

It is true only the high spots of the subject assigned to me have been touched, but in the time allotted it is felt that some of the factors that require inspection in the daily operation of the average gas company have been covered.

WM. L. BRUCE (Westchester Lighting Co., Mt. Vernon, N. Y.): Do you have a school for fitters?

MR. BARADA: That is carried on by the general foremen in the street department. Our street department is divided into six sections. Each section has a general foreman, and under that general foreman are at least six gang foremen. No particular school is carried on, but each foreman makes sure that his men are taken care of.

MR. BRUCE: What do you think of the school idea?

MR. BARADA: Well, the trouble is that if a man is with our company for ten or twelve years, he is still a youngster. We don't have much of a labor turnover in that particular department.

CHAIRMAN VANBEGRIFF: We will now have the discussion on the telephone and telegraph end of inspection methods. I am pleased to introduce our friend Tom Campbell, of the Pittsburgh Division, Western Area of the Bell Telephone Company of Pennsylvania.

Safety Inspection Methods—Telephone and Telegraph

By THOMAS CAMPBELL

Plant Safety Supervisor, The Bell Telephone Company of Pennsylvania, Pittsburgh, Pa.

I will try to outline briefly the various safety inspections made in the Western Area of the Bell Telephone Company of Pennsylvania.

1. Safety Supervisors

There are three safety supervisors in our area. The plant safety supervisor, whose duty it is to mould and direct the safety policy throughout the area; and two division safety supervisors, who check the methods being employed in the field and assist in training supervisors in the art of having workmen work safely.

2. Supervisors

Supervisors are responsible for the safety of the employees under their supervision and must see that each person performs the work assigned to him in a safe and careful manner. It is also their duty to instruct all employees with respect to the safe methods of doing work.

Supervisors are required to make frequent inspections of all tools and protective equipment and determine their fitness for use. They, jointly with the workmen, examine each tool and each item of protective equipment in the possession of each workman every six months, as a part of the tool audit, and arrange for the immediate replacement of any that are defective. Supervisors are constantly reminding their force that by the use of proper tools, in good condition, accidents are decreased.

At least every sixty days supervisors inspect each first aid kit maintained for the use of their force, including reserve kits in stock. Missing articles are replaced at the time the inspection is made.

The supervisor must see that employees under his supervision make a detailed inspection of all body belts and safety straps, in their possession at least once a week. If, after an inspection, there is any doubt as to whether they are in good condition they must be immediately exchanged for ones in good condition.

3. Workmen

Every workman is required to make a very careful inspection of the tools, apparatus and plant with which he is about to work or depend upon for support. He is to satisfy himself that they are in a sound and safe condition. If hazards are encountered, such as stringing wires across highways or over foreign wires, enough men are assigned to do the job safely and specifications covering such work are strictly followed.

Every employee must inspect such tools and protective devices upon which his personal safety depends each time before they are used. To be more specific, for example, an employee must examine his body belt, safety strap and climbers each time before using. At least once each week he must also make a detailed inspection of these tools, in company with the foreman, in order to detect any fault that may have developed through their use and handling, so that they may be removed from service before they become unsafe.

Each employee must subject his rubber gloves to a test each time before they are used and must at all times assume the responsibility for determining that they are in good condition and that their appearance indicates neither deterioration or injury sufficient to affect their strength either from an electrical or mechanical standpoint.

To operate a motor vehicle fleet safely requires that the motor vehicle equipment be maintained in a safe, serviceable condition and that each car be driven safely. Each motor vehicle operator is responsible for the safe operation of the car assigned to him. If his inspection or operation of the equipment indicates defects, he must have the defect corrected at once to insure safe operation. He is thoroughly trained not only in the mechanical operations but in safe operating practices as well.

4. Storekeepers

The storing and distributing of supplies involves a number of exposures to hazards peculiar to this type of work. Conditions arise which require that the supplies force exercises good judgment as well as care in order to do the work safely. Good house-keeping reduces accidents to the minimum.

Storeroom employees when unpacking or handling batteries, insulators or other porcelain articles must use every precaution against cuts. Sharp and pointed articles must be stored in such a manner as to prevent persons from striking them. Under no conditions are they allowed to project into passageways. Guy rods, guy shields, digging bars and long handled tools must be stored in such a manner that they cannot fall.

Goggles which are returned, by employees, must be sterilized by the storekeeper before being placed in stock or being reused.

Storekeepers must inspect each tool before disbursing.

5. Pole Line Inspectors

Our pole lines are constantly being inspected by a corps of experts. When poles shows defects, which weaken them, such as: split tops, hollow, presence of insect life, etc., they are marked for replacement. The inspectors also check the line for correct guying, foreign attachments, broken glass, loose ties, proper clearance, etc. Poles that are to be replaced or re-enforced are marked with a red "X", as a caution to all employees to make certain that they are safe to climb.

When an inspector finds a pole badly deteriorated he calls the wire chief and makes arrangements for its immediate reinforcement or replacement. Poles in the country are dug around to a depth of 15 or 16 inches and if not seriously deteriorated the bad wood is cut away and the surface is sprayed with creosote. This insures against rapid deterioration, thus prolonging the service life of the pole and at the same time protecting the employees who may have occasion to climb it.

6. Plant Engineering Force

They cooperate with representatives of other wire using utilities where their facilities are concerned, so that from an engineering standpoint the plants of all the interests are safe for the general public and for the employees who have occasion to work on them.

When in the course of work operations any particular hazard might be encountered, if an improper sequence of work operations were followed, or if a deviation from standard practices occurred, special notation of the proper procedure to follow is made on the work plans.

Every effort is made to maintain the plant in a safe, serviceable condition and to perform the work so that accidents do not occur. In our efforts to construct and maintain safe plant, we have had excellent cooperation from the other wire using utilities.

7. Buildings

There is a continual routine inspection conducted by our buildings people. Some of the items they observe are: stairways, handrails, treads, etc. They see that passageways are well lighted and that all exits are kept clear and properly marked.

Fire extinguishers must be filled and accessible at all times, fire exits must be safe and kept free from obstructions.

Elevators must be maintained in a safe condition. The operators are instructed in the proper loading and handling of passengers.

Masks and respirators for use in engine or boiler rooms must be inspected each time before they are used in addition to regular quarterly inspection.

I have outlined briefly how seven different groups of our people make specific safety inspections. As a matter of fact every employee is continually making safety inspections although he may not recognize them as such.

The repairman, the installer, the lineman, the cable splicer and the workmen in other telephone crafts are continually observing conditions where they work.

Safety has become such an integral part of the training program of the Western Area of the Bell Telephone Company of Pennsylvania that doing a job efficiently has come to mean doing it safely and expeditiously with a finished product that meets the quality standards.

CHAIRMAN VANDERGRIFT: That was indeed splendid. We can use these reports as a basis for checking the inspection methods of our companies.

The next subject is a debate on "Resolved: That Safety Committee are Indispensable to Furtherance of Accident Prevention Among Public Utilities."

The affirmative speaker is Mr. Chester K. Thomas.

That Safety Committees Are Indispensable

By CHESTER K. THOMAS

Division Superintendent, Chicago North Shore and Milwaukee Railroad Company, Highwood, Ill.

My discussion will be confined to the thing I know the most about—the men and women who compose these safety organizations.

Having been honored with the privilege of presenting the affirmative side of this question, I want to restate the question for the purpose of classification. "Resolved: That Safety Committees are Indispensable." In substance that is what it is.

If we strip this question of its superlatives and get down to the basic intent of the Program Committee, we have the question of safety committee plan of organization versus the non-committee plan of organization. That is the substance of the whole thing. I am strong for the safety committee plan.

I like the safety committee plan because it encourages voluntary participation. It is a representative plan, a democratic plan. It gives the fellow who has to do the work a chance to be represented on the executive councils of your safety organization. That is why I like it. It is a plan that encourages participation; that sells your employee on your safety organization. If he isn't sold on it, you are not going to get very much out of him in the way of contribution to the success of your organization.

A safety organization, to be a good one, should function twenty-four hours a day. It should concern itself with all angles of the accident prevention job. That is especially true of public utility companies which have the responsibility of educating the public in the safest way to handle the commodity.

Who is going to help you do that? I believe that every forward-looking public utility executive today recognizes the fact that the best available instrument for that purpose is the employee. Who can do that job better than the young chap that goes into the home to read the meter, or the employee who comes in contact in any other way with the customer? The chances are ten to one that employee is alone when he makes that contact, and he is not going to do any missionary work for you unless he is sold on your organization. The only way you can sell him on that organization is to make it a democratic organization. Give him a right to be represented on the executive council; to have something to say about the manner in which that organization is to be conducted.

After all what are these safety committees. A committee's function is to counsel and advise. I know of few committees that really order or direct. You know all about these committees. There isn't a man here in this room who hasn't served upon one. The chances are that you may be on one now. That may be the reason why you are down here.

We have committees because we want to spread responsibility throughout the entire organization for the success of the affair. I am surprised that somebody hasn't come along here and suggested that we hold the next Safety Congress without committees. It is just as practical as to eliminate committees from your own safety organization. The National Safety Congress, after all, is merely an enlargement upon the local organization, and if we can successfully get away without it in our local organization, then I don't know why we should have all these four or five hundred committees in the national organization.

Let's abolish committees from Congress. They have lots of them down there. Everybody has committees, simply because it is the best way in the world to spread responsibility for the success of the undertaking. Divide up the work; divide up the representation.

You know participation without representation is just about as distasteful as taxation without representation in this country. We must have representation if we are

going to have anything to do with it, and I can't see how in the world my opponent is going to prevent a plan to give the rank and file of the workers who make up your organization the participation they should have in the affairs and executive council of your organization.

My opponent is going to try to make you believe that the safety committee plan is obsolete. Just bear in mind that almost every safety organization throughout the country is a safety committee plan, and that plan is the product of the very best brains in the public utility industry. I can't believe that the public utility men of today are going to throw in the discard an organization that has proven its worth since the inception of organized safety work.

CHAIRMAN VANDEGRIFT: We have an opponent worthy of the cause, who is well prepared to tell you why we shouldn't have these committees. Mr. Gordon Wilson, Director of Safety, The Management and Engineering Corporation, Chicago.

That Safety Committees Are Not Indispensable

By **GORDON WILSON**

Director of Safety, The Management and Engineering Corporation, Chicago, Ill.

I find that my opponent has already made my case for me.

The question is, "Are safety committees indispensable to the furtherance of safety work in public utilities?" It has already been conceded that they are not because nothing has been said to show that they are. I am going to give my opponent a sporting chance in this row and tell you why safety committees in public utility organization are not even desirable!

Why? We know our public utility plan of organization, structure—and essentially it is the same whether it covers a small utility or one of these great, big super-power projects, that link hundreds and hundreds of small rural communities and farms on one common source of power supply. The whole basis of our public utility organization, the basis of our public utility success is the fact that we have organized on a basis of localized responsibility and the localized authority that goes with that responsibility.

The big problem in public utility organization is to so organize that you are going to have the right man in the right place so that you can trust him to do the right thing at the right time.

A successful public utility man has to be an individualist. He has to be able to stand on his own hind legs and use his own head, solve his own problems and lick his own opponents. When something happens he must know what to do and he must know how to do it. He hasn't time to call any pow wows and to consult any committees. No, the stuff that he has to work with is right underneath his hair and it has to be where he can grab it quick.

The public utility business is one in which there can't be any buck-passing and there are too many committees used as targets for the well-known "buck."

That's not what we are in business for. We are in business to lick these things, one by one as they come up.

I agree with my opponent that every person on the pay roll of a public utility is a member of one great, big safety committee, an all-embracing safety committee. A public utility organization is a safety organization. It must be!

But this particular safety committee, that includes everybody from the board of directors down to the office boy, has some other functions. While it functions as a safety committee, it also functions as a service committee, and has at its disposal specialists in safety and service who are an integral part of the staff of the organization.

I favor and believe you will favor the safety committee, on the roster of which is

every man on the pay roll and which is coordinated and headed by a safety director who is a staff member of the organization, who acts as the clearing house for safety ideas, for solution of safety problems, and who furnishes that little safety stimulus that is going to make every man on the pay roll—not just a few people sitting in a room, smoking company cigars, once a month, but every man on the pay roll a safety committee every day in the year.

That is the organization that we have to work for in the public utility game. We are fighters. We must organize along military lines.

The old American spirit is to solve your own problems, do your own thinking, pass along the good results of your work to the other fellow to use or not to use as the conditions require, but be an American, be a man, fight your own fights, and solve your own problems, and let the weaklings proceed to pass the buck to the committees.

CHAIRMAN VANDEGRIFT: Necessarily there should be rebuttal. Mr. Thomas has an ace up his sleeve.

CHESTER K. THOMAS: Mr. Chairman and Gentlemen. A few minutes ago the plan was to abolish the safety committee. Now they propose to abolish the entire safety organization and to make us a bunch of individualists, every man standing on his own. Now we are supposed to organize along military lines.

I served in the army for twenty-two months during the World War, and we had a supervisor for every seven men in the army. And I don't think I ever saw as much shirking any place as I saw in the army, outside of when the men were up on the front.

With the plan that this gentleman proposes, safety work will no longer be a movement. It will be a duty. It will be a job, and the individual will perform it only to the extent necessary to hold his job, but he will lose a large part of his humanitarian interest in it, the thing that has kept him going in the face of difficulties throughout all these years.

If you abolish the safety committee you are going to kill the spirit of your organization and go a long way toward minimizing results.

Gentlemen, this is no joke. There is a vital principle involved. Do you think that public utility organizations have reached that state of perfection where they can get a group of individuals to work for them who can stand alone? Haven't we a tremendous amount of educating to do yet, before we reach that point?

Don't be misled by a theory. You have the records of your safety organization and committees throughout all these years; something tangible, something real upon which to base an opinion. A great deal depends upon the decision you make here today. Should you decide that you have reached the point where the individual can stand on his own legs and can get along without a safety organization, and some fellow at the head can stimulate interest in the thing and keep it going—all right! But be sure of your ground.

This is all that is involved in this question, gentlemen: Do you want an organization that is representative; that will appeal to your rank and file workers; one in which they can have representation, one which will give the worker who has to run the risk of the loss of limbs or life a chance for representation on the executive council? Or do you want one where every fellow goes out on his own hook, and some fellow up at the top of the ladder says, "This is my organization. I'll tell you whether this condition is unsafe or not. I'll tell you whether the safety recommendation this man sent in possesses any merit." With that type if I want my boys to go out and help educate the public, all I have to do is to send word to them down through my military organization, the supervisors, and say, "Go ahead, boys!" and, they will go forth joyfully to the task.

Isn't that an impossible dream? It can't be done! This plan that he has presented here is nothing but a dream. We have not yet reached the stage of individual development where we can stand alone and pass our good work on to the next fellow. We need help; we need cooperation; we need the inspiration we get from the safety

organization like we have always had, one with a committee, one that spreads throughout the whole rank and file of the organization; one that we can really and truly feel is our own, that is what we need, and let's not throw it away without careful and serious consideration.

CHAIRMAN VANDEGRIFT: There may be some merit left on the other side.

GORDON WILSON: Mr. Chairman and Gentlemen. I advocate a safety organization, organized from the top to the bottom, and I am held up as an advocate of no organization at all. I advocate an organization in which safety responsibility, that is the responsibility for the coordination of safety work is localized in a man who has nothing else to do but work on that one thing, who can get as narrow-minded on safety as he pleases, backed up by the management who are going to support him to the uttermost limit as long as he is right, sound, and practical.

I have been accused of being a theorist. The theories of today are the accepted practices and the conventions of tomorrow. Isn't it a fact? Theory should not be an object of contempt. Theory is a dignified thing. Theory involves analysis of conditions and reasoning, and if you men will analyze your conditions and reason from that analysis what you want to accomplish you won't "kid" yourself any more with safety committees. You will get down to essentials. You will realize that a safety organization is what you want, an organization that is permeated with safety, that has the safety spirit throughout, not in the hands of a few specialists.

That is not a safety organization. That is going through safety motions. Your safety organization means that the big boss puts it down to the next lower tier of bosses. "Each one of you is responsible for the safety of your men. The company is going to hold you for their safety, and I realize that you men, my personal attendants, are not going to be all over the job all the time, so each one of you has to be a good enough safety organizer to organize your men for safety as well as for production. And you, in turn, must make safety organizers out of your subordinates, until you get down to your foremen, and there is where the real organizing must be done."

Get that stream of safety permeating down to the non-commissioned man, the foreman. He is the real safety director. The foreman and his gang, gentlemen, is the only safety committee that can handle the work that the foreman and his gang wants to do.

CHAIRMAN VANDEGRIFT: Many important fundamentals have been brought out by these two talks. I am sure the membership appreciates the contribution of these two gentlemen.

As stated in the policy adopted by the Section we must do everything possible to insure correct methods of selection and placement of workers, their training, and adequate supervision. Probably the greatest of these is selection.

Mr. Dickson is going to tell us about those methods.

Selection of Safe Workmen for Employment

By WILLIAM M. DICKSON

General Plant Employment Manager, The Bell Telephone Company of Pennsylvania, Pittsburgh, Pa.

This subject at first blush may appear to be a rather narrow one if applied to pre-employment requisites and if applied to post-employment it opens much too wide a field to cover in my allotted time. Therefore, I shall attempt to cover, first, some of the pre-employment practices and afterwards what might be called immediate post-employment practices.

Pre-Employment Practices

In order to secure as widespread an opinion on the methods of determining the fitness of an applicant from the Safety Standpoint, I sought the help of about twenty-five outstanding Safety Engineers throughout the country and the gist of their replies, as summarized, give us:

- (a) Physical examination.
- (b) Mental examinations.

The underlying purpose of physical examinations is to insure proper placement so that an individual who has a physical handicap may be placed on a job where he will not endanger himself, his fellow workmen or the public, and where he can make progress and so become a contented useful member of the organization. Likewise the mental examination is for the purpose of placing the particular individual on the type of work for which he is mentally qualified. These examinations are planned and designed not for the purpose of excluding those with handicaps but rather for the purpose of fitting them into industry in places where they will become useful self respecting citizens.

Of course, under physical examinations, the details and extent of such examination might well be set on the type of work for which the applicant is applying. For example, the physical examination of a prospective chauffeur involves some specific physical features in which he must probably excel. His eyesight must be keen; he should have a perfect color sense; he must respond quickly to certain tests, etc. On the other hand the physical examination of an applicant for an outside construction job, where plenty of physical strength is required, may well demand first of all a man of rugged health, well developed, showing no signs of incipient hernia, etc. In other words I feel that with a well defined set-up of job analysis, such as most firms have these days, some real safety measures may be well applied in the matter of insisting on certain definite physical characteristics in an applicant for a given job. This may be done in some instances, either consciously or unconsciously but I am sure a definite routine set-up would be valuable. I feel that particularly in utilities where the work is so diversified, much thought might well be given to this phase of selection.

In some respects the mental examination is a part of the physical examination. It begins when the applicant is first interviewed by the employment man. The latter, through his more or less astute questions, can determine pretty well the mental ability of the applicant; and with a measuring stick based on the mental requirements as they pertain to safety on the position in question a fair job of selection on this basis may be had. Couple this, if you will, with a well planned employment test and the mental examination given incidental to the physical examination by a medical department and a good portion of guess work in the selection is eliminated.

In some firms, previous employment history regarding accidents is sought prior to employment and in others the applicant is employed on a probationary basis pending the receipt of references including accident history. However, most firms do not ask specifically for accident history in their reference request from former employers. This may indicate that more attention should be given to securing such history in addition to history on the common items of character, ability, loyalty, etc. However, the value of such history is questionable unless knowledge is had as to how well previous employers had filled their obligations in promoting safety work in their organization.

Again in other cases, applicants are "tried out" on the job to determine some specific attributes or the lack of them. While not commonly done, nor widely recommended, this nevertheless affords a further means of determining the "safety factor" of the applicant.

The foregoing represents, I believe, what the large majority of industries are doing from the pre-employment standpoint.

Immediate Post-Employment Practices

Once the applicant has been employed the matter of safety instruction is in immediate order. Various methods are being employed to insure the new employee's safety education.

The initial step in this safety education can well be covered in the employment office. The new man should be impressed with the fact that safety is to be as much a part of his job as the actual production operations, and that lack of safe workmanship on his part will not be tolerated. Once the new employee has been formally turned over to his supervisor he should be thoroughly trained in each specific job operation that he will be required to do so that he will understand the right way to perform each detail of the work, the right way being the safe, expeditious way, producing a finished product of the standard prescribed quality. If the standard practice is right, the new man taught this practice and supervision sees that he follows it, very largely the big job of safety education is completed. Safety training to be most effective must be an integral part of the job training. In the telephone company's training activities, safety is not taught as one subject and vocational work as another. They are so interwoven that they become one. Most of our success in accident prevention is due to this integration of "job training" and "safety training".

Many firms at this point present the new man with a "Book of Rules" or "Safety Code", which covers in more or less detail the "safety specifications" of his work. From this period on his education insofar as safety is concerned is fitted in with the regular safety program of the industry.

In the Telephone Company in Western Pennsylvania we have a procedure which has been in use for some time and which has produced results. The employment bureau does no hiring. It receives requisitions for men from the operating forces and proceeds to select from applicants those best fitted (determined by analysis of application blank, test and interview) for the jobs open. These selected applicants are then sent to the first line supervisor who placed the requisition and for whom the applicants will work should they be finally selected. This first line boss then either accepts them, subject to physical examination or is not satisfied with them and requests that others be sent him to select from.

When applicants are rejected for one particular type of work by a line supervisor they are frequently placed on another type of work for which they are better fitted.

If he accepts them, these men are then sent to our plant schools where they are turned over to an experienced instructor who makes them acquainted with our organization set-up, our "Benefit Plan", our thrift plans and our safety requirements. At this time he is given a "Safety Code" and the instructor proceeds to go through the Code with him emphasizing our safe practices, particularly stressing outstanding items as they pertain to his job. He is made to clearly understand that carelessness will not be tolerated on the job, that safe workmanship is one of the outstanding factors considered in wage progression.

After this preliminary course, which lasts about two days, the new employee is then given instruction in the school in the fundamentals of his job. This course which lasts about one week acquaints him with the tools he is to use, the materials involved in his job and the precautions he is to take in handling these tools and materials. Safety is persistently stressed throughout this course. He is drilled in the thought—"Never do a job unless it's safe—If in doubt, call your boss". He is further instructed in the safety code and the slogan "*Know and Follow your Safety Code*" is continually hammered home.

When this course is completed he then reports on the job. At this point the foreman takes him in hand and again specifically informs him of our safety requirements and of the fact that his future progress in the telephone organization depends as much on his attitude toward safety as it does on his production. I might say that

this method of selecting and training our new men in safety has been in a great degree responsible for the reduction of lost time accidents from 51 in 1920 to 14 in 1929. To date this year we have had eight lost time accidents among our 2,300 plant employees who are more or less scattered over Western Pennsylvania. In our whole safety program, nothing is stressed more than the initial training of our new men.

Motor Vehicle Drivers

This is one group which I believe is worthy of some special attention at this time. There is not a utility represented here which has not from half a dozen to many hundreds of vehicles operating over our streets and highways. Much has been done and is being done in the prevention of motor vehicle accidents but the toll seems to continually be on the increase.

In the employment of motor vehicle drivers it is probably essential that certain additional precautions be observed such as:—

1. Thorough physical examinations, with particular attention to:—
 - (a) Vision, including color test
 - (b) Hearing
 - (c) Reaction time tests
2. Thorough course of instruction in the operation of the particular type machine to be driven.
3. A final test and certification by a competent inspector as to the ability of the new employee to safely handle the car or truck.
4. Periodical physical examinations after employment.
5. Supplemental operating instructions and test when a driver is assigned to another vehicle of different design.
6. Printed instructions on the operation and care of the vehicles.
7. Complete record of accidents by individual drivers, by damage costs, etc. and by responsibility where definitely determinable.

In connection with motor vehicle drivers it might be interesting to know that in Pittsburgh there is a "Clinic" functioning to secure more definite and reliable data as to the causes of motor vehicle accidents. This clinic is under the auspices of the National Safety Council, the Pittsburgh Department of Public Welfare and the University of Pittsburgh. Drivers having accidents are sent to this clinic as soon after the accident as possible where complete physical and mental examinations are given them and their personal history secured. Many interesting facts are being developed in attempting to learn the personal characteristics which may be responsible for accidents. I understand this type of clinic is also being held in some other cities.

Recently in the telephone company, in this area, where we have over 900 licensed motor vehicle operators we conducted an eye test to aid us in determining whether or not defective vision was a real factor in our motor vehicle accidents. After instruction by our medical department, three safety supervisors visited all drivers and gave the tests, using:

- (1) The Snellen Test Type (for vision).
- (2) A Commercial Test for Color Blindness.

When the job was completed some very surprising statistics were discovered, the outstanding of which I am enumerating below:

- 986 Drivers were tested.
- 599 or 61 per cent were found normal, (20/20 vision).
- 264 or 27 per cent were found with 20/30 vision.
- 123 or 12 per cent were found with defective vision (less than 20/30).
- 69 or 7 per cent were found to be color blind.
- 17 per cent of the motor vehicle accidents in the previous year occurred to the 12 per cent with defective vision.
- 5 drivers had no vision in one eye.

9 drivers had little vision in one eye (20/200).

8 drivers were both color blind and had defective vision.

Of course, most of those showing defects were employed prior to our having a compulsory physical examination at time of employment.

In order to verify the above statistics the 123 employees whose vision was found defective were given a further examination by our medical people. This check was started about six months after the original examination and the following statistics speak for themselves:—

7 or 5.5 per cent had left our service.

11 or 9.0 per cent had vision which could not be corrected or improved.

84 or 68 per cent had correction made.

21 or 16.5 per cent did not need correction.

At first thought this last figure may seem high but our medical friends say that in a large group this is not a high percentage due to possibility of misunderstanding instructions, being below par physically on the particular day the test was given, etc.

Some of the valuable data we did secure, however, was:

1. Twelve per cent of our drivers were involved in 17 per cent of our motor vehicle accidents, indicating that vision quite likely was a contributing factor.

2. Nineteen per cent of our drivers or about one-fifth of them had either defective eyesight or were color blind. This certainly impressed us with the need of further tightening up on this phase of our physical examination.

3. We found many employees who drive our cars incidental to their telephone work who were color blind, yet whose job necessitated a very definite color sense. This included such employees as installers, cable splicers, etc., who deal in colored insulation, etc.

4. It indicated that a check on the vision of all our workmen might be advisable. This is now under way.

As a result of the eye test and the corrections made in the vision of employees two definite things were accomplished:

1. The most important is that 84 employees are now enjoying normal vision who prior to the test had defective vision which quite likely caused headaches, dizziness, disinterest and other conditions arising from poor vision. In fact some of these workmen came to us afterward and told us how thankful they were that the test had been made.

2. A close check was kept on the drivers whose vision had been found defective and later corrected. A comparison of results showed that whereas this group had been responsible for 17 per cent of the accidents in the preceding year, it was only responsible for 10 per cent of the accidents during the eight months following the completion of the test and the correction of vision where possible.

As mentioned before, I have endeavored for some time to find out what means were being employed throughout the country in the selection of safe workers from the applicant line without finding much more than we are all familiar with, viz., (a) physical examinations, and (b) mental examinations. However, I feel sure that someone somewhere has in use some method, either by directed discussion, test or what not, by which the "Safety Sense" of an applicant may be determined.

There apparently is opportunity to still further develop tests which will be useful in selecting applicants for a particular job from the safety point of view as for example something that would detect men for linemen who did not have a fear of height, etc. Possibly some here may already be using some means of detecting this "safety sense" of applicants. Then again, in this Public Utilities Section it may be worth while discussing possibilities of tests along these lines for particular crafts. At any rate I am sure any discussion which follows will be helpful in developing what more can be done than we are now doing in the selecting of safe workmen.

CHAIRMAN VANDEGRIFT: Mr. Dickson, I thank you for your splendid contribution to this morning's session.

We have, on our Executive Committee, a man who has worked hard on the task of adding to the collection of film strips, which is a part of the service of The National Safety Council. Mr. Howard M. Shaw will tell us something about the film strips which have been developed.

The National Safety Council's Film Strip Service for Public Utilities

By HOWARD M. SHAW

Insurance and Safety Engineer, North American Light and Power Company, Chicago, Ill.

At a meeting of our committee there was some discussion as to what was desirable in a film strip. It seemed to be the opinion that film strips have largely carried safety devices and other safety kinks and practices which were provided by the manufacturer, and which the managements today are glad to accept, adopt and use.

Our duty in safety work is to assist men in such a manner that they can easily grasp the difference between the safe way and a wrong way. I do feel that in giving a man something we should show him the correct and the proper way to do the thing. We should explain it. I have tried to develop that same thought in the minds of the men asked to contribute film strips.

Safety work is done on the job by the man doing the work, and he does it with his fellow man. He does it as a result of his experience, and if he has been a successful tradesman or a craftsman of any sort, and he hasn't been hurt, his method must be successful. As the opportunity affords itself study the work, study your men, get out with your camera and take a picture of the work as it is being done. You will get a great many ideas.

Staged pictures, when shown to a group of men, ordinarily leave them with the idea of having been amused rather than of having been given a thought which really means something to them.

I don't believe there is anyone in safety work who is selfish and feels that he has some special bag of tricks with which he alone produces good results. We all feel that a good thing in safety work should be passed along. That is what we are asking for in these film strips. Let's get something that we know is good. Let's pass it along and let the other fellow have the benefit of it.

What we want in film strips are practical applications of safety methods in doing the work. The men really appreciate it. We have one strip which was developed last year and it is a good example of what we are after. The man who made the picture, made it in the fashion described, when the work was being done. Many of you may have some comment on this picture; you may have suggestions which will make it better.

I hope this will develop some discussion and that you will give us those pictures and ideas. They will be a valuable contribution to our safety work. Show a man how some other man does the thing and does it well, and he will take it for his own use and will very likely become a better workman.

I am going to ask Mr. Beaumont of The Peoples Gas Light and Coke Company, of Chicago, to show the film strip which he prepared.

(Mr. E. S. Beaumont then showed National Safety Council Film Strip No. 20, and described the pictures in detail.)

ADJOURNMENT

Thursday Afternoon Session
October 2, 1930

J. L. VANDEGRIFT, Chairman

The Chesapeake & Potomac Telephone Co., Washington, D. C.

The third session of the Public Utilities Section convened with Chairman Vandegrift presiding.

CHAIRMAN VANDEGRIFT: I am pleased to introduce Mr. G. C. Neff, Vice-President of the Wisconsin Power and Light Company, Madison, Wis., as our first speaker this afternoon.

Disciplinary Measures for Violation of Safety Rules

By G. C. NEFF

Vice-President Wisconsin Power and Light Company, Madison, Wis.

About six years ago, it was my good fortune to be present at a bitterly fought football contest between two Big Ten university football teams. The game was close and the outcome in doubt, when suddenly a halfback on one of the teams carried the ball around the end for a substantial gain. He was tackled and thrown to the ground. He rolled over and got on his feet and ran for a touchdown, which proved to be enough to win the game. Immediately after the play, a great argument arose on the field as to the legality of the play, one side contending that the player was downed and the ball could not be further advanced, the other side contending that the ball was not downed and, therefore, could be advanced.

The spectators took up the argument and the feeling became very bitter. Cries of "Kill the referee" were heard all through that big crowd. In fact, when the game was over, it was necessary for the players of both teams to form a ring around the umpire and the referee in order to escort them safely from the playing field to the dressing room, for there were many in that crowd who wanted to lay their hands on them and do them bodily harm.

If the victorious team had won the game without a questionable play such as I have described, there would have been no such outburst of feeling and no such hostile action shown. True, the supporters of the losing team would have been disappointed, but they would still have been friendly to the supporters of the other team and they would not have felt bitter toward the officials. Why then all this confusion? Why this bitter feeling?

The American public takes its football seriously and insists that it be played strictly according to the rules of the game; some of them thought that a rule had been broken and the officials had allowed it to go unnoticed. In this case, the prize at stake was victory in a football game and because there was a question about the enforcement of a rule, a near riot occurred.

There are rules in business just as there are rules in football, and it is just as important that these rules be lived up to. Yet, for some reason or other, we do not consider the rules of business in the same way that we do the rules of football, although often human life itself depends on the strict observance of those rules. This is particularly true with regard to our safety work. There are rules for doing work safely. These rules have been prepared in most cases by men who have devoted their lives to a study of how to work safely. Very often, the violation of a rule means the loss of a life and much suffering in a home, and yet when one of these rules is violated and some one loses a life thereby, we too often hear someone say, "Well, it

was too bad"; and let it go at that. If we could in some way instill into our employees the same high regard for safety rules in work that we all now have for the rules of a football game, I am sure that we would get results that would be pleasing to all of us.

In the first place, it is extremely important to any successful safety work that a complete, concise set of rules particularly adapted to the work be developed. The presence of many unnecessary rules in the rule book, not applying to the work of a company, has a tendency to create in the minds of the workers a feeling that it is not necessary to observe all the rules in the book, and as a result they are more apt to violate a necessary rule. On the other hand, if all the unnecessary rules have been eliminated and the rule book contains only rules that should be observed, the first step has been taken toward creating in the minds of the employees of a company the feeling that all rules in the book are to be observed.

In the second place, only those employees who know the rules can be expected to live up to them. It is important, therefore, that if a more general enforcement and obedience of rules is to be brought about, we must be sure that the employees know and understand such rules. Often in a large organization, safety rule books are distributed among the employees and the assumption made that employees will read the books, become familiar with and live up to the rules printed in them. Such assumption is likely to be fatal to successful safety work. The rule books have been prepared by men who are experienced in safety work; men who have spent a great deal of time and effort in the preparation of the rules contained in the book. These books offer the best help and guidance that can be obtained in eliminating accidents. Yet, many executives seem to feel that after the book has been prepared and distributed to the employees, their work with regard to safety has been completed; whereas, as a matter of fact, they have only taken the second step. How many executives of companies know whether or not their employees have read the rule book, understand it, and believe in it? It seems to me that it is the duty of the executive to outline a definite plan which, when carried out, will give definite information as to whether or not the employees understand the safety rules. No executive would expect successful operation of a power plant through distribution to the people who operate the plant of a book on power plant operation. He would, of course, further determine just what the operators knew about the plant. We have to apply some of the same methods to our safety work that we apply to the operation of power plants or any other phase of the utility business.

Safety meetings are very important because at those meetings we bring before the rank and file of the employees some of the most important phases of safety work. Employees get together, exchange ideas, and make suggestions as to what can be done to improve safety work. This excellent practice because it helps to keep up interest in safety work which, of course, is very important. Safety work cannot be carried on successfully without safety meetings. Here again, some executives think that by holding safety meetings and by distributing safety rule books, their responsibility ends in furthering safety work, when really, they have taken only the third step in successful safety work; for I am confident that many employees could be found who carry a safety rule book in their pockets and who attend safety meetings regularly but who cannot pass a satisfactory examination on safety work.

Believing that such a situation existed in the organization with which I am connected, we determined to find out whether or not the employees of the company actually did understand the safety rules as set forth in the rule book for our company. We decided to conduct individual interviews with all employees. We adopted a plan providing for an interview between each employee, his foreman, and the local manager. During the interview, safety rules and other phases of the utility work were discussed. This personal interview was not conducted solely to determine whether or not the employee understood the rules in the safety book, but also to ascertain how much the employee knew about the company, what ideas he had concerning company policy, and in general what he was thinking about in relation to company activities.

This work has now been carried on for about two years and we are satisfied that it is a very profitable practice for any company to follow. To any other organization that might want to try it, I suggest the following procedure: First, announce that these personal interviews are to be conducted. Many employees will pay little attention to this announcement. Then call in two or three employees in a district and give them a very thorough examination. I assure you that there will be more wear and tear put on the safety rule book of the organization in two or three weeks than was put on it in the two or three years preceding. Employees will certainly get busy after one or two of them are interviewed.

You may be surprised after you start this work how little your employees know about the safety rule book. You may be surprised how little they know about some other things, too. Some of your men whom you considered as your standbys, 100 per cent in every particular, will disappoint you, and some of those you thought were not as good as they should be will also surprise you in the complete knowledge they have of the safety rules and of the company's business.

In my opinion, the plan I have just outlined is the best method to get employees to understand what the safety rules are and also to get them to understand what the company expects in building proper public relations.

There is just one word of caution I should like to offer and that is that the interview must not be in the form of an inquisition. It is necessary to use considerable care in discussing with the employee those things vital to company welfare. Every effort should be made to impress on the employee that an honest effort on the part of the executives and managers of the company is being made to help the employee learn more about the things he should know in connection with his work and to learn more about the company. If the right approach is made, you will find that after this interview, your employees will be very grateful to you for taking the time and the trouble to give them the information they received. As a matter of fact, we have discovered many very able employees through these interviews and many have been promoted as a result of them.

Thus, the first requisite to obedience to safety rules is that only necessary rules are in the rule book; the second is that employees know and understand the safety rules; and the third is that executives and managers know that the employees are familiar with them. If these three things have been accomplished, an important forward step has been made toward successful safety work.

A very large percentage of employees will willingly and gladly live up to all the safety rules when they know them and when they appreciate their importance. That is not sufficient, however, to get complete obedience to the rules, for a certain percentage of employees of any company are more or less careless and will not give complete obedience to safety rules unless some one checks them once in a while. That brings the foreman or supervisor into prominence in safety work.

In most of our properties we hold foremen's meetings every two weeks at which various subjects are discussed. Those in attendance discuss their work and they discuss safety. They discuss the problems they encounter from day to day and I believe that they learn a lot from each other and that they become better foremen because of these meetings.

I think that such meetings result in convincing foremen that the responsibility for the safety of their men rests on them. They must be made to believe that if an accident of any kind happens in a crew, it is a black mark against the foreman of that crew. Likewise, the local manager must be made to feel that an accident among his force is a black mark against him. There is no reason to stop with the local managers, but the division managers and the executives of the company should feel that an accident any place in the organization is a black mark against the way the whole supervisory and executive organization is functioning. If that idea can be propounded and subscribed to at the local managers' meetings and at the foremen's meetings, another big step will have been made in the safety work of any company.

Persuade the employee to know the rules, know that he knows the rules, school the supervisory forces to feel that they are equally responsible with the employees and that an accident to any employee is a black mark against the whole organization, and then you are beginning to do effective safety work.

There is still another situation that must be met. Every company has a very small group of employees who are really good employees but who are a little hard boiled. I know that we have had linemen in some of our crews who thought it was a disgrace to have to wear rubber gloves. You undoubtedly have all had these same experiences. It has been pretty hard at times to get men of that type to do things they should do. Of course, in some cases, it is necessary to let them go, but we found that in spite of everything, we had to put some teeth in our safety rules in order to get reasonable compliance with them. Teeth can be put into safety rules without in any way hurting the fellow who is trying to do the right thing. Anyone who lives up to the safety rules is not hurt by any penalty which is imposed upon the fellow who willfully disobeys the rules, and I think that some rigid regulation is justified when a life is at stake.

At one of our managers' meetings, about two years ago, the following resolution was unanimously adopted by the district and division managers and department heads who were in attendance: "Any foreman, superintendent, district manager, division manager, or any other person serving in a supervisory capacity, who is found to have permitted the violation of any safety rule without using discipline on the employee involved, will be disciplined to the extent of being laid off without pay for a minimum of two weeks and subject to permanent discharge depending upon the seriousness of the offense involved."

We had had some bad luck in our company; several men had been killed. The whole organization was worked up about it and was anxious to do something to stop this needless loss of life. A review of this accident and other former accidents showed that there had been a disregard of some of the fundamental rules of safety line work. In some cases, it was found that the foreman knew about it, and in one case a district manager was involved. So the whole executive organization which was assembled at this particular meeting (we call it the local managers' meeting) drafted the above rule and voted on it voluntarily, and they included themselves with those liable to be laid off for two weeks if they failed to do their part in enforcing safety rules. The results have been very satisfactory. The penalty has been imposed in our company a number of times on supervisory forces and I am sure that many accidents have been prevented because of this rule. I can recommend it to any company as an effective means of bringing about strict enforcement of the safety rules.

To sum up—my recommendations on how to get obedience to the safety rules are: First, unnecessary rules should be eliminated; second, employees must understand the rules and appreciate their importance; third, executives must know that the employees understand the rules and appreciate their importance; fourth, the foremen and supervisory forces must be made to appreciate their responsibility; and fifth, a penalty should be imposed on the latter forces if they fail to do their duty as far as enforcement of safety rules is concerned.

CHAIRMAN VANDEGRIFT: Thank you, Mr. Neff, for that fine presentation of a difficult subject. This deserves discussion, and I wonder who will volunteer to lead us.

H. A. MOTT (Illinois Bell Telephone Co., Chicago, Ill.): Just what position did the men in the field take? How did they receive the penalty, so to speak, as a general proposition? I don't mean the offender, but the men in general.

MR. NEFF: This rule was imposed by the men in the field. They were the ones who drafted it; they voted on and accepted it before we started. If any company wants to put it into use, first educate the men in the field to the point that they believe in that sort of thing, and let them sort of advocate it and bring it forth. We have no trouble of the kind you intimate.

GORDON WILSON (The Management and Engineering Corp., Chicago): We can

measure the effectiveness of our work as safety promoters by the extent to which discipline is applied by the operating executives as a means of endorsing the observance of safety rules.

There are three stages in the evolution of safety consciousness in the average operating executive: First, he sneers at this "pale pink" bunk that the safety man spills. Second, he tolerates it. And then, some day, when it has been impressed on his subconscious mind that safety is a wonderful thing for him, he becomes a "nut" like the rest of us. When he is in that sneering stage, will he use discipline to enforce the observance of safety rules? No! He sympathizes with the fellow that broke this safety rule because he is being pestered by a lot of red tape and fool instructions from fellows who are not actually on the job.

When he gets to the tolerant stage and somebody calls his attention to the fact that a safety rule has been broken he will go through the motion of enforcing it. He will speak quite severely to the man. He may even get rough and "slap him on the wrist," but his heart isn't in the enforcement of that safety rule yet. But when the grand and glorious day comes that his safety education has progressed to the point that if he sees a man breaking a safety rule it makes him mad, then we know that we have another safety man on our staff.

A. A. OLDFIELD (Wisconsin Power & Light Co., Madison, Wis.): On our property, not only in safety work but in all our departments, it is Mr. Neff's policy that each head of a department, rather than give instructions in the department, shall lead the men in the field in carrying out the instructions. That same policy is followed in this discipline measure.

You recall, in the first case, the district managers passed the measure. They made the resolution. If a case comes up that is necessary to discipline, the safety department, together with the managers, have a meeting with the supervisory force, and if necessary with the men. We finally ask the men what we should do, and invariably the men come back with the answer that the guilty should be punished. It is the men who really assess the discipline rather than the manager or the safety department.

W. F. NORRIS (American Telephone and Telegraph Co., New York City): What is our interpretation of discipline? So often the construction means purely punishment. The construction I would like to put upon it is an orderliness, something taking place, or not having taken place, that produced a result. Not the climax that has resulted in some serious accident or fatality, but what has been going on. We seldom use the better interpretation, education or orderliness.

We have broken through placing the entire responsibility on our foremen. Have you gentlemen ever analyzed a foreman's duties? Have you ever written them on a blackboard, starting at the top, and writing in fine lines all the way down, start another column and fill that, and start another column, and another one? Well, we have, and are placing a tremendous responsibility on our supervisors, and our supervisors are passing the buck on to the foremen.

I have analyzed serious accidents; have seen the guilty party go scot-free and the poor foreman take the brunt because he has been over-burdened with the ignorance of management in what they are imposing on their men. You are beginning to place the responsibility where it belongs.

The foreman has certain responsibilities, I'll admit. Every man in his group has his responsibilities, but somewhere, beyond that foreman, there is a huge responsibility that cannot be shouldered onto that foreman.

CHAIRMAN VANDEGRIFT: You advocate then, Mr. Norris, the definition of discipline to be not only the penalty for non-observance but the reward for fulfillment.

MR. NORRIS: Yes!

JOHN W. ROMIG (Corning Glass Works, Corning, N. Y.): How can a foreman be laid off because of some non-observance of safety rules and then be put back on the job and function as a real foreman?

CHAIRMAN VANDEGRIFT: And still have the respect and support of his men. That is a fair question.

MR. NEFF: We have only had to do that in two cases with foremen. The foremen have gone back on the job, and, as far as we are able to determine, do have the respect of the men, and our check-up indicates that they are about three times as good foremen now as they were before they were laid off. If you have trouble it might be well to shift your men in some cases.

R. V. HYDE (Northwestern Bell Telephone Co., Omaha, Neb.): I can cite a case within the past two years where a general foreman was penalized three month's pay, and within six months following that was promoted to branch superintendent.

WM. L. BRUCE (Westchester Lighting Co., Mt. Vernon, N. Y.): We had a case of a foreman being penalized because we thought he was the cause of the death of one of his men. After the coroner's inquest was held, the coroner exonerated the company from any responsibility or liability because of this man's death. All of the men under that foreman signed a round robin asking that he be kept in his position. We suspended him for one month and then returned him to the same gang. He is back on the job, doing good work and the men and the company are satisfied.

CHAIRMAN VANDEGRIFT: Was it determined that it was his responsibility?

MR. BRUCE: Yes.

WM. R. HAMILTON (West Penn Power Co., Pittsburgh, Pa.): Just how do we discipline? In the case of the foreman or his superiors, who decides how the discipline should be handled? Is a board created of men equal to the man who was penalized, or is it an order from his boss? You get into different types of mentality; do you treat them all alike?

Individuals cannot be handled like a machine. They all have to be handled in different ways.

Does the company discipline a man for his first offense, or do you censor him and discipline only the chronic offender? Is laying a man off as satisfactory as discipline? I doubt it. We lay a man off three or four days. Some men like to shoot in the hunting season. The man considers it as an opportunity to go hunting. It is a vacation for him. He doesn't pay the penalty as the man who awards the discipline thinks he should.

Why are we disciplining the man? For punishment or correction? There are two meanings. We try to correct a man to make him better. If we are punishing him, that is something different, and must be met differently. If we are punishing or correcting an individual, how are we getting that to the entire organization? If that one man needs correction how about another over on the other side of the system? We must find a way to get that across to the entire organization.

I have no solution to the questions I am asking but would like to have it.

A. A. OLDFIELD (Wisconsin Power & Light Co., Madison, Wis.): Mr. Hamilton asked the method of discipline. As Mr. Neff said, we discipline for willful disobedience of rules. That doesn't mean that every time a small accident occurs where a rule is broken, a man is laid off, but it does mean that after a careful check of our employees, whether they be linemen, or gangs, or foremen, if we find they are willfully disobeying the rules, we do discipline them.

So far as the gangs are concerned, usually the district manager, together with the general foreman and his foreman, constitute a committee to decide whether that particular man should be disciplined. When we get up the line, then the committee that decides upon the discipline is the safety department, the district manager and the division manager.

Do we consider discipline punishment or correction? All of our safety work is corrective work. After it has gone through the corrective stage, then it becomes really a question of discipline, whether you call it discipline, punishment, or orderliness.

Now, as to how our men feel regarding this discipline, Mr. Neff spoke about two foremen having been laid off. One particular foreman was moved to another location after his discipline because the management thought it was a good policy. In the other case the man went back to his work and since that time has had much more respect from the men under him and has been a much better foreman.

I often thought some of the fellows would consider the discipline as an opportunity to do something which they might want to do. A foreman laid off for two weeks considers it real punishment, and when he goes back to his work he feels that he must get from his men the same respect he had before and he is a much better foreman 99 times out of 100.

MR. HAMILTON: How does the rest of the company benefit from the discipline?

MR. OLDFIELD: If it is a case of willful disobedience that person would be punished in a similar manner.

MR. HAMILTON: It might not be willful. Possibly it wouldn't apply in safety. Operating errors are mistakes where carelessness applies. If we call it to the attention of the entire organization, some one else may benefit by this admonition.

MR. OLDFIELD: If a mistake is made unintentionally, you can hold that out as an example to the rest of the organization and call attention to the fact that, although it has been going on for sometime, from then on it is going to be a punishable error.

MR. HAMILTON: Have you considered, in disciplining a man, to require him to report to his headquarters each day with a letter on some subject pertaining to this safety rule in particular of safety in general, those letters to go to a person high enough in the company to cause him to think constructively and to give a little thought to the subject?

Now, he does not report to work. It isn't fair to lay a man off and make him work, but you can lay a man off and make him at least write a letter addressed to the vice president on some subject which has been decided on. In the case of one man whom we recently penalized, I laid him off for four days. Each day he came to his headquarters with a letter on a certain subject assigned to him covering the mistake, or things parallel to the mistake. We did this rather than give the man an opportunity to have four days vacation.

MR. OLDFIELD: In the state of Wisconsin, if you lay a man off and don't pay him, you can't require him to perform any duties whether it is writing a letter or reporting to headquarters.

MR. HAMILTON: If that man signs a release for those four days you can. You can give him the opportunity of signing the release or being fired.

MR. OLDFIELD: I realize that no one can pick out every individual error in the organization. On all properties there are things going on day after day that we would like to get away from, but the point is, once this fellow has been disciplined, you may be sure that fellow is beginning to think about his record. He is not going to be laid off many times before that layoff is going to be permanent.

CHAIRMAN VANDEGRIFT: Gentlemen. There is something Mr. Hamilton said in his closing discussion that struck me forcibly: A fall down in safety is an operating error. Tie that up with discipline. Who is responsible in the last analysis? Is the workman who fails to carry out instructions responsible? Not necessarily. Is the foreman responsible for not requiring the workman to carry out the instructions? Not necessarily. Is the district superintendent or the district manager responsible? You would think that he should be, but if he isn't backed up by the right kind of management, you can't hold him responsible. I think we had better stick to fundamentals and consider this safety an absolute part of operation. It isn't any side issue.

What methods do you have in your organization for imparting safety information? Do you merely publish your book, put it into the hands of the man, and say, "Thank God that is done. We are all educated." You can laugh but that is the way we used to do it. We had a fine code distributed to the men, and we made them sign little

receipts. They signed the receipts and the accidents kept on, and we thought we had performed our full duty. It wasn't even a start.

There is nobody better qualified to continue the thought, than a man whose company is successful along this line. Our next speaker is Mr. Buchman of the Ohio Bell Telephone Company.

Conference Plan of Imparting Safety Methods

By R. P. BUCHMAN

General Plant Employment Supervisor, The Ohio Bell Telephone Company, Columbus, O.

Some one has said that there is nothing new under the sun. I am in a position to confirm it emphatically in so far as it applies to my giving you any new ideas on the basic fundamentals of accident prevention work.

Those of you engaged in accident prevention work, in a staff capacity, appreciate that the control of your accident situation rests in the hands of your line supervisory organization.

By the line supervisory organization I mean the entire line organization, from the president on down to your first line supervision. We do not confine that exclusively to the foremen.

The problem of your staff man becomes one of the ways and means whereby he can get the line organization to recognize their responsibilities, and to apply the ideas and principles of accident prevention work.

We had that problem in our organization as our job was poor from an accident prevention standpoint. We had been using methods commonly employed such as group meetings, a safety code and posters.

There was something lacking which was needed to tie the safety work to the operating job. Our efforts seemed to separate the two rather than link them together.

We could never hope to realize results in accident prevention so long as that separation existed, and on that basis we developed a conference procedure which we hoped would link the two.

This conference procedure was handled on the "directed discussion" method. The conference was set up so the discussion would be confined to a consideration of some basic principles. We did not permit the aimless discussion which falls far short of its objective. We brought our supervisors into the conference, generally in groups of twelve. A conference leader conducted the groups which spent from one-half to a full day in discussing the basic fundamentals of accident prevention work.

With a group this large we will not be able to carry on the same kind of a discussion as we have had in our company. However, I am going to inveigle you into a discussion to bring out the cardinal points and give you a picture of the manner in which our discussions were conducted.

Our experience in 1928 was 36 lost-time accidents per thousand employees. We engaged in these conferences beginning in the spring of 1929, and our experience last year was 16 lost-time accidents per thousand employees. On the basis of the first eight month's experience this year, we hope our experience will be approximately 12 lost-time accidents per one thousand employees.

The conference alone did not contribute wholly to that reduction. There are many factors such as training, new methods, material and tools, which contribute to improvement.

To get into this discussion let us set up a mythical organization, a company that is engaged in every phase of the utility field. Then assume that we are all supervisors and are gathered here to discuss an accident situation, which, while not necessarily

bad, is not as good as we would like to have it. Further assume that our accident situation is such that the management is requesting an improvement and on that basis we have a definite motivating power to get busy and get something done.

Let this organization be mythical only so far as its identity is concerned. Let it be absolutely practical so far as the regular operating job is concerned. We have practical problems.

With that as a background, I ask this question. Remember we are thinking about this organization of ours. Have we any job that cannot be done safely? Remember we are climbing poles; putting in light service; operating power plants; maintaining central offices; digging trenches for gas mains, and I would like to know this: Is there any job in connection with our regular operation that cannot be done safely?

(Various cries of "yes" and "no.")

MEMBER: For discussion purposes why not introduce this situation: A foreman is hurriedly called to a job and the thought uppermost in the minds of the foreman and the men is to get that line working. They may do certain things that will result in a fatal or serious accident.

MR. BUCHMAN: All right, let's introduce it. Here is a situation where, because of service demands, quick action is necessary. There is confusion. But, is there any job which cannot be done safely even in the face of these conditions?

MEMBER: No!

MR. BUCHMAN: No? Does everybody agree with that?

(Various cries of "Yes.")

MR. BUCHMAN: We must arrive at a definite conclusion with respect to this question before we can go on with our discussion. That is, if we have in our regular operating procedure a job that can't be done safely, why all the hullabaloo about accident prevention? You can't do them safely and you are going to have accidents. But if we don't have any jobs that cannot be done safely, then we have a different perspective on this thing. Can't we say: "We have no jobs which cannot be done safely?" If we did have any, we could develop ways and means of doing those jobs so they could be done safely. There might be an operation which had never been performed before, upon which you had never had any experience, and the first time you might have an accident, but it wouldn't take you long to develop ways and means of doing that job safely.

MEMBER: I don't think you are right. Suppose lines are down, lightning is flashing around, and there is fire—is it safe?

MR. BUCHMAN: Did you ever do that kind of a job?

MEMBER: I have seen it done.

MR. BUCHMAN: Did you have any accidents?

MEMBER: Yes sir.

MR. BUCHMAN: Did you ever do that kind of a job and not have an accident?

MEMBER: Yes sir.

MR. BUCHMAN: Then it can be done safely.

MEMBER: I think you have a little luck sometimes.

MR. BUCHMAN: Call it what you may, you might have been unlucky when you had the accident, but you have definitely proven by doing the job safely that it can be done safely. Isn't that right?

MEMBER: No sir, because you have no control over lightning.

MR. BUCHMAN: Well maybe not, but we said that we have had jobs of that character, under identical circumstances, and that we have done them safely.

MEMBER: Lightning just didn't hit that time.

MR. BUCHMAN: Suppose we give you credit for lightning then.

MEMBER: Will you contend that a hazardous job that is completed without an accident was done safely?

MR. BUCHMAN: No. Have any of you had experiences where you definitely took

a hazardous job and conducted it along lines which produced successful results, which every reasonable person would say was done safely and which did not result in an accident.

(Various cries of "yes.")

MR. BUCHMAN: I think that is right. There are certain jobs which have more accident possibilities than others. We have jobs which are dangerous; jobs upon which, if we do not proceed in a carefully planned manner, we are likely to have accidents, but I don't believe that your company would tolerate a job which could not be done safely. They would find ways and means of throwing that job out of the operating procedure, or would develop something so it could be done safely. Isn't that a fair assumption?

(Cries of "Yes.")

MR. BUCHMAN: Perhaps there are some things we can put in the category of "Acts of Providence", about which we know little and can hardly bring them within the scope of any reasoning concerning accident prevention. I would like to follow that up with the question: How many of the accidents that you had last year came from such sources? Fifty per cent?

(Cries of "No.")

MR. BUCHMAN: Another question; If that was the only kind of an accident you were concerned about, many of us would not be here today. We are having those accidents which occur primarily in connection with the jobs we are doing day after day. Isn't that right? If you will review your accident experience you will find that you had a relatively small number of accidents in connection with really hazardous work. Why? Because you have recognized it as being hazardous and have taken the proper measures to circumvent those hazards. We will go on with this definite statement: We do not have jobs which cannot be done safely.

Now this question: If we don't have jobs that cannot be done safely, why do we continue to have accidents?

MEMBER: Man failure.

MEMBER: Lack of training.

MR. BUCHMAN: Let's get some of these reasons on the board. One gentleman says lack of training.

MEMBER: Lack of supervision.

MR. BUCHMAN: As we develop this list, some of them may overlap but it doesn't make any difference.

MEMBER: Improper placement of men.

MR. BUCHMAN: Improper assignment.

MEMBER: Defective tools and materials.

MEMBER: Inattention. I think that causes 95 per cent of the accidents.

MEMBER: Thoughtlessness.

MEMBER: Lack of specific instructions.

MEMBER: Haste.

MR. BUCHMAN: Oh no!

(Cries of "Yes sir.")

MEMBER: Physical condition.

MEMBER: Disregard of safe practices.

MR. BUCHMAN: Should I put that up here? Disregard of safety rules.

MEMBER: That's safety.

MR. BUCHMAN: All right, let's put it down. That is, we don't say these are the most important causes but they are some of the causes.

MEMBER: Fatigue.

MEMBER: Horseplay.

MEMBER: Home surroundings.

MEMBER: Mentality.

MR. BUCHMAN: We could develop many reasons why we continue to have acci-

dents, but let's take one of these. This one impresses me (haste). Do you mean to tell me that fellows are hurrying so fast they are getting hurt? What are they hurrying for?

MEMBER: To restore the service.

MEMBER: To get the job done.

MEMBER: It is along toward quitting time.

MR. BUCHMAN: What about it? There must be some reason why people hurry.

MEMBER: Restoring the service.

MR. BUCHMAN: Well why restore the service.

MEMBER: Disregard for safety rules on the part of the supervisor.

MR. BUCHMAN: Let's stick to this one.

MEMBER: That is the reason for haste, the men wanting to work faster than they should under pressure.

MR. BUCHMAN: There must be some fundamental reason. People don't hurry for the sake of hurrying.

MR. BUCHMAN: In general we might say that people hurry to get the job done. But why do they want to get the job done? Probably fundamentally to make a good impression.

MEMBER: There are other causes. For instance, where you cut off traffic over a certain block of a street. The police department allows a certain time to do the work. If it is not completed in that time, they will open the street up to traffic.

MR. BUCHMAN: Let's analyze that. We have a company here that is going to block a street. A policeman says, "I will give you thirty minutes. If you are not done in that time, I am going to run this automobile traffic over you." Let's reduce that to fundamentals. The superintendent goes to the foreman, and says, "Bill, they are only going to give us an hour on this job." Why shouldn't the foreman say, "I don't care. Let them run the traffic."

Bill isn't that kind of a foreman and doesn't want to take that attitude in front of his boss. He is interested in what his boss thinks and Bill says, "I'll do it." So Bill goes out and says, "Boys, we just have an hour.—Let's all dig in and get this job done."

If there wasn't some incentive why shouldn't their attitude be, "Well, what of it? Let them run the traffic. I don't own the darn thing. I just work for it." That isn't their attitude. Their attitude, if they are the right kind of employees, is, sure we will get the job done in an hour. Why? Because they are good employees! They are interested in what their boss thinks of them. They are interested in their standing in that organization.

MEMBER: Before we depart from "haste," let's also remember that a good many of our haste accidents are due to improper planning.

MR. BUCHMAN: We might reduce this and say that haste was being done in order to make this good impression, but if the job had been properly planned in the first place, the haste wouldn't have been necessary and you could have made just as good an impression. Let's put this down: Men sometimes hurry to make a good impression.

Here's another one that interests me: Disregard of safety rules. Why do men do that? Why don't they follow them? You are paying them. Why do they disregard these safety rules?

MEMBER: Because of that first reason: Lack of training.

MEMBER: They are not enforced because they are not popular.

MR. BUCHMAN: They are not popular?

MEMBER: An illustration: Goggles are a mean thing to wear sometimes and so are rubber gloves.

MR. BUCHMAN: Here's an illustration: We buy a man goggles and say, "Whenever you start drilling through masonry walls, stick those things on." So he starts on the job. Probably he can't see all the aspects of it. He is going to the subscriber's

home and carries the tools he thinks are necessary but he doesn't have those goggles. Why doesn't he go and get them?

MEMBER: He follows the road of least resistance and doesn't want to take the extra trouble.

MR. BUCHMAN: There is something in that. All of us are a bit lazy. How many times in your home have you been on the second floor, and maybe one of the screws in an outlet plug is loose. You have a good screw driver down in the kitchen but you reach down in your pocket and say, "I'll take this dime and tighten it up." It would only have taken you a second to get that screw driver and do a real workman-like job.

We like to do things the easiest way. Isn't that right? I am not going to waste my energy. I am going to need it for my old age. I am going to hang onto it a little. So I think we can put that down: Inherent laziness.

Without going into a further discussion I ask this question: Do the things we do from an accident prevention standpoint slow up the job?

(Cries of "No.")

MR. BUCHMAN: Why don't these fellows follow the safety rules then? What are some of the rules we have in this mythical organization of ours?

MEMBER: Goggles.

MR. BUCHMAN: That is, you have to wear goggles.

MEMBER: Don't use defective ladders.

MR. BUCHMAN: Defective ladder or defective substitute.

MEMBER: Use of rubber gloves.

MEMBER: Grounding devices.

MEMBER: See that all rubber equipment is okay.

MEMBER: Stop at all railroad crossings.

MEMBER: Lay out the job before starting.

MEMBER: Test brakes.

MR. BUCHMAN: We have a rule that if a lineman has his hooks on and is going to do a job that doesn't require them, he should take them off even though in ten minutes following that time he is going to have a job that will require the use of those hooks.

We could get many more rules up there. I would like to put myself in the position of one of these workmen. We have just developed that I am inherently lazy and that I want to make a good impression. Here I am down in the basement of a subscriber's home putting in a telephone. I have forgotten my ladder. Over there is a couple of cases that are just as good as any ladder. So I hop right up on those. Is it all right?

(Cries of "No.")

MR. BUCHMAN: It is going to take me quite a while to drag that ladder in. It means dragging it down a flight of stairs. There are a couple of boxes that give me exactly the right elevation I need. Besides what are you doing? You're my foreman. You say, "Come on, let's get going. You only got five phones in yesterday." You want me to get six in today. Yet you expect me to run out and get that fool ladder and bring it back in again? Shall I do it?

MEMBER: I would fire you for not taking it in, in the first place.

MR. BUCHMAN: Mr. Neff, would you permit that?

MR. NEFF: No, I don't think so.

MR. BUCHMAN: I didn't do it willfully. Honestly I forgot it.

MEMBER: That's no excuse. You have to do the job and you know you must have the ladder.

MR. BUCHMAN: I'll admit that I should have taken it in.

MEMBER: Why didn't you go in without the telephone?

MR. BUCHMAN: Well the telephone is more evident but I thought this was one of those cellars where I wouldn't need the ladder.

MEMBER: If you use the box you will be forming a bad habit.
 MR. BUCHMAN: I won't get a weak one. I know better than that. I'll make sure I always use a strong substitute.
 MEMBER: Does it belong to you?
 MR. BUCHMAN: No.
 MEMBER: Then why use it?
 MR. BUCHMAN: I asked Mrs. Smith on the way down whether I could.
 MEMBER: You used your best judgment.
 MR. BUCHMAN: Yes, but I have broken one of your rules.
 MEMBER: Why was that rule made to begin with? Hasn't some one been hurt before using boxes?
 MR. BUCHMAN: Yes, but I have never been hurt using boxes.
 MEMBER: Why should you violate a rule that has been made for your protection?
 MR. BUCHMAN: Well I shouldn't but you have me between two fires of getting the job done. So I can't spare the time to get that ladder, and yet, if I don't get it, you are going to say that one of your safety rules has been broken.
 MEMBER: Use a little common sense.
 MR. BUCHMAN: That is what I thought I was doing when I didn't go get that ladder. Should I get that ladder?
 (Cries of "Yes.")
 MR. BUCHMAN: How many of you would have gotten it? How many of you fellows got that screw driver when you needed it?
 MEMBER: Did you have an accident with this box?
 MR. BUCHMAN: No sir.
 MEMBER: If the policy had been different, you would have gone back for the ladder.
 MR. BUCHMAN: The policy of my company is that I can go out and get that ladder.
 MEMBER: Why argue about it?
 MR. BUCHMAN: They have more than one policy, they like the man that gets out more work.
 MEMBER: Which is the best policy?
 MR. BUCHMAN: Well I didn't have an accident. Maybe I would fall down and break my leg going out after that ladder, and you might have said, "There was a perfectly good box. Why didn't you use it?" (Laughter.)
 MEMBER: Why hurry? Start earlier.
 MR. BUCHMAN: I started early and I am going to hurry too, because you want me to get lots and lots of work done.
 MEMBER: You wouldn't be censored if you broke your leg getting the ladder whereas you would be if you broke it using the box.
 MR. BUCHMAN: But I still would have a broken leg which isn't the most pleasant thing.
 MEMBER: I think you have broken the spirit of the rule.
 MR. BUCHMAN: You don't think I should have gone after the ladder? Then it is all right to break these rules occasionally?
 MEMBER: Isn't it reasonable to conclude that you will not find boxes in every cellar into which you go? Consequently you should equip yourself with the right kind of tools before you go into any cellar and not depend upon finding substitute equipment.
 MR. BUCHMAN: That is a fair assumption. But you see it was wholly unintentional. I haven't done it for weeks but this day I walked in without the ladder.
 MEMBER: If I find you without that ladder, isn't it reasonable to expect that I will find you breaking some other rule?
 MR. BUCHMAN: Oh, I have all the respect in the world for the safety rule.
 MEMBER: Get that ladder then!

MR. BUCHMAN: Well I'm perfectly willing to get it but I want to get a lot of work done.
 MEMBER: Get that ladder and work over time. If you are anxious to get the work done and to follow the safety rule, you'll work overtime.
 MR. BUCHMAN: I have been working twenty minutes over time now, trying to get as much production as you want.
 MEMBER: How are you going to make the best impression? By violating the safety rule or by observing the rule and getting the ladder?
 MR. BUCHMAN: My boss isn't there and about the only way he can measure me is by the number of units of work.
 MEMBER: So you are taking that chance and you have specific instructions to use a ladder. You should be censored more for not doing it than you would for getting out less work.
 MEMBER: If you keep on using those boxes you are going to fall sometime and break your leg.
 MEMBER: Would your foreman ask you to put in six phones a day if it was unsafe?
 MR. BUCHMAN: Oh, I don't think so, no.
 MEMBER: Which comes first, safety or production?
 MR. BUCHMAN: Safety or production? Don't ask me.
 MEMBER: Is the extra phone worth a broken leg?
 MR. BUCHMAN: No, but you see you fellows seem to forget that I haven't broken my leg yet.
 MEMBER: If you come on the job not knowing whether safety comes ahead of production, you are not properly trained.
 MR. BUCHMAN: Oh I know that! Yes sir, when I came on the job they said, "See here, buddy, if it ever comes to a showdown between safety and production, safety is first." But every day since that time they have been saying, "Units! Units! Units! Work! Work! Work!"
 MEMBER: There is something wrong with the policy of that company then.
 MR. BUCHMAN: Here's a gentleman who says there is something wrong with the policy of the company. What are we in business for anyway?
 MEMBER: To make money.
 MR. BUCHMAN: What are you fellows in the electric light business for?
 MEMBER: Profit? Everybody is in business for profit or they wouldn't be in business.
 MR. BUCHMAN: What is the most important part of our job.
 MEMBER: Which is the most important to have? Profit?
 MR. BUCHMAN: I think we will have to stick to this one thing. You can't assume that you are not going to have an accident, merely by not considering that phase of it, but what is the most important part of every job?
 MEMBER: Service.
 MEMBER: Efficiency.
 MR. BUCHMAN: What do you mean by efficiency? What does that get you?
 MEMBER: More money.
 MR. BUCHMAN: I think that is right. We could set down this one salient feature which applies to every company: That we are in business for production.
 In other words, if I am making shoes, the more shoes I can make for a given expenditure of money, the better I like it. Isn't that right? And if I can get you, as an individual working for me, to make ten pairs of shoes where you formerly made five, that is what I am there for. Is that unfair?
 MEMBER: I don't agree with you. You are not in business for production. You are in business for production safely. If you make ten thousand pairs of shoes and kill two men you haven't made as much profit as though you make one thousand pairs of shoes and don't kill a man.
 MR. BUCHMAN: Assume that is right but take this case: If I make one thousand

pairs of shoes and don't kill a man, and then if I make two thousand pairs of shoes and don't kill any men, and if that is made with the same expenditure, that is what I like, isn't it?

MEMBER: Yes, you want safe service and safe profit.

MR. BUCHMAN: What I want is shoes. That is what I sell. I can't peddle that service stuff.

MEMBER: The amount of money we earn is governed by the Public Service Commission. Where does profit enter into it?

MR. BUCHMAN: To be real frank a good many of us don't know where it comes in. Are the officers of your company interested in profit or not? Certainly they are interested.

Couldn't we define production as the maximum quantity of a standard quality product at the lowest possible cost? Isn't that what we are after in business? Is that a fair assumption on which to continue. Now we are going to get back to this ladder that you are going to take off of my truck. The more I get done, so long as I maintain my quality of work, and the cheaper I do it, the better you are going to like me.

Today I get eight units of work where formerly I only got five. You say, "Bravo!" Of course, you say, "I don't want any accident, Bill," but uppermost in your mind is this thing we have defined as the maximum quantity of standard quality at the lowest possible cost, and that is the reason why I don't go after your ladder. Isn't that right?

I say to myself, "It certainly looks 'dizzy' to me. They tell me to take off my hooks for five minutes and then put them back on again. They must think those hooks just jump onto my leg automatically." That is the reason why I want to leave those hooks on when I get into the truck to go from one job to the other.

MEMBER: Suppose you had broken your leg and they had had to put a new man in your place, how much farther ahead would they have been?

MR. BUCHMAN: They would have been way behind, but I don't think it is fair to make that assumption because I didn't break my leg.

MEMBER: Why isn't it fair to assume that if you climb onto a safe box today, in two weeks or four weeks you may climb onto one that is unsafe and fall?

MR. BUCHMAN: I am not going to climb onto just any old rickety box. I am going to get something substantial. As a last resort, I'll go out and get that ladder.

MEMBER: If you do you will be more secure, your mind will be at ease, and you will be able to work faster.

MR. BUCHMAN: No, I picked a good box.

MEMBER: I think inherent laziness entered into this.

MR. BUCHMAN: It was a combination of things. I was a little lazy, and thought it would take two minutes. In two minutes I can drive 14 tacks, and with those two minutes over a certain time I get so many units in.

MEMBER: You are training into a bad habit. You didn't go after the ladder today. It is easier for you to do without the ladder in the future. You have put yourself in line to violate other safety rules and you are going to get hurt.

MR. BUCHMAN: I don't think that is a fair assumption. I am not doing this thing wilfully but am trying to use what I consider to be good judgment.

MEMBER: What is a rule for?

MR. BUCHMAN: In general, it is a good rule.

MEMBER: Your judgment isn't as good as the rule.

MR. BUCHMAN: You didn't tell me that as an employee a couple of weeks ago when you gave me a raise.

MEMBER: You were getting production safely or you wouldn't have gotten the raise.

MR. BUCHMAN: I am getting production with safety. I haven't been hurt yet.

MEMBER: It was assumed that you were following the safety rules.

MR. BUCHMAN: All you are interested in is the amount of work I am doing without accidents.

MEMBER: That means that you are following the rules.

MR. BUCHMAN: That is just the confiction. You tell me to follow these fool things but day after day you say, "Come along, Buchman. Let's get something done today."

MEMBER: Are you going to take that rule up with the proper authorities to see that it is changed so you can live up to your code?

MR. BUCHMAN: No, I don't think so. The fact of the matter is, if my boss were around, I would go and get the ladder.

MEMBER: If you used the box instead of the ladder, you didn't do the job safely.

MR. BUCHMAN: Oh, but I did.

MEMBER: You didn't do the job safely. You just didn't happen to have an accident.

MR. BUCHMAN: What do you mean by safely? I might climb up and down that ladder which you provide me, and be subjected to just as many hazards as crawling up and down on a box.

MEMBER: What do you mean by doing the job safely?

MR. BUCHMAN: I don't know.

MEMBER: Without accident.

(Cries of "No.")

MR. BUCHMAN: That seems to be the wrong answer. Who is one of these fellows who said "no?"

MEMBER: Without a reasonable chance of accident.

MR. BUCHMAN: Well let's look at this thing. Here's the box. It is a good, strong box, made out of two by fours. It is dog-gone good wood. It is just as strong as any step ladder that was ever manufactured, and it has an added advantage. It has a much wider surface for me to work on. Can you crawl onto a box safely? All right, I am going to crawl onto this box safely. I am assuming that I have crawled onto the box. What in the heck have I done that isn't reasonably careful?

MEMBER: Reach over there—four feet over.

MR. BUCHMAN: Wait a minute! I have this box where the work is. I am not going to reach four feet from the top of the step ladder. I'd get down off of the box and push it over. I have done everything with reasonable safety.

MEMBER: We had a fellow do that same thing and he got careless and slipped off of the edge of the box.

MR. BUCHMAN: He could probably have slipped off of the edge of the ladder.

I have no complaint against the rules they have laid down. I think these are fine rules. But now I have a conflict between the two rules.

MEMBER: There is no conflict. It is a set of rules promulgated for your safe working. Your production is based on those rules.

MR. BUCHMAN: My production is based on them. Well, here I have a chance to save two minutes.

MEMBER: That doesn't enter into it. You are violating a rule, taking a chance to further production. You have no alternative.

MR. BUCHMAN: That is right, but I am supposed to get out a lot of work too.

MEMBER: In accordance with the rules.

MR. BUCHMAN: Oh you didn't say that.

MEMBER: Otherwise those rules would not have been promulgated.

MR. BUCHMAN: You fellows are inconsistent. Last month we had a meeting of all line foremen, and we discussed some of the phases of the job. The supervisor said, "Smith, you have a rating of 210. That's fine. There is something for you other boys to shoot at." He said, "Jones, you have a rating of 180. That's good, but it can be a little better. Smith got 210. Jones, perhaps you can get yours up there." And so he goes down the list, and finally he gets down to me, and he says, "Buchman, 90. Not so good."

When he told Jones about his, he didn't say, "Jones, did you follow rule 63 in getting that 180? Did you follow this in getting that 210," and "Did you follow this rule in getting this 90?" He didn't ask me that. He just said, "Good for you, Smith. You got a rating of 210 this month." He should have gone farther and asked them how they got their production.

MEMBER: Don't you think your safety rules are to cover routine operations where you can specify the type of work, whereas what you are trying to develop is a safe workman who can use his own judgment when conditions are such that they don't come under routine operation? Your ladder is to be used where it can be used safely. Every time you put in an installation you don't have to use a ladder. If the supervisor gets you to use your judgment, he is getting a safe worker, depending on your judgment. You are perfectly right in using boxes, providing your judgment says that is better than the ladder in that particular position.

(Cries of "There! There! There!" and "No! No!")

MR. BUCHMAN: Maybe that is all true. What should I do about that?

MEMBER: I want to disagree with all of the rules you have up there. It is man failure. It is man failure to observe the rules laid down, isn't it? Self-preservation is the first law of nature. If the man doesn't take care of himself, who will. It is up to me to apply those safety rules. If I don't do it, then it is man failure on my part. I don't see that the executive is to blame. All business is conducted for profit, and the more production we get, the more profit we make, providing the cost of production is at a minimum. That is the reason safety was installed in business. It was for the purpose of minimizing the cost of that production so we will get more profit.

MR. BUCHMAN: We could carry on this discussion but there are some other features we must get in. Some of us in our accident prevention work fail to recognize the principles brought out here this afternoon; that the man on the job does know, that down deep in your heart the thing you are thinking about, as the manager, or the supervisor, or the superintendent, is production. You can bring him into a meeting once a month, give him a dollar dinner, and get up with all of your flowery language, and say, "Boys, for the sake of your homes, for the sake of your families don't get hurt," but, at eight o'clock next morning, you say, "Now let's get things done today." He doesn't question your sincerity but knows that the thing you are in business for is production.

I am not going to do the things in the interest of accident prevention unless you can prove to me that it will make my job easier. If you have any rules—whether they be safety rules or whatnot—that I think make my job harder there is only one time in the world that I am going to observe those rules, and that is when the boss is looking.

That revolves itself into this: Can we prove that the things we do in the interest of accident prevention really make the job easier. If we can prove that one thing, we are on sound ground. We are going to try to prove that safety and efficiency go hand-in-hand. If you can prove that the things I do in the interest of accident prevention will help my production, will make my job easier, I will ride with you all the way, and probably I will start using that confounded ladder but I am not sure.

We should develop one thing: Is there any difference between an accident and an injury?

MEMBER: Yes. An accident might not produce an injury. If I drop an ax from the top of a pole there is no injury necessarily, but if that ax should strike me on the head, there is an injury.

MR. BUCHMAN: But it is an accident whether or not it hits you on the head?

MEMBER: If it hits me on the head, it is an accident plus an injury.

MR. BUCHMAN: Are we all agreed on that? There is a distinct difference between an accident and an injury?

MEMBER: Is an accident a cause or an effect?

MR. BUCHMAN: Which is it? Can we have an accident without having an injury?

(Cries of "yes")

MR. BUCHMAN: Take a simple case. Let this represent a screw driver, and I am putting in the screw. Suddenly it slips. That time it slipped, it missed me. I am doing that same identical operation, and it slips again but this time it catches me. I had an accident in both cases, but I haven't had an injury in both cases. What was the cause of the injury?

MEMBER: The accident caused the injury.

MEMBER: Carelessness.

MEMBER: Poor judgment.

MEMBER: The first accident was just an accident. The second accident was an injury because you failed to recognize the first accident. Your tool was not properly fitted for the job. You knew that. You took a chance, and the second accident took place and an injury followed.

MR. BUCHMAN: I will change my story. This thing slips eight times, and it doesn't catch me until the eighth time.

MEMBER: It is a known fact that we do things innumerable times and never have an accident. It may be done a thousand times, and then the accident happens. All accidents are potential injuries.

MR. BUCHMAN: That may be absolutely right. Let's take this actual case. A gang was rebuilding a line. In this case, the line came along the street and then crossed. It was a single cross-arm lead carrying 10 wires, and those wires turned on the pole to make the crossing.

There were two men working on the pole untying the wires from the pins, and just as they finished untying that pole shifted and broke off across the base. One of these fellows grabbed a handful of the wires and started out toward this hard brick street. When the wires were down to a point where it was impossible for them to go any farther, his grip broke and he continued on to the street, falling on his back and breaking a vertebra. The other fellow fell over onto the grass. He didn't fall quite as hard, but he fell from the same height and suffered no particular injury, other than general bruises.

Now there is A and B. Let's say A is this fellow who fell out on the brick street and B is the fellow who fell onto the grass. The question is, did both A and B have an accident?

(Cries of "Yes")

MR. BUCHMAN: Let's assume that B did not have an injury in the sense that we normally interpret it. He was shaken up but not particularly hurt. Acting on that assumption, we must say that B had no injury and A had an injury. Both had this accident, so the cause must have been the same. Both were on that pole. Whatever caused the pole to break, caused it with respect to A just as much as it did with respect to B. There is no change there. A had an injury and B didn't. What caused A's injury?

MEMBER: The sudden stop caused it.

MEMBER: They failed to take the necessary precautions for their self-preservation.

MR. BUCHMAN: Let's look at this from the standpoint of what caused the injury. If A had fallen on a haystack, he probably wouldn't have gotten the injury, so what must have caused the injury?

MEMBER: The accident plus the combination of all surrounding circumstances.

MEMBER: Failure to see that the pole was strong enough.

MR. BUCHMAN: B didn't get hurt.

MEMBER: Every accident is a potential injury.

MR. BUCHMAN: But B didn't get hurt and A did.

MEMBER: The cause of the injury and the cause of the accident were entirely different matters.

MR. BUCHMAN: Did the lack of supervision cause the injury?

(Cries of "no, lack of coordination")

MR. BUCHMAN: B didn't get hurt. The same lack of supervision was manifested. MEMBER: Every accident is a potential injury. An injury depends upon more than one thing happening. You usually can't have an injury as a result of one thing, because that one thing has happened many times before without injury occurring. In other words an accident is a potential injury. An injury depends upon two things. It must have some other circumstance that caused the setup to be such that the man was injured.

MR. BUCHMAN: What was the particular circumstance in connection with this screw driver slipping?

MEMBER: That varies in every case.

MR. BUCHMAN: I don't think it is variable.

MEMBER: Lack of coordination between mind and body: man failure.

MR. BUCHMAN: Was there any greater coordination between mind and body the first time than there was the second time?

MEMBER: Your mind was doing one thing and your hands something else.

MR. BUCHMAN: But one time I got hurt and the next time I didn't.

MEMBER: What caused the injury there was the violent contact of the body with the ground. The cause of the injury with the screw driver was the violent contact of the screw driver with your finger.

MR. BUCHMAN: That seems to be the answer to that problem. The cause of the injury was that my body wasn't tough enough to withstand the blow of a pointed screw driver touching me. That caused the injury.

MEMBER: Is that the basic cause?

MR. BUCHMAN: We are just talking about the cause of the injury now. If we reason in this fashion: If this fellow had fallen on a haystack instead of falling on a brick pavement, this injury would not have resulted. Then it looks to me that somewhere in the cause of the injury, must have been the surface that he fell on. There is one salient feature in this whole thing. You have read accident reports like this: "The man was installing a sub set. The screw driver slipped and punctured his right hand." That is the cause of the accident.

MEMBER: The cause of the injury; not the cause of the accident.

MR. BUCHMAN: In what are we interested?

MEMBER: The cause of the accident.

MEMBER: A was injured and B wasn't. All right, we are not interested in the cause of the injury, but we are interested in the cause of the accident.

MR. BUCHMAN: Is that right? Are we interested in the cause of the accident?

(Cries of yes.)

MR. BUCHMAN: My conception of the cause of the injury was: The man was wearing a lineman's belt. He had tools in the back of the belt and he landed on that hammer. Was that the cause of that injury? If there had been a haystack there, he would never have broken a vertebra. There must be something in connection with the resistance which was offered to his fall. Now what good would it do to know the cause of that injury?

MEMBER: The belt was the cause of the injury, holding him so he could not get around as the other man did.

MR. BUCHMAN: We don't have to draw a definite distinction between the cause of the accident and the cause of the injury. I don't know what caused this injury, but my assumption is that the bones in A's back weren't strong enough to withstand the shock when he fell they broke. That was the cause of the injury. The cause of the accident may have been something entirely different. What are we interested in?

MEMBER: The cause of the accident.

MR. BUCHMAN: What was the basic cause of the accident. If you fellows will review your accident reports you will find a considerable amount of detail, telling you the man fell and did such and such which resulted in a contusion of the right leg.

In what detail are we interested? The thing in which I am interested is not the fact that this pointed screw driver ran through my fingers but what caused that screw driver to slip. Was it a poor tool? Was it due to the fact that I don't know how to use that tool, or what was it? The thing to put down definitely is that we are interested in basic accident causes. Is that right?

MEMBERS: Yes.

MR. BUCHMAN: When this screw driver slipped and caught me on my hand, was that the only time that screw driver slipped?

MEMBERS: No.

MR. BUCHMAN: It slipped a good many times, but I don't think that every time it slipped it hurt me. The cause of that screw driver slipping is that it is a poor tool. Picture that man throughout the entire day, working with that screw driver let's say, with rounded corners. Every time he uses that screw driver he is inefficient with respect to the way he might have been had he had a good screw driver? (Mr. Buchman wrote on the blackboard the figures: (1-29-300).)

MR. BUCHMAN: Those figures are the result of some investigations made by the Travelers Insurance Company. They investigated a number of injuries and developed this fact: for every accident that results in a lost-time injury, there are 29 accidents which result in no lost-time injuries. They have continued their investigation, and have arrived at what is termed a conservative conclusion. For every lost time accident injury and for every time you have an accident which results in no lost-time injury, you have 10 accidents without any injury whatever.

Go back and multiply these. 10 times 1 equals 10; and 10 times 29 equals 290. Add those, and we get 300 accidents without any injury whatever; or we have a total of 330 cases, 330 accidents. Out of that 330 we get 1 lost-time injury, 29 no-lost-time injuries, and 300 no injury accidents; but we have 330 cases of inefficiency.

Will it pay that man to do the things necessary to stop those inefficiencies in his production? Will it pay him to get a good screw driver? Will it make his job easier for him? I think it will, and we could go on and innumerate a good many examples of this idea of safety and efficiency.

There has been distributed a copy of the chart which is an excerpt from one of Mr. Heinrich's articles. This particular one was in the July 1928 issue of the *National Safety News*. Here is what I would like to do: look down this list of supervisory and physical causes, and reflect in your own experience and see whether you can think of an accident that could not have been attributed to one or more of those basic causes? Will you do that hurriedly? Or: what per cent of your accidents could be attributed to one or more of these basic causes that are listed on that sheet? Would 90 per cent be too high a figure for the accidents you know about?

MEMBER: No.

MR. BUCHMAN: As you read down the list of those basic causes is there one that your organization would be better off if it didn't have it? I'll clear that up. We have under supervisory causes faulty instruction. Does it cost you money in dollars and cents to have faulty instruction in your organization?

MEMBER: Lots of it.

MR. BUCHMAN: We have inability of the employee. Does it hurt your production to have employees who are unable to do the jobs assigned to them? Does it hurt your production to have poor discipline in your organization? We could go down through every one of those basic causes, and eventually show that it will hurt your production to have that condition existing in your force.

Tie the two together. Here are the things that are causing your accidents. The same identical things will hurt your production. Is there any question but that safety and efficiency do go hand-in-hand, and that the things you do from an accident prevention standpoint will make your job easier.

ADJOURNMENT

Joint Luncheon Session

Electric Railway and Public Utilities Sections

Wednesday, October 1, 1930

At this luncheon session of the Electric Railway and Public Utilities Sections Mr. H. B. Harmer, safety engineer, The Philadelphia Electric Co., Philadelphia, presented the trophies to the winning companies in the Public Utilities Annual Safety Contest which ran from January 1 to June 30, 1930. Mr. Harmer reviewed the report of the contest (copies of which, under date of September 19, 1930, may be had by writing the National Safety Council, Chicago) and then presented bronze plaque trophies to the winning company in each of the six groups, and certificates of merit to others, as follows:

Combination Gas & Electric—Group A

	Frequency Rate
1. Wisconsin Public Service Corporation, Milwaukee, Wis.	5.366
2. Alabama Power Company, Birmingham, Ala.	6.509
3. Public Service Company of Northern Illinois	7.617

Combination Gas & Electric—Group B

1. Michigan Gas and Electric Company (No. Div.), Ashland, Wis.	0
2. Eastern Shore Public Service Company, Salisbury, Md.	1.899
3. Lake Superior District Power Company, Ashland, Wis.	4.887

Electric—Group A

1. Duquesne Light Company, Pittsburgh, Penn.	2.957
2. Commonwealth Edison Company, Chicago, Ill.	6.726
3. The Edison Electric Illuminating Company, Boston, Mass.	6.765

Electric—Group B

1. Mississippi Valley Public Service Company, Milwaukee, Wis.	0
2. Haverill Electric Company, Haverill, Mass.	0
3. Chester Electric Company, Coatesville, Penn.	0
4. Worcester Suburban Electric Company, Uxbridge, Mass.	0
5. Kaministiquia Power Company, Fort William, Ontario, Canada	0

Gas—Group A

1. Hope Natural Gas Company, Pittsburgh, Penn.	2.282
2. The Peoples Natural Gas Company, Pittsburgh, Penn.	2.898
3. Equitable Gas Company, Pittsburgh, Penn.	6.266

Gas—Group B

1. Reserve Gas Company, Pittsburgh, Penn.	0
2. Pittsburgh & West Virginia Gas Company, Pittsburgh, Penn.	7.634
3. The Pawtucket Gas Company, Pawtucket, R. I.	7.935

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL

Quarry Section

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Thursday Morning Session
October 2, 1930

A. L. WORTHEN, Chairman
 The Connecticut Quarries Co., Inc., New Haven, Conn.

The first session of the Quarry Section of the Nineteenth Annual Safety Congress convened with A. L. Worthen, The Connecticut Quarries Co., Inc., New Haven, Conn., presiding.

Annual Report

By A. L. WORTHEN

The Connecticut Quarries Company, Inc., New Haven, Conn., General Chairman

Following the Annual Congress last year the Executive Committee met on October 24, 1929, at New York City, to discuss plans for the year. There were two important tasks facing us: to build up the membership of the Quarry Section so that it might be considered representative of the industry and thereby helpful to it, and to make further study of the Safety Manual in accordance with the motion as adopted by the Section at the last Congress. Both of these problems will be discussed later in this report.

Posters

The Poster Committee of our Section has during the past year issued the full allotment of safety posters allowed us by the Council. Our Section is at present privileged to publish a safety poster every other month but we are endeavoring to have this allotment increased to one each month. The hazards of our industry are sufficiently numerous to give us ample material for a greater number of posters than we have so far issued.

Posters are an important and effective factor in accident prevention. By bringing to the attention of quarry workers the hazards of our industry and constantly impressing the workmen with the risks with which they come in contact, the display of posters will undoubtedly be productive of good results.

The posters issued by the various sections of the Council are illustrated in each monthly edition of the *National Safety News*. The Council also issues annually a catalog of posters, from which may be selected such posters as each of you feels would best serve your purpose.

Subject material for posters has been gathered within the past few months sufficient for some time and these posters will be issued regularly. Possibly some of you have used home-made posters in connection with your accident prevention work. If so the Poster Committee would much appreciate it if you will let us have some of this material to work up for the industry. Each one of you has ideas which would assist us in producing posters. Give us the benefit of your ideas along these lines and help us in issuing such posters as will be of most value to the Quarry Section.

News Letter

We have put out five News-Letters during the past year and the measure of cooperation extended by the members in providing material for these letters has been considerably improved over the situation the previous year. There is still room, however, for considerable improvement in this connection and it is highly desirable that the Section to have a News-Letter worthy of the name, for the various members of the Section to constantly have in mind the forwarding of interesting material to the editor.

Editing the News-Letter is a most difficult task and we would welcome suggestions as to how this letter can be made more helpful and interesting to the Section.

Publicity

Releases of the transactions at the meetings of the Executive Committee were sent to the trade papers, but the major part of our publicity this year has been in connection with the drive for new membership. This will be discussed later in the report of the membership committee.

Statistics

The work of the Statistics Committee consisted in the preparation of accident statistics of 125 quarries covering the year of 1929, and the presentation of these statistics to the headquarters of the National Safety Council for publication in the yearly report entitled "Industrial Accident Statistics"; also progress in the preparation of similar statistics for 1930.

I am happy to be able to state that the accident frequency rate for quarries in 1929 represented an improvement over the three previous years. The accident severity rate was not as favorable as that for the two previous years although it was still considerably better than the rate which prevailed in 1926. The rise in the severity rate was due to the occurrence of fatal and permanent injuries at a relatively small number of plants.

Among the 27 industries for which the National Safety Council published accident statistics for 1929 the quarry industry ranked fifteenth in accident frequency but twenty-sixth in accident severity. This indicated that the average period of disability from quarry accidents was relatively high as compared with other industries for which figures were published. The combined accident frequency rate for the 27 industries was 25.53 per million man-hours of exposure, the rate for quarries being 26.71, which is 4.6 per cent higher than the average. The combined severity rate for all 27 industries was 2.23 per thousand man-hours, as compared with 6.11 for quarries, which shows that the quarries had a rate which was more than 2½ times as high as the average for all of the industries combined.

It may not be reasonable, as yet, to expect the quarry industry to establish as favorable an accident rate as that for some of the industries enumerated in the Council's report, but it is certain that the quarry rates can be reduced below the present level. An improvement over past years has already been recorded and further progress may undoubtedly be expected from a continuance of the interest in safety work on the part of a large number of producing companies.

Membership

The membership records of our section since the Congress a year ago show progress. Our section has an enrollment of 102 members today, a year ago we numbered 70. During the period from October 1, 1929, to September 1, 1930, we enrolled 32 new members and lost eight through cancellations.

New members were obtained by direct solicitation on the part of our members and by mail approach. A careful check of directories and lists gave us a selected list of 200 prospective members—quarrying companies of sizeable operations employing an average of more than 25 workers.

During the year this list received the following solicitation:

1. General letter enclosing special folder "Large Plants are the Safest" mailed in October.
2. General letter on Council's Industrial Health Service enclosing health folder, mailed in November.
3. General letter on safety with descriptive folder outlining service, mailed in December.
4. Letter to canceled members of past five years enclosing service folder, also mailed in December.
5. Letter by W. F. Wise, President of National Crushed Stone Association, to complete list of 1,300 N. C. S. A. members followed by letter from Council enclosing Quarry Section News-Letter. Both letters were mailed in January and built up to N. C. S. A. convention in Cincinnati. Direct return: four memberships, \$87.50 dues.
6. General letter enclosing booklet "Protecting Life" describing service, also mailed in January.

7. General letter following up January letter, mailed in February.
8. Letter to members by President Pettibone announcing Spring Membership Campaign, sent in March, followed by letter from the General Chairman, enclosing several prospective members' names on cards and urging their solicitation by members.
9. General letter enclosing testimonial folder mailed in April.
10. Specific letter by the General Chairman enclosing poster, mailed in May. Direct return: five memberships \$169.50.
11. Testimonial letter (general) by Mr. Temple Williams, Secretary of the Dodge Manufacturing Company, also mailed in May.
12. Letter by J. R. Boyd, Secretary, enclosing new "Gazing into the Future" booklet describing specific quarry service, mailed in June. Direct return: one membership \$25.

A summary shows that each prospect received seven general appeals to affiliate and four specific quarry appeals during the year. This mail campaign brought us in a total of 14 members with annual dues aggregating \$382.

Many of our members have helped by writing to prospects, usually at the suggestion of Headquarters. Their endorsements were of vital assistance in obtaining some of the members listed above and in the remaining total of 32 new members with aggregate dues of \$919.50.

I believe that our cause, its aims and purposes, and our Council service have been presented to the industry. Future solicitation will become more and more specialized and result in individual approaches to companies rather than general mail appeals. In the future we will progress in proportion to the help given by the members of our section in soliciting those quarries which are not yet members of our National Safety Council.

It was recommended by the Executive Committee at its first meeting, that Mr. Blake of the Independence Bureau be appointed chairman of a committee to study the tentative Safety Manual, with a view to improving it. Mr. Blake was unable to accept this duty so in the interest of time it was assumed by your chairman. The committee immediately set to work to redraft the manual with the object of condensing it and, if possible, making it applicable to all of the industries in the section.

A draft was made and submitted to the crushed stone, sand and gravel, lime and slate industries for their examination and suggestions. A second meeting of the Executive Committee was held in Washington on May 21, 1930, where the principle business at hand was the further consideration of the Manual with the result that the industries making up this section recommended certain changes or additions. Your committee will submit a Safety Manual with the recommendation that it be referred to the incoming officers for further considerations and development.

In conclusion I wish to thank each member of the Executive Committee for their interest in the year's work, and for their great help to me personally. It has been a pleasure to work with such a willing and responsive committee. It is my sincere hope that we have contributed something to the growth of this Section, and I wish the incoming officers the best of success during the year ahead.

R. E. COLVILLE (U. S. Gypsum Co.): I wanted to ask if I understand correctly that though this severity rate is two and a half times the average of all industries, it represents an improvement?

CHAIRMAN WORTHEN: Over 1926, yes.

MR. COLVILLE: Do you have a detailed report of increases other than one or two small operations?

CHAIRMAN WORTHEN: Mr. W. M. Adams of the U. S. Bureau of Mines could answer that question; he is familiar, of course, with those statistics. In my company we have been carrying on an accident prevention program for about a year; it was a lukewarm affair for some time, the most difficult problem being to sell the super-

intendents; it was difficult to make them believe it was possible to operate a crushed stone plant without accidents. Next was the difficulty in getting it across to the workmen.

Mr. J. J. Forbes of the United States Department of Mines was at one of the monthly superintendents' meetings and his talk resulted in our applying to the Bureau of Mines for instructions in first aid training. We adopted a 100 per cent course in training.

I believe at this time our company is the only one in the quarry industry that is one hundred per cent trained in first aid.

Mr. Forbes, who is supervising engineer, Safety Division, United States Bureau of Mines, Pittsburgh, is going to talk to us about cooperative first aid training.

MR. FORBES: I want to preface my remarks with this statement: that the United States Bureau of Mines has never made the statement that first aid training is a panacea for accidents. We do claim, however, that first aid training should be part of every company's accident prevention program.

We have also found out from twenty years of experience—and I might say it is continuous experience, conducting first aid training in industry—that a first aid man, properly trained in the work, is less likely to injure himself than the man who is untrained.

The Value of Cooperative First-Aid Training

By J. J. FORBES

Supervising Engineer, Safety Section, U. S. Bureau of Mines, Pittsburgh, Pa.

The Act of Congress authorizing the establishment of the United States Bureau of Mines became effective on July 1, 1910. One of the most important duties that Congress has delegated to the bureau is to study the health and safety conditions among those engaged in the mineral industries. Investigations made early with a view to bettering these conditions demonstrated the need of prompt care of injured employees in the mineral industries, as under the difficulties inherent to these industries, seemingly unimportant wounds if not treated promptly may become infected and possibly cause permanent crippling or even death. In the past many seriously injured persons have been brought out of the mines and plants by fellow-workers ignorant of the approved means of transportation, and have been handled in such a manner as to cause suffering and accentuate injuries to such a degree that they bring about permanent disablement. Accordingly, the need of general instruction in first-aid became apparent.

History of First-Aid Work

In this country, education of the miners in first-aid was probably first taken up systematically by the anthracite industry in Pennsylvania. Subsequently, first-aid training was actively carried on in Alabama and Indiana. Meantime, a general campaign in this training among industrial workers was carried on by the American Red Cross Society, but when the Bureau of Mines began its nation-wide campaign of instructing employees of the mineral industries, the Red Cross turned over that part of its industrial training work to the bureau, but continued to cooperate by furnishing surgeons as judges in important first-aid contests and demonstrations. Also, the Red Cross assisted for a number of years in determining the methods of training.

In 1913 the Bureau of Mines issued Miners' Circular 8, giving instructions in first-aid work. Subsequently, when the need appeared for another publication ex-

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plaining in the simplest possible language the rudiments of first-aid for the miner, Miners' Circular 23 was issued in 1916 printed in four languages.

Early in 1916 it became manifest that there was need of an advanced course in instruction for miners' first-aid crews who had been thoroughly trained in the rudiments; also, it was evident that the methods of giving instructions should be standardized, inasmuch as contests held in various parts of the country disclosed that miners trained by different mine surgeons had been given different instructions. Consequently, a representative committee of surgeons was appointed to prescribe standard methods and the manual, "Advanced First-Aid Instructions for Miners", was the result; in 1922 this manual was superseded by the "Manual of First-Aid Instruction For Miners," and several hundred thousand copies were printed and issued during a period of eight years. In the early part of the present year it was replaced by the "Manual of First-Aid Instruction", of 221 pages. This booklet was endorsed by the U. S. Bureau of Mines, American Red Cross, U. S. Public Health Service, and the National Safety Council.

The First-Aid Course

The first-aid course as prescribed by the Bureau of Mines consists of 15 hours instruction by means of lectures and practice. It goes into detail concerning the anatomy of the human body, the respiratory system, the vascular system, and the nervous system.

Instructions are given in caring for the injured, treatment for shock, artificial respiration, control of bleeding, dressings for open wounds, fractures and dislocations, and burns, and also in transportation of the injured.

At the completion of the first-aid course, which generally requires five lessons of three hours each, the Bureau of Mines issues a certificate to those who have successfully completed the course. From July 1, 1910, to June 30, 1928, 236,782 certificates were issued; from July 1, 1928, to June 30, 1929, 70,080; and from July 1, 1929, to June 30, 1930, 112,570, or a total of 417,950.

The Bureau of Mines has cooperated with the cement and quarrying industries by providing instructors to conduct first-aid training at various mines and plants operated by these industries.

During the early part of 1929 an extensive campaign of first-aid training was conducted for the Portland Cement Association by bureau personnel. This campaign resulted in the training of several thousand men. By June 30, 1929, 6,795 men were trained in 26 States for the Portland Cement Association and an additional 2,386 were trained during the fiscal year ending June 30, 1929, or a total of 9,181.

At the end of the fiscal year, June 30, 1929, there were 19 cement plants at which all of the employees had received the first-aid training, and to which 100 per cent training certificates had been issued.

First-aid training has been conducted at various plants during the last several years. However, in most cases the plants did not cooperate as fully as those of other industries and, consequently, the work was not as successful.

Quite recently 100 per cent cooperative training was conducted for the Connecticut Quarries Co. at Meriden, Conn. During this campaign 138 employees were trained at five plants operated by this company. All of the men employed at the various plants completed the training, and 100 per cent certificates will be issued to the company for this work.

The Bureau of Mines will be pleased to cooperate with the quarrying industry in organizing and conducting 100 per cent cooperative first-aid training whenever the industry desires.

Many letters and statements regarding the value of first-aid training in the mineral industries have been received by this bureau. Numerous instances of the saving of

lives by men trained in administering artificial respiration and by prompt and proper action in controlling loss of blood, etc., are cited in these letters and statements.

First-Aid Contests

First-aid contests have proved to be one of the best means for stimulating interest in first-aid training, and as a result many contests are conducted each year. These affairs are sponsored by the various companies, State Departments of Mines, American Red Cross, and the U. S. Bureau of Mines. Probably the most outstanding of these is the International Contest. Last year 46 teams from 17 different companies from 11 States competed at this contest. In some cases these teams were selected as the best, through elimination contests, from 60 or more teams. Prizes, many of them elaborate, are offered at these contests for the winning teams. The contest for 1930 was held at Louisville, Ky., between 48 teams from 11 States. Nova Scotia, Canada, was represented by a first-aid team at the Louisville International meet.

The System of Training all Employees

In the spring of 1923 a new idea in first-aid training was conducted for the Davis Coal & Coke Co. at Thomas, W. Va. This is known as the 100 per cent plan and consists of training every employee of a mine or plant.

After noting for a number of years the beneficial results from the prompt treatment of injuries and also that men trained in first-aid work apparently did not become injured as frequently as those untrained, it was decided that the training of all employees around a mine or plant would be desirable. Consequently, in 1926 an effort was made to interest various companies in the cooperative 100 per cent training plan.

Although the first 100 per cent training was apparently conducted in West Virginia, the cooperative plan was first used on a large scale in Illinois.

Under this plan a group of "key-men" are trained as instructors by the bureau. They are employees who have been selected for their knowledge of first-aid and their ability as teachers and leaders. Their training as instructors generally requires two weeks of intensive work, when the employees of the entire plant are divided into groups of 15 to 20 men and an instructor is appointed to each group. The instructors train their respective groups in the bureau's methods of first-aid under the direct supervision of a bureau instructor. In this way large groups of employees can be given individual instruction in first-aid methods and the results obtained are much better than where large classes are conducted by a Bureau of Mines instructor alone.

At the completion of the classes, the groups trained by the "key-men" or sub-instructors are examined by the bureau men, and those who have passed the course are granted a Bureau of Mines certificate.

When all of the employees are trained, a certificate is issued by the bureau to the mine or plant showing that 100 per cent of the employees have been so trained. On July 1, 1930, a total of 303 of these certificates had been issued. During the past fiscal year, in which more than 110,000 men were trained in first-aid by the Bureau of Mines, more than half of them were trained under the cooperative 100 per cent plan.

Advantages from Complete Training

There are several advantages in conducting the training on the cooperative 100 per cent plan, namely:

1. Competent instructors are provided for the plant.
2. Small groups or classes assure individual attention.
3. Large plants can be completely trained in a comparatively short time.
4. An active spirit of cooperation and fellowship is sponsored by the plan.

5. A nucleus of competent instructors is left at the plant so that the interest in first-aid does not leave with the Bureau of Mines rescue car or instructor, as is generally true under the other plan.

As an incentive for the key-men or sub-instructors to cooperate in the 100 per cent plan, a first-aid instructor's certificate is now being issued to all key-men who satisfactorily train a class or classes. This certificate will be issued on a temporary basis, effective for one year after date of issue. However, if an instructor satisfactorily qualifies for five annual renewals, the certificate will then become permanent.

Outline of First-Aid Course

An outline of the course in first-aid on the cooperative 100 per cent plan is as follows:

First-Aid Instructor's Outline

Lesson No. 1:

1. Brief talk on first-aid to the injured.
 - (a) Anatomy of human body.
2. The nervous system.
 - (a) Physical shock; cause and effect.
 - (1) Treatments; use of stimulants.
3. The lungs and their action.
 - (a) Need for artificial respiration.
 - (1) Electric shock; (2) Drowning;
 - (3) Asphyxiation.
 - (b) Demonstration of Schaefer method.
 - (by instructor)
4. The heart and circulation of blood.
 - (a) Bleeding.
 - (1) Arterial; (2) venous; (3) capillary.
 - (b) Control of bleeding.
 - (1) Pressure points (22).
 - (2) Digital pressure for temporary control.
 - (3) Tourniquets and their application.
5. Open wounds.
 - (a) Incised, lacerated, punctured.
 - (b) Treatment for open wounds.
 - (c) Sterile compress.
 - (d) Triangular bandage.

Lesson No. 2:

1. Class to demonstrate artificial respiration.
2. Class to apply tourniquets to all points.
3. Dressings for open wounds.
 - (a) Demonstrated by instructor, applied by class.

Lesson No. 3:

1. Questions on Lessons 1 and 2, by instructor.
2. Short talks on joints, ligaments, muscles, and tendons.
3. Dislocations.
 - (a) How to reduce dislocation of fingers and jaw.
 - (b) How to care for all other dislocations.
 - (c) Dressings for dislocations.

Lesson No. 4:

1. Questions on Lesson 3, by instructor.

2. Fractures, with symptoms.
 - (a) Simple fractures.
 - (b) Compound fractures.
3. Dressings for fractures.
4. Transportation and stretcher drill.

Lesson No. 5:

1. Burns.
 - (a) Kinds—dry and moist.
 - (b) Removal of clothing.
 - (c) Picric acid gauze.
 - (d) Dressings for burns.
2. Questioning of class by representative of the U. S. Bureau of Mines.

Advantages from First-Aid Training as Told by Operators

Some of the advantages to be expected from first-aid training are:

1. A man who has been trained in first-aid is generally a safer man after receiving the training because he has been made to visualize serious personal injuries.
2. A trained man is an asset to any plant because he can relieve an injured employee of much suffering; in some cases, he can actually save life.
3. Financial savings are generally realized through reduction in compensation and insurance payments.

The Bureau of Mines has on record many letters showing the value to the mineral industries of first-aid training. One of these letters received from the safety engineer of a large California petroleum company states that the benefits derived from training 1,451 men in first-aid are most encouraging. It has resulted in a 50 per cent reduction in the number of infection cases, 98.5 per cent reduction in days lost time from infections, and 95.2 per cent reduction in compensation and medical cost from infections. This results in a gross saving of approximately \$73,740 a year, by reducing infection cases through wholesale first-aid training. He further states that the secondary effect of such training has been quite apparent in reducing both the number and severity of accidents, with the result that large financial savings have been made.

A letter from a superintendent of a large plant in Pennsylvania, which operates a coal mine employing about 150 men, states:

It is our opinion that the effect of this (100 per cent first-aid training) training has had its effect in making our men more careful, as we have just completed six successive months without a lost-time injury in our mine.

A prominent coal-mining operator, remarking on results of 100 per cent first-aid training, stated:

I want to say it certainly does get results to have your men trained; it doesn't only get results in preventing accidents, you get better work, get better cooperation throughout the mines in every respect. When you do this it shows to the men that work for you that you are interested in their families and their welfare as well as in your mine and paying compensation.

The safety director of a large coal-mining company has written to the Bureau as follows:

We feel that the 100 per cent training has been a big help in reducing major accidents, if not minor, and I really think that where the high point is reached in accident reduction is that the miner himself learns how weak his body is and what opportunity there is for a fatal accident and is more careful and takes less chance of receiving a severe injury. As far as the minor injuries are concerned, they show a decrease but not in proportion to the major accidents. In my opinion, another great advantage is after a man receives an injury he knows how to take care of it himself and does take care of it more readily than he used to before

he had the benefit of the training. I can well remember in olden days before there was such a thing as first-aid training, when a man received a bad cut on his hand he would slap a "chew" of tobacco out of his mouth on the cut and tie it up with some piece of old rag torn out of the lining of his coat or a rag torn off of his shirt saturated with perspiration and filth and that was the extent of the treatment probably for a week or until he had such an infection he had to go to a doctor.

At the present time in all of our mines we have a first-aid kit on every parting or branch, whichever you choose to call it, with bandages of all descriptions as well as mercurochrome in bottles and the small mercurochrome compresses. The bandages and these compresses are all under wax paper and have been sterilized before placed in the papers, and so far as germs from the outside are concerned there is small chance of developing an infection. Of course, if a man is physically weak and in a run-down condition he is liable to develop an infection in spite of all these precautions.

The benefits of 100 per cent first-aid training are fully appreciated by another coal mining company as shown in the following letter from a division superintendent:

This will acknowledge the receipt of your letter of June 18 advising that you are forwarding a certificate in connection with our 100 per cent first-aid training at Mine —

You inquire as to the writer's opinion of the influence of this 100 per cent first-aid training among employees. I wish to state that we are indeed pleased with the influence that first-aid training has among our employees. We feel that the training itself generally has a tendency to make a more careful workman out of the employee, also that it builds up cooperation between employer and employee. Without any question where the major portion of employees have taken first-aid training it reduces the number of accidents which is the most gratifying thing in connection with the movement.

As to the methods we have in mind toward establishing and maintaining 100 per cent first-aid training, wish to state that it requires constant effort to keep the first-aid movement alive. It is necessary to have a number of teams trained at each mine. To keep the teams well trained requires a lot of work on the part of the team members, and in some manner they must be compensated.

We do not pay the teams for the time they put in training but we do send them to various meets, which gives them a trip to the State and National Meets each year. This is a trip that they enjoy. All of the teams have a chance to compete for the opportunity to attend the meets. They have a further chance to compete for the various trophies and prizes awarded at such meets.

Unless contests are held at regular intervals your teams will not keep up the training. By having a number of teams at each mine this keeps up the incentive among most of the employees, as they are usually eager to enter the teams and we expect to continue with this work as time goes on with a thought in mind of keeping the men trained to efficiently render first-aid to the injured and ultimately reducing our accidents to the minimum.

The value of training every man at a mine or plant in first-aid is appreciated by many progressive mine officials, and many letters testifying to this fact are received by the Bureau of Mines. Some of these letters are quoted here:

Wish to acknowledge receipt, with thanks, of your letter of June 17, 1929; also certificate in connection with placing our operating plants on a 100 per cent basis in first-aid training.

In the future, it is our intention, after employing five or six men who have not had this training, to form a class of these men and instruct them in this work, thus keeping our plants on as nearly 100 per cent basis as possible.

With reference to the third paragraph of your letter, will advise that we feel that first-aid training of employees is an educational movement and that educa-

tion of employees for their own safety is one of the greatest accident prevention methods we have.

First-aid training, as taught by the Bureau of Mines, not only teaches a man how to take care of an injury, but their course of instruction calls attention to the hazards of mining and preaches accident prevention. If the course as given by the Bureau of Mines instructors is given serious consideration by the persons taking it, there is no doubt but what it is a good thing.

After an accident occurs, if it is properly taken care of by a man who has had first-aid training, the injured man is placed in the care of a doctor or hospital in better condition. As we understand it, first-aid is not being taught as a cure, but as a training for occasions when prompt action may prevent death, or, in minor cases, prevent further harm being done or so put the patient in the best possible condition for more extensive treatment. In other words, it may prevent the dangers of bad hemorrhage, an infected wound, a crooked leg, or stiff joint. It means less blood lost, a cleaner wound, less pain, and less shock.

First-aid training teaches a man to think in terms of physical suffering, causes him to view unusual situations in terms of safety; creates a tendency to mentally place one's self in the victim's position; induces the pupil to study how to keep himself from being involved in an accident; impels a man to analyze his particular job, and by so doing, he will foresee and eliminate conditions that might bring about an accident and urges men to take more interest in their physical well being.

Early in 1927, our mines were made 100 per cent in first-aid training to our employees and we have given instructions to employees who have been engaged since that time, again placing our mines on a 100 per cent basis.

Trusting that this information will show that we consider this training invaluable.

With further reference to your inquiry relative to the safety record of the coal company for the year 1928, wish to advise you that during the year 1928 the coal company produced 1,313,206 tons of coal and employed approximately 2,300 men. This tonnage was increased to 1,850,777 tons before having a fatal accident.

This record was secured as a direct result of a prearranged and intensive safety campaign, which was accomplished as follows:

First: By giving practically 100 per cent of our employees training in first-aid under the supervision of the State and Federal Departments of Mines and Minerals. The success of this training was due to complete cooperation given by the miners themselves.

Second: By the use of posters and bulletins furnished by the National Safety Council and others made by a man employed at one of our mines. Those made locally had a particular interest because they portrayed local happenings and accidents and an additional interest because the artist was one of the miners.

Third: Careful supervision on the part of all bosses, which was encouraged through the use of a bulletin put out each month analyzing the accidents by employment and causes and rating each foreman on a basis of man-days lost for each month.

To further the interest along lines of safety, a general get-together meeting of all the supervisory force has been held at various intervals to discuss numerous phases of the safety movement. Also, a small bonus is paid each of the supervisory force, based on his record for the month.

Attached hereto you will find a copy of our monthly bulletin, and should there be any further information you require in this connection I shall be glad to furnish it.

Replying to your letter of June 17, I desire to thank you for your comments as well as your certificates, and in answer to your question as to the results of the 100 per cent first-aid: Our tonnages which are gratifying, are as follows:

Year	Coal produced for each lost-time accident, tons
1925	4320
1926	3880
1927	4781
1928	5602
1929 (first 3 months)	6181

Our 100 per cent first-aid organization shows the following influence: More men are reporting minor accidents and are receiving treatments and thereby preventing infection and lost time. We are having less trouble getting reports of accidents from the men, and the employees take an interest in reporting dangerous conditions that may come under their observation. A much better understanding exists between the employees and employer. Our reports show an increase in tonnage between accidents which tend to show that employees are cooperating with the movement. Previous to our 100 per cent campaign many of our employees looked with suspicion at the first-aid movement. These same men are now ardent supporters and a more sympathetic feeling exists between employees and operator.

To maintain our 100 per cent first-aid training in our mines we are using the following methods: We have more instructors; we have a number of teams for contests and lend every aid to those outside our organization, such as boy scouts, public schools, etc. We talk first-aid and keep the movement alive by our work and real interest, and the movement is now a real issue, and all the new employees are required to have first-aid training.

We wish to acknowledge with thanks your kind favor of June 18, together with 100 per cent first-aid training certificate. Our accident prevention experience since we have had 100 per cent first-aid training has been very gratifying. We have shown an appreciable decrease in the number of serious accidents, and it is our belief that this training has made a profound and lasting impression upon the majority of our employees. We are still maintaining 100 per cent training and to do this it is necessary for us to have all new employees take the training immediately after they are employed. They are hired with the understanding that they will take this training, and we have experienced no difficulty in maintaining our mine 100 per cent.

We wish to extend our most sincere thanks to the Bureau of Mines for the splendid cooperation in helping us put this work over and we are especially indebted to your representative for his valuable assistance in the training of our employees.

The certificate awarded to my colliery of 100 per cent first-aid training was received by me some time ago. I wish to thank the Bureau of Mines for the hearty cooperation we received in putting over our initial 100 per cent first-aid training course.

I highly recommend this form of training for our men at least once each year, since it is most beneficial in creating a desire of more knowledge of first-aid work, especially among men who never had the opportunity to receive a thorough training. I am sure that the entire personnel of our colliery enjoyed the meetings and benefited to a great extent from them.

Replying to your letter of July 19, we are pleased to advise that Bureau of Mines certificates in connection with our 100 per cent first-aid training as pre-

scribed by the United States Bureau of Mines have been received. We are delighted to receive the certificates and assure you they shall be given a very prominent place in our safety building, which has recently been completed.

As regards influence of our 100 per cent first-aid training of employees: Writer would assure you that he believes the training well worth while. Our employees are proud of the fact that they have had the training, and we have noted a number of occasions where it proved very beneficial. While the average employee does not step forward in many cases and attempt to administer first-aid they all understand handling an injured person better, and as a result, persons injured do not suffer so much from shock. Fortunately, our physicians are available at practically all times, and it is not so necessary that injured persons be given first-aid, as a doctor is on the ground almost immediately after the injury is received.

We thank you for the certificates and assure you that they are appreciated.

We received your congratulatory letter of July 19, 1929, and we thank you for this personal touch of interest.

We also received the certificate showing that 100 per cent of our employees have taken the full course in first-aid to the injured.

It is our opinion that the effect of this training has had its effect in making our men more careful, as we have just completed six successive months without a lost-time injury in our mine.

We expect to keep up this 100 per cent training among our employees. We are now developing a team which will be used to give this training to all new employees.

A safety director of a large petroleum company states in a letter—

We have checked up on employees who get injured, and find that four men who have not had first-aid training get injured to one that has had the training. Four to one is not a bad ratio. First-aid classes stimulate our safety work, create a lot of safety interest, and reward our company in returns that can not possibly be compiled.

A vice-president and general manager of a large bituminous coal company stated during a public address that—

Our experience has been that the number of men who are injured who have first-aid training, as compared with those who have not, is about 1 to 8.

First-aid training spreads its beneficent influence in diverse directions. The more important of these are here indicated:

Employee

1. The employee is trained to care for injuries to himself and to others during his employment, at home, and elsewhere.
2. He is less liable to be injured, because the training inculcates the factor of personal safety from acquaintance with the dire results of injuries.
3. He is taught that even the most trivial injuries are potential sources of danger; therefore he takes fewer chances of allowing wounds to become infected.
4. Due regard for fellow employees, both as to their safety and the proper care for injuries they may receive, is stimulated.

Employer

1. Those trained in first-aid become safer integral parts of the working force, thus lowering the accident experience rate.
2. Better care at the critical time for injured employees is afforded in proportion to the number trained and their placement among the working force.

3. Lost time due to accidental injuries is reduced.
4. Compensation and medical costs from accidental injuries are smaller.

One Hundred Per Cent First-Aid Training

One hundred per cent first-aid training enhances the opportunity to reap the foregoing benefits proportionately. It is believed that where such training is maintained over a period of years it will affect the benefits to the maximum.

Further, it has been found by the United States Bureau of Mines' experience to date that with 100 per cent first-aid training the intermingling of the men, the bosses, and the plant officials in the classes where every one has a common interest in a humane endeavor, has created a better feeling and understanding between the men in general and their company. It propagates among the supervisory and working forces a spirit of mutual protection and regard for the well being of all.

CHAIRMAN WORTHEN: Before we begin discussion of Mr. Forbes' paper I would like to say a few words as to the manner in which we carried on our first aid training, and the results which we obtained from it.

One of our most difficult problems was to really interest the man on the job in accident prevention work. We started this first aid training by having all of the superintendents, with four or five men from each of the plants, meet in a hall hired for the purpose.

When I first broached the subject to my general superintendent, I suggested that we pay these men for their time while they were attending the classes. He disagreed with that; he felt that I would be surprised at the interest with which they would take up the work. I was surprised, because it took fifteen hours; the men came over after work, the classes starting at six-thirty, and they stayed there three hours, going through this training. It was a revelation to me, to see their interest.

My men are no better educated than the average quarry men, and I think a great many of you would have the feeling that these fellows could not possibly tie a bandage; but it was surprising how they took hold, and they finally received their certificates.

It has surely done more to make our accident prevention work of value than anything else we have been able to do.

C. R. RENNS (Philadelphia Company): What is the attitude of the various companies the Bureau approached, so far as paying the men for their time while taking the training is concerned?

MR. FORBES: I am glad this came up. It is a question that is always asked. I am a strong advocate of volunteer training. After sixteen years' experience I don't know of any class I conducted directly where the men were paid for their time in taking the work. Local conditions may govern the *modus operandi* in that direction, but I believe we should keep it on a voluntary basis. Of the thousands of men trained last year, less than five per cent out of about a hundred thousand, were paid for their time devoted to taking the work.

If a company desires to pay its employees, we will follow the lead, but if they asked our advice, we would much prefer that the work be taken voluntarily.

S. C. DICKINSON (Pacific Gas and Electric Co., San Francisco, Cal.): Mr. Forbes and I had a very short acquaintance, but on that particular job we had lots to do. It was in Red Lodge, Montana. One morning at four o'clock we received a telegram that there was a fire in one of the mines in Butte. A hundred and sixty three men lost their lives; some 32 were rescued, the rest of the men, 425 who were in the mine, got out through various openings.

I believe in first aid training; I come from the utility field. We have 18,000 employees, approximately. We have trained, as nearly as I can judge, 10,000 of them. We do pay the men, we train them on company time. We have, or had last year, 65 teams, and we always allow them two hours a week of company time in which to

practice; of course, it is expected that they will also practice at least two hours on their own time.

First aid is an aid to accident prevention, no doubt about it. We started training back in '22, using Bureau of Mines instruction. Later we trained our own instructors and now employ them. We have something like a hundred, not full time men; our work goes on continuously. We have an order issued by the general manager of the company, requiring every man on the job to take at least one hour a month, so as the men come in they will eventually receive the entire course of training.

Our quarries are only temporary in that we open up a quarry and when the particular job is finished, we close it down. At the present time, for example, we are building a dam three hundred and ten feet high, nine hundred and sixty five thick at the bottom, three hundred yards across the stream, a half mile across the top, using cement. The quarry from which we get that rock is six hundred and fifty feet long, with a hundred and sixty foot face; we usually blast off a twenty foot section of it in one blast, and our troubles begin, as far as accidents are concerned.

We don't have very many, but when we have one it is serious, on a job of that character. We have a doctor available sometimes; at other places we have first aid men; in any event the men get first aid help before they are moved. That is the importance of first aid training, so that they can stop bleeding and put on splints and so on.

MR. FORBES: We will be glad to assist you in this work, if you will address your letters to the chairman of this section, or send them direct to me, in Pittsburgh, or Washington D. C.

CHAIRMAN WORTHEN: There is a man in this state who has been identified with accident prevention work since '25; he is always assured of a warm welcome from Pennsylvania producers and those outside of the state who have knowledge of his work are also grateful for the opportunity to listen to him.

Mr. Thomas J. Quigley, Chief of the Mines and Quarries Section, Pennsylvania Department of Labor and Industry, Harrisburg, is going to tell us about accident reduction in the quarry industry.

How We Reduced Accidents in the Quarry Industry of Pennsylvania

BY THOMAS J. QUIGLEY

Chief of the Mines & Quarries, Department of Labor and Industry.

Pennsylvania is one of the pioneer states in the quarrying industry.

Long before the birth of concrete roads, bridges, or reinforced concrete buildings, quarrying was a very important industry in supplying the steel mills of Pennsylvania with limestone. Very little attention was given to the quarry industry from a standpoint of safety or accident prevention until April, 1925. The Honorable Gifford Pinchot, Governor of Pennsylvania, appointed Richard A. Lansburgh Secretary of Labor and Industry. Shortly after the appointment of Secretary Lansburgh, he decided to make a survey of the quarries in Pennsylvania for the purpose of reducing the fast-mounting accidents in the industry.

In April, 1925, I was appointed to make the survey and make recommendations for the prevention of accidents. I made a survey of the industry, visiting sand pits, limestone, granite, trap rock, cement rock and slate quarries, making a special study of the different hazards found in the different kinds of quarries. The survey completed, we prepared safety regulations to protect the workers in the industry. Tentative regulations were printed and distributed among the workers and operators, public and group meetings were held throughout the state. Every person attending

these meetings was given ample opportunity to express his approval or disapproval of the regulations. When they were adopted, they had the approval of practically every important operator in Pennsylvania.

A campaign of education was then started to educate the workers regarding the new regulations. Copies were placed in the hands of all the workers, safety committees were organized at all the quarries, plant meetings were held in the quarries. Speakers explained the regulations and appealed to the individual workers to cooperate with the state and the management for the reduction of accidents. Community meetings were held in churches, high school auditoriums and theatres. Motion pictures depicting safety were shown at the meetings to help spread the safety gospel among the workers. Speakers were furnished for all the meetings to deliver safety talks to the workers, their wives and families. Thanks to the very high grade of men who owned and operated the quarries in Pennsylvania, they cooperated 100 per cent with the State Department of Labor and Industry and spent thousands of dollars for music, entertainment, pictures and printing to put the safety movement over. As proof that our campaign has been a handsome success, I quote you the following accident figures:

The new regulations went into effect January 1, 1926. In 1927, the first year of our operation under the new safety regulations, we had a reduction of 10.2 per cent in accidents as compared with 1926; in 1928 a further reduction of 4 per cent as compared with 1927, and in 1929 a reduction of 10.8 over 1928, or 25 per cent accident reduction in 1929 as compared with 1926.

For three consecutive years, we have shown a reduction each year and for the first eight months of 1930 our accident records show 6 per cent below 1929 or 31 per cent below the figures for 1926. When an industry can show a reduction in accidents for four consecutive years, what owner or operator can advance an argument against the methods used in Pennsylvania to reduce accidents? Personally I feel that the quarry owners in Pennsylvania have made a record to feel proud of.

One of the most outstanding records was made by one of the large quarrying companies in the eastern part of the state. In 1927 this company had 308 lost-time accidents, or one accident each working day, working 26 days each month. In April, 1928, this company started safety work and reduced the number of lost-time accidents to 158 for the year 1928. In 1929, they showed a further reduction of 39 accidents for 12 months, and for the first seven months of 1930 they showed 5 lost-time accidents at all of the eight plants operated by the company, employing about 800 men—an average of less than one accident per month in 1930 as compared with 26 accidents per month in 1927. Prior to 1928 this company seldom, if ever, operated one month without a lost-time accident. I quote for you the records of six quarries which this company operated in Pennsylvania:

- Quarry No. 1—has operated 208 days without a lost-time accident.
- Quarry No. 2—has operated 727 days without a lost-time accident.
- Quarry No. 3—has operated 608 days without a lost-time accident.
- Quarry No. 4—has operated 408 days without a lost-time accident.
- Quarry No. 5—has operated 190 days without a lost-time accident.
- Quarry No. 6—has operated 166 days without a lost-time accident.

Many other quarries in Pennsylvania have made remarkable records:

The General Crushed Stone Company quarry at Rock Hill, Pennsylvania, had a perfect record in 1929.

Ormsrods Quarry, Lehigh Portland Cement Company, had a perfect record for two years.

Ormsrods No. 2 Quarry, Lehigh Portland Cement Company, had a perfect record for one year.

The John T. Dyer Trap Rock Company had a perfect record for two years.

Hercules Cement Company, Stockertown, had a perfect record for one year.

Lone Star Cement Company, Nazareth, has a perfect record for one year.

Medusa Portland Cement Company at York had a perfect record for 18 months.

Giant Portland Cement Company, Egypt, had a perfect record for one year.

The St. Clair plant of the Pittsburgh Limestone Company, Williamsburg, Pennsylvania, went two years and three months without a lost-time accident and has now gone 14 months with one lost-time accident in three years and five months. This quarry is producing from three to four thousand tons of limestone each working day.

And last but not least, the No. 4 quarry, Pennsylvania Dixie Cement Company, Nazareth, Pennsylvania, the pride of all quarries in the old Keystone state with the magnificent record of four years and ten months, free of accidents. The last accident in this quarry was October 31, 1925. The record of the Penn Dixie Cement Company is surpassed only by the Cowell quarry of the Cowell Portland Cement Company at Cowell, California, which had its last accident August 14, 1925, and the quarry at the Iola, Kansas plant, of the Lehigh Portland Cement Company, which had its last accident September 18, 1925.

Many other quarries in Pennsylvania have made similar records. To continue to enumerate all of the quarries in Pennsylvania that have made such records would take up entirely too much of your valuable time. I believe that what I have enumerated above is sufficient to show you what has been done in Pennsylvania.

These records I have just quoted, prompt me to make a suggestion—

Many of the delegates present here today are also members of the National Crushed Stone Association. It has been my one ambition to see the National Crushed Stone Association go into accident prevention on the same basis as the Portland Cement Association. It was my pleasure two years ago to attend the National Crushed Stone Convention in Cleveland, Ohio, and I say without fear of contradiction, I never met a finer body of men in all my life. I would like to see the National Crushed Stone Association select a man of the type of Mr. A. J. R. Curtis, put him in direct charge of the accident section and go after accidents with a determination that accidents must stop. I am confident that a real live man in charge of the accident prevention section would return handsome rewards to your association.

Another suggestion I wish to make is regarding compensation insurance charges. It is very unfair to those of you who employ full-time safety engineers and those of you who do not, but maintain plant safety committees and are members of the National Safety Council, also your local councils, and are constantly working to keep down accidents, to be compelled to pay for the fellow who does nothing to prevent accidents and who thinks all of us who are preaching accident prevention are a lot of fanatics. I also have in mind the fellow with a ground-bog hole, who starts work every time he gets an order for 50 tons of crushed stone. His plant is unsafe, his machinery unguarded. Personally I feel that we should demand a different classification of quarries. It is my personal opinion, plants should be rated not only on a physical basis, but also on an accident basis. I believe quarries should be classified on an accident basis somewhat as follows:

- Class 1—Plants where less than 2% of the employees were injured the previous year.
- Class 2—Plants where less than 5% were injured.
- Class 3—Plants where less than 8% were injured.
- Class 4—Plants where less than 12% were injured.
- Class 5—Plants where more than 12% of the employees were injured.

The percentages I have used are simply for the purpose of illustration, but I firmly believe if this principle was enforced, our accidents would be reduced and the undesirables driven out of the quarrying industry.

There is an old saying, "Accidents will occur as long as men work for a living." That is true, but it is also true that as long as men work for a living, those who employ them are bound by the laws of God as well as the laws of the different

states to protect those who work for them. Through the years that I have been connected with the Department of Labor and Industry, I have investigated many accidents and I say truthfully, if I was the owner, operator or superintendent of some of these plants, my conscience would bother me until the end of my life. From such cold-blooded officials you usually get the reply "and as long as men work for a living, men will be killed."

It is to this cold-blooded type, who either fail or refuse to practice accident prevention, and who disregard all state and safety laws, that we should direct our attention for the good of the industry and the protection of the God-loving and man-protecting employers who have the interest of each and every one of their employees at heart.

CHAIRMAN WORTHEN: We thank you very much, Mr. Quigley. There are a number of persons here today closely allied with the policies of the National Crushed Stone Association and I am sure your recommendations will be considered.

I am sure you touch a responsive chord within the industry represented here when you point out the needs for an insurance classification which recognizes successful effort in accident prevention.

Surely the statement Mr. Quigley has made, as to the large number of plants going for as long as four years without a lost-time accident is conclusive evidence that a quarry can be operated without them.

D. B. BURTNER (France Stone Co.): I would like to ask Mr. Quigley the procedure he would follow if an employer is compelled to contribute to a state fund, and to use the manual rate promoted by the state, in determining his compensation rate for the year.

We operate twenty quarries in Ohio; we feel in some instances we have not been treated fairly in so far as compensation is concerned that has been assessed upon us.

We are at a loss to know how to go about remedying that condition. We have a number of small quarries in the state, operating only for the length of time it is necessary to fill small orders, or for one particular job. As a result they do not go to any extent in safeguarding employees, or safe practices, and the experience is computed and based on a manual which is determined from the experience of the small as well as the large quarries, where safeguarding is given consideration in the operating.

Mr. Quigley: The laws in your state would have to be changed; the suggestion I have offered is to change that method; we have the same condition here: we have our Rating and Inspection Bureau, and from all the plants they arrive at a manual rate; everybody pays this, the minimum amount; so long as the condition exists you will pay it.

A. J. EALES (Bessemer Cement Corp.): Would it not be better if the members took the Safe Practice Manual drafts with them, and returned them a week or so later, with recommendations of changes or additions? There is a draft in the cement industry which has been mailed to each member for return with changes or additions, or suggestions to be embodied in the draft; I suggest that this be not put to snap judgment, but rather let a man have plenty of time to peruse it, and make changes, additions or suggestions.

CHAIRMAN WORTHEN: The thought in mind was not to adopt these, necessarily, at this Congress. I don't know whether you are aware of it, but there was a Manual presented to the Congress last year, and it was voted by the section that it be referred to this year's committee, the Executive Committee, to redraft and present at this session, so my thought was to give these out and give you an opportunity during the noon period to look them through. This afternoon we could have discussion or suggestions and probably follow out the suggestion in my report that it be referred back to the incoming officers for further consideration. That would give the opportunity you ask for, for the members to look them over at leisure and then write to

the Committee, making such suggestions as they might care to make with regard to them.

They have been submitted to all of the industries making up the section; I have letters in my brief case from the sand, gravel, lime, and slate industries with reference to them, and we made certain changes after receiving those suggestions.

Mr. BURTNER: For the benefit of those who did not attend the sessions held last year, a committee was appointed to determine the code we would adopt; at the time this committee was appointed a code was submitted which was adopted tentatively, subject to revision. I feel we will do the same with this code, providing everyone is in accord, and adopt it on a tentative basis, with a view in mind of bettering it in the future at any time by amendment.

However, I have looked over Mr. Worthen's proposed code and I consider it very satisfactory. It is short enough to be general in its application to the smaller as well as the larger quarry. We don't want to get a code that is not comprehensive, that will not reach everyone in our section if it is adopted, because it would be little or no good if not applicable to the entire section.

R. E. COLVILLE (U. S. Gypsum Co.): I want to refer to the chairman's report. I know of some of his work during the year to accomplish the results that have been accomplished. I think it is noteworthy that we have thirty-two additional members in the Section. I believe the Chairman deserves commendation for the manner in which he has brought up membership in the group.

The work of the Poster, News-letter, and Publicity Committees is also worthy of commendation; our program here today, our whole Congress, the attendance, I believe all this is due in great part to the efforts of our Chairman.

I wanted to take this opportunity of voicing what I believe is the opinion of the entire group, that his report should be accepted, with the sincere appreciation of the Quarry Section.

Mr. EALES: I do not think the brick manufacturers are represented. I wonder if there was not something we could invite them in to?

CHAIRMAN WORTHEN: That is a thought; we will take that up with the officers of the Council and see what their recommendation is.

O. M. GRAVES (General Crushed Stone Co., Easton, Pa.): Mr. Quigley has indicated to you the success which has attended to some extent the efforts of those engaged in quarrying operations in this Commonwealth; there is no inherent difference between their management or personnel and that of any other state.

I believe it is true that the severity and frequency accident rates in the quarrying industry in Pennsylvania are lower than in other states; therefore there must be some factor here that does not exist elsewhere. We think that difference lies in our Department of Labor and Industry, and I believe the essential thing that distinguishes that department is Mr. Quigley himself.

He comes, not as one putting out rules and regulations of his department, not to see that they are enforced as a matter of law, but he talks to us in the same ordinary sort of way as if he was in our company at the time. We have carried out some of his recommendations and sometimes I have been unable to say whether the advice was technical or not. The Department makes modifications from time to time, and it does so only with the advice of the quarrying industry throughout the state, so that we feel we have as much a part in formulating them as anyone else, and we are as responsible for carrying them out as the department itself.

In view of the courteous and kindly reference he made to the quarrying operators in Pennsylvania, we don't feel that it is nearly so much our efforts, as the fact that he possessed that rare ability to stimulate enthusiasm in those with whom he comes in contact.

ADJOURNMENT

Thursday Afternoon Session
October 2, 1930

A. L. WORTHEN, Chairman
The Connecticut Quarries Co., New Haven, Conn.

The second session of the Quarry Section convened with Chairman Worthen presiding.

CHAIRMAN WORTHEN: When I have gone to an executive of a company seeking his membership in this section, the inevitable question is "What does the Quarry Section do for me?"

Mr. J. V. Scott is Director of the Service Extension Division of the National Safety Council, and has been of great assistance to your officers this past year, building up this membership.

What the National Safety Council is Doing for the Quarry Section

By J. V. SCOTT

Director, Service Extension, National Safety Council, Chicago, Ill.

What is the National Safety Council doing for the Quarry Section. Theoretically, this question can be answered only by giving the answer to another question, "what is the Quarry Section doing for itself?" The cooperative organization of the Council provides that its members work together upon a reciprocal basis, help one another, and through the exchange of ideas and experience, prevent accidents in individual operations and in the industry as a whole.

In the 18 years that have elapsed since our non-commercial, non-profit making organization was formed, the Council has grown from a swaddling infant of a few dozen members to a mighty, international organization of 5,500 companies in every nation of the world. Ten million workers today are being taught higher standards of safety and health through the organized instruction of the Council. Consequently, safety has advanced from the stage of abstract theory to a highly specialized business that absorbs the time of thousands of safety engineers and executives. And with this progress, the National Safety Council has accumulated data and experience that are invaluable to any company or to any industry that becomes convinced that accidents can and must be stopped.

At the Annual Safety Congress five years ago, a Quarry Section was organized. A few pioneers—I see most of them here today—who at that time were members of the Cement Section, blazed the new trail. The Cement industry had enjoyed real success in reducing accidents, for with virtually every cement plant in the nation a member of the Section, this industry has established a phenomenal record of an 83 per cent decrease in accidents during a ten year period. The quarry operators decided that quarry accidents could be stopped, too, and the Quarry Section came into being.

The faith of this little group of pioneers was not misplaced. While it is my purpose to discuss the present and future of the Quarry Section's activity, permit me to complete my introductory thought with a mention of the results of five years of safety work.

I am told that half of the quarrymen in the country are employed by companies holding membership in the Council and the Quarry Section.

The 1929 accident records of 125 quarries that reported to the United States Bureau of Mines indicate fewer lost-time accidents in the industry, on the basis of exposure, than during any of the previous three years. The 1929 accident frequency rate of these establishments indicates a decline of 9 per cent over the 1928 rate, and a 38 per cent reduction over the 1926 rate for the industry. The accident severity rate, while higher fractionally than either the 1928 or 1927 rates, was 21 per cent lower than the 1926 rate.

With 10 per cent fewer fatalities and 20 per cent fewer injuries in the industry in this brief period, it is apparent that the organized safety work being done by the Quarry Section is showing results. Since the Section was formed five years ago, quarry accidents have been reduced 40 per cent in number, and days lost from accidents have been cut 20 per cent.

Throughout this period, the National Safety Council has helped the Quarry Section by serving as its clearing-house. The experience of two decades of accident prevention effort in all industries has been compiled by Council engineers and librarians and has been placed at the disposal of the Section. One of the first steps taken to encourage the Section to conduct research into quarrying hazards and methods of overcoming them was the publication by the Council of the Safe Practices Pamphlet "Safety Organization for the Quarry Industry." Long before the demand justified their production, the Council issued specific quarry posters. A monthly News-Letter was authorized for the Section, and through this medium members have been able to exchange ideas and information supplementing their annual sessions at the Congress. The proceedings of these meetings have likewise been published, and every effort has been made to record the experience of the Section during the early years.

Another important aid the Council has extended to the Quarry Section has been the encouragement of its membership growth, a service in which I am personally interested. Working in close cooperation with the National Crushed Stone Association, a vigorous effort has been made during the present year to bring every American quarrying company into the Council and the Section, to concentrate the safety work of the industry.

It is my pleasure to report a splendid response by the industry to this effort. In January I attended and addressed the National Crushed Stone Association Convention. At that time, the membership of the Section was approximately 70. Today it has more than 100 members, the largest rate of growth of any of the Council's 30 industrial sections during 1930. In view of none too thriving business conditions, this increase—more than 30 per cent—reflects an aroused interest in safety in the industry and prophesies real support for the program ahead of the Section.

The National Safety Council has helped the Quarry Section perfect an active, working organization. Every possible aid has been afforded. Because of the Council's non-commercial structure, with every penny of revenue going to provide our regular service, no profits are accrued to permit specialized service. But I am convinced that the Quarry Section is well on its way to success. Sufficient momentum has been gained during the first five years to insure rapid strides forward to the next few years. I look for real accomplishments by the Section in the coming year.

I spoke of the Section's program. Many improvements in the service are scheduled. I understand four quarry Safe Practices Pamphlets are being considered. Their tentative subjects are "Safe Practices in Sand and Gravel Excavation," "Safe Practices in Clay and Shale Digging," "Safe Practices in Monumental Stone Work," and "Safe Use of Explosives in Quarries." Incidentally, the Cement Section is now completing its fourth Safe Practices Pamphlet of its new series of seven; the subject is: "Cement Rock Quarrying and Crushing."

These pamphlets will take their place in the series of 125 Safe Practices Pamphlets

which have been issued by the Council in collaboration with the Safe Practices Conference Committee of 75 safety engineers and the Executive Committees of the several Sections.

The new "Manual for Quarrymen" also should come from the press during the coming year, and I understand a quarry film strip is being considered. This program may well be termed ambitious. Its success depends almost entirely upon the support of the members through participation in the Section's activities. I urge you to contribute ideas and opinions to the Monthly News-Letter, to make it a real forum of quarry accident prevention problems. Help develop the service—contribute photographs to the Council's poster department and the National Safety News—report safety discoveries and news to the Council's engineers and library—recommend to quarries not in the Section to put their shoulder to the wheel by becoming members of the Council—put real fire into your individual safety programs and by successful results, influence less interested people in the industry to take an active part in quarry safety promotion.

It is simpler to define than execute, the way in which the Quarry Section can achieve outstanding recognition for safety. A word answer is: WORK!

I have not attempted to describe the general service of the Council available to every member, since I feel you all understand it. I do want to emphasize however, the value of using the Council's safety engineering consultation service, the industrial health consultation service, the million dollar library at Headquarters, the numerous publications and supplementary services. Headquarters is a great clearing house of safety information, and there is an answer for your every question—if you will but ask it! Begin now to call upon Headquarters for help, form a direct working contact if you have not already done so, and make full use of the extensive service that is yours. What the National Safety Council does for the Quarry Section depends, as I have said, upon what the Section will do for itself and how much you will avail yourself of the aid awaiting you.

CHAIRMAN WORTHEN: We now will hear the report of the Nominating Committee. Mr. Yotter, Chairman!

Report of the Nominating Committee

H. F. YOTTER (General Crushed Stone Co.): At a meeting of the Executive Committee this Section held in Washington, the following nominating committee was elected:

Nathan C. Rockwood, editor-manager, Rock Products;
Norman C. Hough, president and general manager, National Lime Assn.;
W. W. Adams, supervising statistician, Accident Statistics Section;
H. F. Yotter, General Crushed Stone Co.

After considerable deliberation, the following were nominated for office for the coming year:

General Chairman, Quarry Section, A. L. WORTHEN, The Connecticut Quarries Co., Inc.

Vice-Chairman, D. B. BUETTNER, JR., The France Stone Co.

Secretary and News Letter Editor, V. P. AHEARN, National Sand and Gravel Assn.

Chairman, Publicity Committee, J. R. BOYD, secretary, National Crushed Stone Assn.

Chairman, Statistics Committee, W. W. ADAMS, U. S. Bureau of Mines.

Chairman, Poster Committee, H. F. YOTTER, General Crushed Stone Co.

CHAIRMAN WORTHEN: I am certainly very appreciative of the expression of confidence.

I have enjoyed the work this past year and this coming year I will do what I can to still further increase this Section membership, because I personally feel that unless the industry is represented—I won't say a hundred per cent—but unless the industry is fully represented, I don't think the Congress can accomplish what it should.

O. M. GRAVES (General Crushed Stone Co. Easton, Pa.): I move that the nominations be closed, and that the secretary be instructed to cast one ballot for the nominees as reported by the Chairman of the Nominating Committee.

(The motion was carried unanimously. The secretary cast the ballot.)

CHAIRMAN WORTHEN: This morning I gave out Safe Practices Manual drafts. I don't believe we should take the time for any lengthy discussion. I would like to hear some discussion as to what you feel should be done with it—whether it should be accepted tentatively as suggested this morning, and referred to the incoming officers for further consideration, that they may take it up with the various industries to see whether all feel that it fits their needs, the sand and gravel, the limestone, and so on through all the industries making up the Section, or whether we should adopt it as written.

R. E. COLVILLE (U. S. Gypsum Co.): Has this been submitted once for comment?

CHAIRMAN WORTHEN: It was submitted once to the National Association of each Industry. I don't think it was sent to your company. They prepared one last year from which this was taken. It was comprehensive, but we felt it was too much for the average producer.

MR. COLVILLE: I cannot help but think there is merit in getting this into operation as soon as possible, perhaps in tentative form. Maybe with us it will develop that there are certain points that we will be able to correct or change, but I think it would be very wise to get started at the earliest possible moment, with the idea of revision in mind.

I would like to see it done, if possible, at this meeting. I will put this in the form of a motion, that the Manual be accepted for the quarry industry, as it stands, adopted immediately, subject to changes that the use of it during the next year make apparently wise.

CHAIRMAN WORTHEN: Would you add that it be put in pamphlet form and distributed to the members?

MR. COLVILLE: I make the motion, with that addition.

NORMAN C. HOUGH (National Lime Association): I second the motion.

(The motion was carried.)

CHAIRMAN WORTHEN: I think the idea is a good one, because we will get more suggestions as to additions or changes from a Manual which is really being used, I think, than if we try to revise this one further.

J. R. BOYD (National Crushed Stone Association): It seems to me it might be well if a committee were appointed to act as a clearing house for this pamphlet as it operates throughout the year. I believe the suggestions would come in quicker if the section knew and realized that there was a committee appointed for the purpose of receiving such suggestions, and going over them, and as a committee reporting such changes as they deem advisable, next year.

CHAIRMAN WORTHEN: It would be my idea to have as members of the Executive Committee, the secretary or some other officer of each national association of these industries; they would be the logical ones to bring in any suggestions from their own industries.

Is that would satisfy you, we will consider that the Executive Committee will act as such a committee as you suggest.

MR. BOYD: For instance, I, as a member of that Committee, don't believe I am qualified to know whether the pamphlet is good or not,—at least I am not in the same position as the operators.

CHAIRMAN WORTHEN: I don't expect to get them from you, but that your industry would clear through you to us. Does that seem reasonable?

(All agreed to follow the chairman's suggestion.)

MR. GRAVES: I don't mean to interrupt what you have in mind, but it occurs to

me the Lime Association, two years ago, made a very radical development in trade association procedure, in not electing one of its own members as president of the association, but selecting the man another association would have as secretary, and making him president. That made necessary the greatest care in selecting the man; they were eminently successful; he is Mr. Norman C. Hough; this is the first meeting he has attended.

MR. HOUGH: I have not given as much thought to this matter of safety in which you are all concerned as I should have. I didn't realize until May of this year what a serious mistake I was making. At that time I had occasion to meet with your Executive Committee and then began to get a really clear insight into the work of the Council and the Quarry Section.

Then I determined to take a more active part in the work you are doing, realizing the real value of all this work from the view point of the industry. It is my intention to place the matter of safety on our program at our annual meeting next June, because I feel my industry should know more about the value of the work which this Congress is doing, and what it means to them not only from the view point of cutting down accidents, but from what it means to become part of this movement.

I was interested in Mr. Quigley's suggestion to get together and work out new laws which will help solve the problem of absolute prevention where some of you men are paying the bills of some of the others. We have not yet, in this movement, claimed our baggage; that is one of the most important things gained from this morning's meeting. I know I am going to get some more this afternoon.

CHAIRMAN WORTHEN: We are glad to have had you say a few words; I expect you will attend our meetings in future.

I am going to ask Mr. Dan Harrington, from the Bureau of Mines, to stand up.

DAN HARRINGTON (U. S. Bureau of Mines): I am an interloper here; I don't belong to your organization, but I am interested in view of the fact that we of the Bureau of Mines are concerned with accidents and the general work of prevention.

Mining is an allied industry, in which we include quarry and cement industries. We in the Bureau feel that you have more to give us than we have to give you, in connection with safety. We have looked with satisfaction on the work of the Portland Cement Association; we have been able to get a great deal of inspiration by referring to what they are doing, and what they have accomplished.

I understand you are doing some exceptionally good work. I was told yesterday that there are three quarries in the United States now which have very excellent record of having gone over five years without a lost time accident. That is a real accomplishment. I wish we could get some of that sort of thing into our mines.

CHAIRMAN WORTHEN: This morning Mr. Colville asked me a question with regard to statistics. Mr. Adams will answer it now.

MR. COLVILLE: My question was: I understand that the severity rate for quarries is higher than our past record; I also understand the reason is that in one or two isolated instances there were plants employing a small number of men, and that these were the plants that caused the rise.

I think it would be interesting to the other men to have this elaborated upon, as to the cause of the increased severity in the quarries last year.

W. W. ADAMS (U. S. Bureau of Mines): A year ago, when we were together, it was my pleasure to announce that the statistics covering the 1928 Quarry Section showed a more favorable accident record than ever before experienced by the industry. It is my pleasure to state that record has been slightly improved in 1929. There was a reduction of 10 per cent in fatalities; 20 per cent in injuries, in 1928 compared with the previous year.

In 1929, there was a reduction of two points in the combined fatality and non-fatality frequency rates for full time workers.

As Mr. Colville indicated, there was a little rise in the fatality rate, which is due to the increase in fatalities in a relatively small number of plants. The lost days are figured as six thousand in the industry records.

We find, in quarries and mines, that part time operation increases the accidents, and full time, steady employment, makes for safety. I am not able to say whether the part time work by the companies showing those high rates is steady employment over a short period of time, or whether it is employment throughout the year. We do find, however, that mines and quarries working less than 150 days a year have much higher frequency rates, than those working in the neighborhood of 300 days a year.

That accounts, in large part, for the fatality rate in 1929.

MR. GRAVES: As you doubtless all know, there is another representative of the Bureau of Mines present, who has done as much as anyone in helping us prevent a higher rate, Mr. Munsch, who has been in charge of the exhibits.

A. A. MUNSCH (U. S. Bureau of Mines): It has been my pleasure to be at every Congress since Detroit. There we tried to show something along safety lines; we had a few demonstrations there which I was told later started you on the right track.

CHAIRMAN WORTHEN: Mr. Quigley this morning touched upon one phase of saving money through accident prevention, when he expressed his conviction that the insurance companies should give greater weight to accident prevention work in rate classifications. I am sure that the message Mr. O. M. Graves and Mr. William E. Hilliard have to give us today is going to be most interesting.

They are both executives of companies carrying their own workmen's compensation insurance. Mr. Hilliard's company has carried insurance for a number of years, that is they were carrying their own insurance before any real work was being done in accident prevention by the industry.

Mr. Graves' company, as I understand it, adopted the policy of carrying its own insurance after real headway began to be made in accident prevention, although perhaps not because of that. I will ask Mr. Graves if he will open this round-table discussion.

"Saving Money Through Accident Prevention"— Round Table Discussion

Led by O. M. GRAVES

Vice-President, General Crushed Stone Company, Easton, Pa.

I have not any pre-digested thought to give you, gentlemen. I regret that I have not what I want to say to you in concise form. It is a compliment to one's audience to prepare thoughtfully what one wants to say. I ask your forbearance for about ten minutes, in telling you of the problems our company meets and how it attempts to meet them.

I hope you realize as definitely as I do that we are not praising ourselves for what we have done. The contrary is true. We have done only enough to indicate to ourselves what more there is to be done, and how insufficient our efforts have been in the results we hoped to attain.

Three years ago, in October, I had the pleasure of attending a meeting of the Congress in Chicago. I knew little or nothing about accident prevention work; in fact, as little about it as Mr. Hough modestly admits he knows. I am sure I knew even less. It was much to my astonishment that I learned I was to appear on the program of that Congress to talk on accident prevention work. However, if my talk had no value to anyone else, it had to me because it forced me to investigate the subject, of which I was fundamentally ignorant, and threw me into the atmosphere of men who were trying earnestly to prevent accidents.

It sent me home with an enthusiasm which I believed it impossible for me to

possess. I believed, as the other officers of the company did, that we did as much as possible to prevent accidents; we told the superintendents we didn't want men to be hurt, and expected them to pass this along to the men.

If anyone called our attention to physical hazards that needed remedying, we quickly remedied them; that was the extent of our work—a rather receptive sort of interest. We were ready for suggestions, and to follow them when they should be made, but we were not on the alert, seeking the things that were hazards and seeking methods to change and improve things to lower the frequency and severity rate.

At that time we had a severity rate of about seven days for one thousand man-hours of exposure; this one thousand naturally means one hundred men working a ten hour day; that is to say, every time a hundred men work for a day, seven days of time was lost. The frequency was one in a million man-hours of exposure.

I think, as those figures might be compared to the average, they were not so reprehensible as to cause great concern; they were neither good, bad, nor indifferent, neither fish, fowl nor good red herring—somewhere near the average of the industry, not bad enough to disturb our conscience, nor good enough to awaken our enthusiasm to better them.

We gave a good deal of thought to what could be done to prevent accidents after this Congress three years ago. We were just as fully alive to the humanitarian standpoint as anyone else; perhaps no more, but fully as much. Perhaps we were somewhat more alive to the humanitarian side of it by reason of the interest our president, Mr. John Rice, has in every member of our organization; but it seemed to us that if we could in some manner tie up the expense to which we were put by virtue of accidents to a more energetic campaign to prevent accidents, we would have that material and financial interest in the success of the plan which would do fully as much if not more to stimulate effort than if we had only the humanitarian point of view.

It seems like an admission from a material mind to say that when things become costly we become immediately alarmed. Our consciences are so pliable, so adjustable to conditions as we find them; it is easy to keep our consciences square on the line all the time, to say "Are we not doing as well as could reasonably be expected?" and content ourselves with axiomatic expressions, letting us out of responsibility; but when it was brought home that every time an accident occurred it made a direct drain on the finances of the company, someone is going to begin pressing on why it happened and what can be done to prevent it recurring.

Therefore we decided—I am telling you the way we were thinking things out, and are still—it would be an advantage to try the experiment of carrying our own insurance.

At that time our premiums amounted to \$50,000 a year to insurance carriers. That was for a number of plants, not nearly so great as now. It seemed to us there was a fund of \$50,000 with which we might play; if we could do it for less we would be better off financially; should it cost more—I doubt if it could, unless there was some catastrophe, unless there should be an abortive explosion; there might be an explosion that would kill five or six men.

You New York men can estimate how much it costs to lose a life in that commonwealth; anywhere up to sixty or seventy-five thousand dollars. Losing six or seven might be so costly that it would outweigh any advantage you might get out of a \$50,000 fund such as we were playing with.

That led to investigation as to whether a "stop loss" order might be taken out—a catastrophe insurance. We found it could be obtained, but that it would be difficult. The insurance companies search the records of a company with extreme care, to observe how it was conducting its operations, if it would be a warrantable risk. We were helped in that connection by the Independence Bureau in Philadelphia which undertook to assist us in accident prevention work and which spoke reassuringly to

the insurance carrier which was large enough to carry insurance of that type. So we secured insurance to the extent of \$250,000 covering any one accident above \$10,000. That is to say, if we killed a man in any manner whatsoever we would be liable for the first \$10,000 of compensation, but above that our liability would cease and the insurance policy would pick it up and carry the loss up to \$250,000, above which we would be liable. We assumed it would be beyond the realm of possibility that any one accident could cost us more.

Now, I am sure what I mean there is clear, and if an explosion occurred unexpectedly, and four, five or six men were killed by that one accident, our loss was limited to \$10,000 no matter how many were killed.

With that protection giving us a better feeling of security, we undertook to carry our own insurance.

The point is that as soon as we realized that we were launched on this plan, that no one was going to pay our losses but ourselves, that all compensation, all medical expense, was to be paid by ourselves, it became obvious that it was incumbent upon us to reduce those accidents to the lowest possible limit. That we undertook to do.

I am not going into the ways and means of accomplishing that. We have found during the two years and a half we have been doing it, for 1928, 1929 and approximately the first half of 1930, that our net premiums to insurance companies would have been approximately \$128,000.

We actually spent in compensation for accidents \$22,000; our medical attention amounted to \$7,600; administration costs were \$36,000. The administrative cost can be decreased as time goes on; for instance, for the first year it was \$13,000 and for the first half or two thirds of this year it was only \$9,000. That difference is not altogether accounted for by the fact that the year is not completed, but is also attributable to over-zealous effort at the start, and expenditures which were perhaps justified at first, which we have found can be saved; making the total cost to us during this two and a half year period approximately \$66,000 as compared to the amount we would have paid in premiums.

That is, you may think, not so great a saving, but as I know the profits of crushed stone companies, it is a fair profit in itself, and furthermore, made in the finest sort of way. Not by reducing the cost of operations and increasing prices to consumers, by being a little sharper or shrewder than your competitor, but by benefitting the people working for your company. I know no better way than by helping someone else to protect themselves from being hurt, to keep himself from the suffering, and his family from the grief and sorrow that comes when any member is injured or killed.

So I am gratified by the saving of the \$62,000 made in this period, not simply because the saving represents a reasonable profit on what we have undertaken to do, but also because of its humanitarian aspects; that is the thing I want to emphasize.

That is the way to think of it, it seems to me. Perhaps I have rather lost my perspective on the subject; but it does seem to me that neither purpose is complete without the other, that the two should go hand in hand. If we reduce accidents, we should benefit financially, but we should have two reasons: avoidance of sorrow, grief and suffering to the man and to his family, and the profits which would rightfully accrue to the company effecting the saving.

I realize that a plan of this sort is not applicable to all companies; I can understand that the number of men employed by a company might be insufficient to warrant such an undertaking; I am not prepared to admit, but I might be convinced.

It seems to me a man operating one plant, with 25 employees, has a better opportunity to prevent accidents than a company operating fifteen or twenty plants with 1,000 employees; by the very nature of the widespread activity and operation, it is more difficult to give each plant the personal, earnest attention which it deserves. Whether from the operating, selling, or accident prevention point of view, that

fortunate man who lives with the plant he owns, lives right there with it all the time, it seems to me ought to be able to operate more economically, and sell to better advantage, and prevent accidents to a greater extent than the large company.

That may be so, but in so far as there is any truth in it, he has the opportunity to prevent accidents which would warrant him in carrying his own insurance.

I would regret to have what I say reach the ears of an insurance company to indicate a lack of knowledge on my part of the value of insurance. We all realize we must be insured in some form or manner, against the vicissitudes of life, whether personally or affecting the conduct of our business. There is not a man here who would dare to drive his car in the city or state without insurance; many carry public liability insurance, which we carry, for instance. In one plant we still carry compensation insurance with an insurance carrier, in Massachusetts. I have observed with the greatest pleasure the work the insurance carrier has done there in assisting us to reduce accidents to a minimum. I am in sympathy and accord with insurance.

Insurance Rates are Built upon Averages

We could not be without some protection behind what we are doing; that would be some form of insurance, whether a deferred account on the books of the company or some form of insurance, that would depend on the individual case. I am simply talking about workmen's compensation insurance, and for us it has proved profitable to the extent indicated. I am aware, as our record has improved, our manual rate would be reduced with the carriers and it is difficult to set up this figure of \$128,000 as the probable amount we would have paid, as it would have been decreased by our record, but I listened with secret pleasure to what Mr. Quigley said this morning, that in arriving at the manual rate there is a good bit of throwing everything into the hat, and stirring it up, and pulling out something and giving it to you. That is not altogether fair (though I appreciate what he means) to the insurance company. He knows, even better than I do, the insurance companies have a definite manner of arriving at the manual rate. I think his suggestion of classifying the quarries has decided merit, but without knowing about it from the insurance man's standpoint I realize it might seem to mean a difficult undertaking.

Insurance companies deal in averages; they don't know how long I will live, but they know how long the average man of forty-eight will live; they can guess almost to a day when the average man of forty-eight will die. It is a little gruesome and disturbing, this sort of thing, to think about; but they are forced to deal in averages.

I am aware of what the companies are doing so that insurance may be extended and become profitable; I believe, as that occurs more and more, the insurance carriers will find an answer to it, and what he suggests might be the local answer, something to throw them off the present trend in order to reflect more readily and quickly to the company that is preventing the accidents its proper share, and not entail this company paying for the company that is not preventing accidents.

As for what we have done in that length of time, aside from the financial phase of it, one of our plants operated eighteen months without lost time through injury; another twenty-eight months without any lost time; in 1929 we placed two quarries among the first six in the National Crushed Stone competition, and in the open competition sponsored by the Bureau of Mines for all mining operations, we placed one sixth and one sixteenth. That would not be a record of which a cement company would be proud, but it is in the first two and a half years that we have undertaken any accident prevention.

Another plant operated twenty months without lost time through accidents, and two sand and gravel operations had no lost time accidents for twenty-three months.

CHAIRMAN WORTBEN: Mr. William E. Hilliard will continue the round-table discussion.

Saving Money Through Accident Prevention

By W. E. HILLIARD

General Manager, The New Haven Trap Rock Co., New Haven, Conn.

Money can be saved by reducing the accidents in any concern. If a concern carries compensation insurance, it may perhaps benefit directly in getting a better insurance rate on its policies after it has demonstrated over several years that as a company it is a preferred risk. Also, it may benefit indirectly by the fact that basic rates are determined by the insurance companies on the average experience of a whole industry, so that if one or more concerns in an industry can reduce their accidents, eventually that will be reflected in at least a slightly lower rate among the various competing insurance companies.

If a concern carries its own compensation insurance, of course it is self-evident that fewer accidents with lower total payments mean an immediate saving directly in the firm's own bank account.

It is clear then that whether a concern carries its own insurance or not, any reduction in its accident experience saves money in the end.

The company I represent has carried its own compensation insurance since it began business in 1915. While it is not safe to draw general conclusions from the experience of any one company, nevertheless, I am glad to present a brief statement of our experience in saving money directly in our own bank account by aiming constantly to keep down our accident hazards.

Our company operates one large trap rock quarry located at North Branford, Conn., a small country town ten miles northeast from New Haven.

Our company employs about 130 men. Some years ago, we employed about 150 men. As is quite generally the case throughout our industry, the use of improved machinery and methods makes it possible for us to produce more stone per month with the smaller force now than we were able to produce with a larger force previously.

We operate a railroad six miles long from our quarry to rail connection with the NYNH&HRR and with our own dock terminal on Long Island Sound. During our operating season from 20 to 25 men, included in the figures given above, work on this railroad. During the three months or so when we shut down in the winter, nearly all the railroad men are released. In the quarry and mill at that time, our total working force is reduced to half of its normal size or less, and is occupied mainly with repairing and overhauling the plant and machinery; although a certain amount of drilling in the quarry is carried on at favorable opportunities.

From the very first, it was decided that the company should carry its own compensation insurance. Each month an amount equal to 2 per cent of the payroll was set aside in the books of the company by debiting Compensation Insurance Expense Account and crediting Compensation Insurance Reserve Account. The 2 per cent was about what insurance companies would have charged us at that time, in 1915 and a few years immediately following.

Our quarry is in Connecticut and subject to the laws of that state. In 1915 weekly compensation for injuries was paid at the rate of half of the man's average weekly earnings during the preceding six months, or the average for a shorter period if he had not worked six months with that same concern, but with a maximum compensation of \$10 per week; in case of death, his dependents were to be paid at the same rate for a period of six years.

Every two years or so the law was changed in some particulars, with the general tendency to increase the maximum for lost time or for death. Finally, about the year 1923, the law was changed to read, "an injury sustained in the course of his employment or an occupational disease". The maximum weekly rate was advanced

to \$18 per week. In 1927, by a further revision, the maximum was raised to \$21 per week, which is the maximum at the present time.

The insurance companies naturally had to increase their rates considerably at different times to cover the added financial liability created by these changes in the law; and in spite of that, it has been generally understood that most insurance companies, as a rule, have not made much profit on their compensation insurance business.

Under the present status of compensation paid for lost time or for death from injuries sustained in the course of one's employment, many surprising cases came up in Connecticut for decision.

So much difficulty was encountered about the state in connection with cases of hernia that in 1927, the law was revised. In our own company, we had several cases in this period. One man was operated on and awarded the usual weekly compensation and all hospital bills and medical fees of every sort were paid by the company. He claimed to have received a severe strain in the course of his work causing the hernia. He returned and worked for us several months and then left to go back to Italy. Before going, he told some of his fellow workmen with great delight that he had put one over on the company in connection with his operation because he had sustained a hernia in Italy several years previous. A doctor in New Haven advised an operation and so he thought he might as well try to get it out of the company. Many concerns in Connecticut endeavored to have physical examinations made of all new employees, partly to prevent cases like this from arising. Of course the expense of many such examinations would soon amount up to the total cost of one hospital case. In 1927, the revision states that "an employee must prove that the hernia resulted from an accidental injury, that inability to work immediately followed such accident, that there was not a pre-existing hernia at or prior to the accident, and that any claim on account of hernia must be made within two weeks of the alleged time it was incurred".

This reduction in risk in hernia cases is one of the few changes in favor of the employers in the last fifteen years, as practically all the changes in the law have been in the favor of the employees. I do not question the wisdom of the present law in Connecticut, as we all agree that full and ample protection must be awarded all workers. I am merely making the point that it has become steadily more and more expensive to pay for accidents; and, therefore, any substantial reduction in accidents, means a much greater saving than would have been the case ten or fifteen years ago in the same circumstances.

From time to time, we raised the rate we charged ourselves in our Company which was 2 per cent of our payroll in the beginning until we reached the rate of 5 per cent which was about what we were quoted by insurance companies if they were to get our business.

At the end of fifteen years ending December 31, 1929, we had accumulated in our reserve account \$74,900. This represents the amount left in the reserve after having deducted all the payments we made on account of accidents. At first sight, it would appear that we had saved that amount of money in fifteen years by carrying our own compensation insurance. There are, however, a number of important offsets.

In the first place, we may have charged ourselves somewhat more than the rates we would have had to pay during this time. If we had charged ourselves 10 per cent to 15 per cent more than the insurance companies would have charged, our reserve would now be \$7,500 to \$10,000 higher than necessary.

In the second place, we have some unpaid liabilities against this reserve. If tomorrow at noon some insurance company were to accept our policy and we no longer carried our own risk, any accidents after noon to-morrow would not be our responsibility. We would, however, have to keep on making weekly payments to several widows and several men now receiving compensation for injuries.

Probably from \$7,000 to \$9,000 would be required for that purpose. The exact figures could not be ascertained in any way in advance because such risks are contingent. If the widow of a man who is accidentally killed has no children and is receiving compensation, and was the man's only dependent, in the case of her own death before the six years is up, the compensation ceases. If there were children, and the widow herself dies, the children would receive a portion of the original award each week, but not the full amount. If a man who has no dependents is permanently crippled and cannot work, he receives compensation for ten years, but in the event of his death, such compensation ceases.

In the third place, in connection with the Federal Income Tax, and with the State Income Tax in Connecticut which is figured much in the same way as the Federal Income Tax of corporations, we have had to pay more taxes than we would have paid, had we not carried our own compensation insurance. For instance, in the year when we first started, assume that we set up as a liability, \$10,000 in our reserve account and charged off that \$10,000 as expense. The actual payments checked out for medical services, hospital bills and compensation claims in that year we assume to have been \$7,000. We would then have \$3,000 left in our reserve at the end of the year. If we had actually paid an insurance company \$10,000 as a premium that year, of course we could have deducted all that amount as an expense of operating for the year, in computing our Federal Income Tax return. In our own case, however, the Government officials would hold that we could only deduct the actual amount paid out which was presumably \$7,000 and they would hold that the remaining \$3,000 was really a part of surplus since it was still in our possession on the last day of the year. In computing our income tax return, we, therefore, would have to use the figure of \$7,000 instead of \$10,000 as our deductions from gross income for compensation insurance expense that year. The result would be that the final net income for that year on which we would have to pay taxes would be \$3,000 greater than our own books showed.

The Federal Income Tax rate as you may recall, was 1½ per cent or 2 per cent for corporations about 1915 and 1916 and then in wartime ran up to 15 per cent. After the war this rate of 15 per cent was gradually reduced until in the last calendar year it was 11 per cent. If we should assume that the average during the last fifteen years is approximately 10 per cent, then we have paid out in the fifteen years about \$7,500 more for Federal Income Taxes than we otherwise would have paid and about \$1,500 more income taxes to the state of Connecticut than we would otherwise have paid. You understand, of course, that all actual payments for injuries or death claims or medical and hospital bills in any one year can be deducted in that year. If we had one disastrous year in which many expensive accidents occurred, so that the payments made by us amounted to a large sum, say \$25,000 or \$30,000, we would only charge off against that year the usual 5 per cent or so of our payroll and the rest of the total amount paid would come out of the reserve carried over from previous years. In our Federal Income Tax and our Connecticut Income Tax return for that year, we, therefore, would deduct a much larger figure for compensation insurance than our own books call for in that year. In other words, if we set up \$10,000 a year for five years, it would make \$50,000. If we paid our \$7,000 a year for five years, it would make \$35,000 leaving \$15,000 in our reserve. If we set up \$10,000 for the sixth year, added to the balance of \$15,000, our reserve would then equal \$25,000; but if a series of bad accidents in the sixth year amounted to exactly \$25,000, it would just use up the total reserve. In our own books for that year we would have only the \$10,000 expense charged off, but on the Federal Income Tax return, we would be allowed to deduct the whole \$25,000 paid out in that year; so that we would pay income tax on a much smaller total net income that year than our own books showed.

In the fourth place, an insurance company naturally takes full charge of all

claims. Accidents are reported to them and they do the rest. When a concern carries its own insurance, it is necessary to spend a considerable time, over a period of years, in having the claims checked up, papers made out and signed, hearings arranged with the Commissioner, payments made at required intervals to the different claimants and closing up the records when each one has been paid in full.

My assistant and I, during the past fifteen years, have undoubtedly spent many hundreds of hours more in attending to these matters than we would have if we could have turned the settlement of these claims over to the representatives of an insurance company. Our time for this work has undoubtedly cost the company several thousand dollars in all during these fifteen years.

Our figure may therefore be revised as follows:—

Present reserve, after 15 years		\$74,900
Less 12% more than insurance premiums might have cost	\$9,000	
Less claims now running to be paid in the future	9,000	
Less extra income taxes paid	9,000	
Less administration and clerical labor	3,000	30,000
		<u>\$44,900</u>

It appears, therefore, that as a very conservative estimate, our company has saved approximately \$45,000 in fifteen years which is a rate of saving of about \$3,000 per year for the entire period. I am of the opinion that this figure is quite conservative and that a long and exhaustive analysis carefully computed would probably show that in my estimate I have deducted somewhat more than I should have from our present reserve to arrive at the figure of \$45,000.

I have endeavored to state our company's experience as concisely as possible, but do not wish to make it appear that I am necessarily advocating the plan for a quarry company to carry its own insurance rather than place it with an insurance company.

We have had a favorable experience, but it is evident to you all that during the first few years, say from the first year up to the sixth or seventh year, we were running a very considerable risk. A series of bad accidents during those early years might have caused us to have to pay out large sums of money far in excess of what we had set up for that purpose.

There are a great many factors to be considered in determining whether or not a quarry company should take this very considerable risk during the early years while it is building up a reserve.

I ought to explain that we have been able, during the last few years, to obtain supplementary insurance for exceptional risks. We are now paying \$880 a year premium to one insurance company, by the terms of which policy that company will pay for any losses incurred by us in any one accident which amounts to more than \$10,000, their total liability not to exceed \$100,000. In other words, if we had an accidental explosion in which severe and fatal injuries occurred to a group of men amounting in all to damages of \$25,000, we would be obligated to pay the first \$10,000 ourselves and this insurance company would have to pay the remaining \$15,000. This policy, however, is limited to any one accident. If we had three bad accidents, one week apart, each causing liabilities of \$8,000, we would have to pay the whole \$24,000 ourselves. However, we regard that excess insurance as well worth while for us to carry as a partial protection against some unforeseen catastrophe. That form of excess insurance has been developed by the insurance companies especially for concerns like ours who carry their own regular compensation insurance.

We have been fortunate in having one very able superintendent for our whole quarry and plant, Alexander McKernan, in charge during the entire period of

fifteen years. He has always been keenly interested in the welfare of his men and has had a great deal of influence in training them to be careful. We have also had one man in charge of our crushing mill and one man in charge of our blasting and quarry operations during this entire period. No doubt we would have had many more expensive accidents except for the care and attention that these three men have given to accident prevention.

The subject of our discussion to-day is "Saving Money Through Accident Prevention". I have therefore endeavored to confine my remarks to that particular topic, but it is entirely impossible to consider this question, even briefly, without keeping in our minds the fact that human life and human welfare is of fundamental importance and that in our Company, as in the industry in general, we are far more concerned with saving human life and preventing human suffering than we are in the financial side of the question. If these two considerations came into conflict, the problem would be terrific. Fortunately, these two problems are both on the same side. By preventing accidents, we save human life and reduce human suffering and in addition, and as a secondary motive, save money. We believe our whole industry, which is necessarily somewhat hazardous, has before it a splendid opportunity in the future,—by giving its enthusiastic interest and support to accident prevention,—to reduce its accident rate and thereby reduce the sum total of human suffering and disaster; and at the same time, reduce its own expenses and produce a needed and welcome increase in its own net operating profit.

A. J. EALES (Bessemer Cement Corp.): I would like to know from Mr. Graves if he deviates from the State Compensation Law, if he goes above it? Here we have no payment for the first seven days, thirty days medical and hospital treatment. Do you go above that? Do you give them beyond what is allowed as compensation payment, or go beyond the limit of medical and hospital expense.

We carry insurance which provides that we pay all the medical and hospital expenses, if they go beyond what the insurance company allows. What I mean is we pay the difference between what the insurance company allows and the actual expense.

Mr. GRAVES: We follow exactly the compensation payment required by the state laws in the states in which we operate.

R. E. COLVILLE (U. S. Gypsum Co.): We have found it profitable in some instances to go beyond this, particularly with regard to medical requirements of the law; simply as a business proposition. It is a good idea to give whatever medical attention is necessary to get the man back into shape, but as a general rule we stick closely to what the law requires in the way of compensation.

I think one point in both these talks should be borne in mind by anyone contemplating self-insurance. I admit when Mr. Graves mentioned he thought even a small operation probably could justify self-insurance, I had some thoughts to the contrary along these lines: that insurance companies have found that the small operation is the one they consider the bad risk because there is a concentration of hazards; one bad accident there will just about ruin that premium setup for the year, which may be very small. On the other hand, good management may overcome this objection, but there is the element of uncertainty there.

I notice Mr. Hilliard's premiums are considerably different from the ones that Mr. Graves mentioned, and I judge the operations are different in size, enough different at any rate to tend to prove our point, that the smaller operations, the ones concentrated in one location, may be run with a very substantial saving of premiums, if well managed.

As far as our company is concerned, we try to place a pretty strict yard-stick on ourselves. We feel it is a matter which can and should be measured on the basis of your ability to control accidents. Our savings in percentages do not amount to those that Mr. Graves gave us, but over all our self-insurance in our plants saves approximately 35 per cent of the premiums set up.

One question: you showed an amount of compensation paid; do you include reserves for payments to be made in future on those same cases?

MR. GRAVES: No, that is what we have paid up to now.

H. F. YUTTER (General Crushed Stone Co.): Pardon me, they do represent an estimate of what is to be paid.

MR. GRAVES: It is 48.3 per cent saving; it is natural ours would be a little more than yours as it is more recently started; we had so much greater opportunity to accomplish results than you would have now, or than we will have in the future.

CHAIRMAN WORTHEN: Has there been any accident since you have been carrying the catastrophe insurance? Have you had an accident that required the insurance company to come in?

MR. GRAVES: No, we have not. It is reaching up to the \$10,000, but not over it.

MR. YELLAND: I think it would be interesting to know how much we pay in New York State for a death. There are three states in this country which carry their own risk, Pennsylvania, Maryland and New York. In Maryland the maximum compensation is \$18 a week, with a three day waiting period, and a maximum payment of \$6,500. Pennsylvania has a seven day waiting period, \$15 weekly maximum, with a maximum total of \$6,500. New York has a seven day waiting period, a weekly maximum of \$25, the widow is paid compensation as long as she lives unless she re-marries; I understand it is possible in case of a single death that it may cost the employer a hundred thousand dollars. It has been known to cost as high as \$80,000. Children under twenty-one are paid 10 per cent each, that is each child, until twenty-one.

MR. GRAVES: So that for a young married man, with children, the risk is enormous.

CHAIRMAN WORTHEN: I would like to take this opportunity to thank you all for making these sessions enjoyable and to thank the speakers who have talked to us this afternoon.

MR. GRAVES: I am going to ask the Chairman's permission to introduce a motion, expressing to Mr. Worthen our appreciation of his work during the past year; not only that, but the willingness he has shown to sacrifice his time during the coming year.

MR. COLVILLE: I might add that I believe Mr. Worthen's one year in office has given him an opportunity to sort of "cash in" next year on the efforts he has put in this year. I know accomplishments don't always show up at the time the effort is being put in. I, as well as the other members of the Committee, feel gratified that he is to be in office again this coming year.

I put this in the form of a motion, that the thanks of the Quarry Section be extended to Mr. Worthen, and our best wishes for the coming year.

(The motion was seconded and carried unanimously.)

CHAIRMAN WORTHEN: I appreciate this expression very much. I would like to have the new secretary, also the secretary of the National Association, just rise, not to make any remarks but just to let you see him Mr. Ahearn!

V. P. O'HEARN (Secy. National Sand and Gravel Association): The only remark I would like to make is that I did not feel particularly well qualified for this arduous task, since my predecessor in office has such unusual qualifications. I will try to do my best, and I am sure Mr. Worthen will be a great help to me.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Cement and Quarry Sections Joint Sessions

Wednesday Luncheon Session
October 1, 1930

EDWARD H. PARRY, Chairman
Glens Falls Portland Cement Company, Glens Falls, N. Y.

The joint meeting of the Cement and Quarry Section of the Nineteenth Annual Safety Congress was called to order by Edward H. Parry, Glens Falls Portland Cement Company, Glens Falls, N. Y., General Chairman of the Cement Section.

CHAIRMAN PARRY: We are going to dispense with all formality and call on our old friend, Lieut. Col. Henry A. Reninger.

Address

By LT. COL. HENRY A. RENINGER
Past President, National Safety Council, Special Representative, Lehigh Portland Cement Company, Allentown, Pa.

I will give you a short history of the work the Portland Cement Association has been doing in accident prevention work.

The National Safety Council came into being at a time when our good friend Lou Palmer was secretary of the Iron and Steel Electrical Engineers. Their first meeting, which we now designate as the first Congress of the National Safety Council, was held in Detroit in 1912. At that same time, I believe, Mr. John Lober, president of our Association, known then as the American Portland Cement Manufacturers, and of the Lehigh Valley, had been having a great many fatal accidents, as in every other cement plant. With the passing of compensation laws, some of which were passed in 1912, he was foresighted enough to see that something had to be done in our own industry to prevent these serious accidents.

He appointed a committee, now known as your Committee of Accident Prevention and Insurance, to try and do something along accident prevention lines. That committee was wise enough to go to an organization then in existence, known as the Independence Inspection Bureau for help. He asked them to come to the aid of the cement manufacturers, make a careful and thorough inspection of cement properties throughout the country, and evolve safety rules. Those rules were issued in pamphlet form; and in reading them over last week, I found that while we have improved in some ways, fundamentally we are following along the lines laid out by Foster, Medina, and other engineers in those old days.

We began keeping accident records in 1913. Since that time statistics in the cement industry are perhaps the most complete of any industry in the United States.

We all realize the way we were operating cement plants in those early days. No thought whatever was given to safety. Our hardest problem, I believe, was to educate our executives. Today I believe that every one of you men—if you were asked the question, "Does your president or does your general manager believe in safety?"—could honestly answer that question affirmatively. If they did not believe in it, I doubt if you would be here today.

Our first meeting of the Cement Section was held in Philadelphia, in 1915, at the Fourth Annual Safety Congress. Mr. Robert Sinclair, chairman of the Committee of Accident Prevention and Insurance, presided. Mr. Medina, Mr. Robert Brenton Mill (our first secretary), Mr. Young, then chief engineer of the Alpha, Mr. A. G. Croll, general superintendent of the Atlas, and myself, were the speakers at that Congress.

Those of you who saw the presentation of the Joseph A. Holmes Award, by Mr. Scott Turner of the Bureau of Mines, to Mr. Young of the Lehigh Portland Cement Company, heard Mr. Turner make the statement that the cement industry was far ahead of other industries in this country in accident prevention work. That statement was made again yesterday, and it has been made a half dozen times at this Congress. We are virtually as old as the National Safety Council. We have reached the point of being recognized as the outstanding industry in safety work.

The thought that I want to emphasize here is that you men must return to your own organizations and carry on this work. After years of great effort we have reached this point in the cement industry, and we cannot afford to let up one minute in our work. If anything, we must keep in closer touch with the work and keep those accident records down. It is very easy for them to jump up.

I think every one of you men will agree that the safety programs you are carrying on in your plants is the finest thing that ever happened. If your executives are familiar with the results of your work, they cannot help but feel that they cannot afford to let up on their safety efforts now. Safety has meant good housekeeping and efficiency. That is what we need just now.

Depression is here, business is slow. For the past two or three days you have heard pessimistic remarks made by some of our men who, I believe, do know the general situation. I hope we have now reached the road running through the valley, and that by Spring we can start going up the other side.

I do not believe that any of us can afford to curtail the work that we are doing in safety, because, to my mind, it is one of the most important things that we have, not only in our own industry but in every other industry. It makes me feel very happy, when I have an opportunity (as I do once in a while) to talk to organizations outside the cement groups, and also to one's friends and the wives and mothers of employees, to tell them that their husbands or sons are far safer working in a cement plant, with dynamite and pulverized coal, than they are walking down Main Street of any town, or even in their own homes. It is true. Last year twenty-seven plants in our industry operated without a lost-time accident, and I don't believe we can take twenty-seven homes of any twenty-seven employees that you pick out and find that in those homes there has not been some accident causing lost time.

So I think all of us can feel very happy and proud of the work that we have done, that we and our fellowmen can walk around our plants and do our daily jobs with a more secure feeling than when we are walking the public highways.

Don't let up, fellows, in your work. The greatest advertisement that the cement industry has today is the record they have been making in safety. The Portland Cement Association and the individual companies have received more real advertising, and there has been more really good feeling established throughout this country for the cement industry, through this accident prevention work, than through any other activity that we are carrying on today. I hope that those of you who are members

of the cement association will continue to realize that the small amount of money being expended by you for safety work brings greater returns than any other money being spent by the association.

I say that because I heard big executives, in big steel companies, make statements, and the executive of one of the largest soft coal companies in the country just made that same statement to me the day before yesterday. He said that if the soft coal industry had been wise enough to spend probably two or three times the amount of money that the cement industry has spent, they perhaps would be in far better shape than they are today.

Don't be selfish in safety. You men are perhaps the only ones in your communities interested in safety. Take the subject of safety up with your superintendents of schools. If your schools do not have safety in their regular curricula, see that it is put in. What we need more than anything else today is the education of the children in this country. Those children who are being taught safety in the public schools today are coming into our organizations when they leave school with a mind that unconsciously has absorbed safety. It is going to be an easy matter then for a cement company or a steel company to hand the new worker a book of rules: also it will be much easier for those youngsters to read those rules, study them and carry them out. There won't be opposition to those rules. You and I remember opposition from older men in our organization. But if education in safety is started in the schools it is going to mean that accidents in this country will be cut down very materially, in those communities where the education is given.

Carry that message back to your superintendent of schools. If he wants any information, it is only necessary to drop a line to the National Safety Council in Chicago. They will gladly send all the information necessary to the superintendent of schools for his program.

Give us your help: You are the men to take the message back to your school superintendent. If we can do anything to help you, the National Safety Council will be glad to do it. But we do want safety taught in every school in and around every cement plant in this country. We cannot be selfish. Now that we have achieved a record, we must spread safety. Accidents are costly, whether they happen in and around a plant, or on a highway, or in a community. Give us your help!

ADJOURNMENT

Wednesday Afternoon Session
October 1, 1930

EDWARD H. PARRY, Chairman
Glens Falls Portland Cement Company, Glens Falls, N. Y.

The second joint session of the Cement and Quarry Sections convened with Chairman Edward H. Parry, of the Cement Section, presiding.

CHAIRMAN PARRY: There are two items of unfinished business before us. Those of you who were at yesterday afternoon's session recall a motion empowering the chairman to appoint a committee of three, to call upon the Bureau of Mines, with the idea of seeing whether an appropriate trophy could be provided for the three quarries about to complete five consecutive years without a lost time accident. That motion was made, seconded and carried, and so I appoint these three men to act on that Committee: Mr. Fred Hunt, Mr. W. H. White, Jr., and Mr. Frank Sass.

I believe that the work of that committee can be done here in Pittsburgh, inasmuch as Mr. Scott Turner, the head of the Bureau of Mines, and Mr. Dan Harrington, their chief engineer, are both here.

This afternoon we have the privilege of hearing a man who has been terribly injured in an industrial accident. Without further formality, I introduce Mr. Walter A. Darling, of Cincinnati.

The Cost of An Accident

By WALTER A. DARLING
Cincinnati, Ohio

I feel that I know something about the cost of an accident from the victim's standpoint. I don't know how much I know about it from the executive standpoint. But in the past two years I have talked to nearly a half million workmen over the United States and Canada, and in that time I have come into contact with a great many of the leaders, a great many of the executives in industry, and I have made a few observations.

When the question of costs as related to accidents is the subject for consideration, there looms in the mind of every person a great variety of ideas. It is quite natural that these ideas should invariably resolve themselves to money or its equivalent, as money is the accepted standard of cost accounting. And so firmly is the money cost established as a standard that it appears to be the only item of interest growing out of an accident.

To the foreman an accident means a break in the well-oiled, smooth-functioning department. He realizes that interrupted production is costly to his organization as well as the cost of compensation and medical attention to his injured workman, and he feels he is responsible for an expenditure that is not profitable to his company. His entire thoughts have, therefore, been in terms of money.

The superintendent sees this department as a broken cog that may cause delay throughout a great portion of the general industrial process. He realizes that delayed production means less production, with the overhead remaining at the original figure. His thoughts, too, are in terms of dollars.

The safety department sees its frequency and severity records mounting, and realizes that maintaining this department cannot be profitable unless satisfactory results are obtained.

This department often includes employment, and they know that replacing the

accident victim is an item of expense under the heading of labor turnover. Again the cost resolves itself into dollars.

The insurance company that sees a claim that may include hospital calls, medical attention, compensation for the injured employee and continued recurrence of accidents, classifies the manufacturer as a poor risk, thereby making higher rates justifiable and necessary.

The vice-president and general manager, or the chief executive, has a complete picture of higher insurance costs, higher overhead and manufacturing costs, and higher sales costs, all of which present a problem demanding serious attention. He, too, is thinking in terms of dollars.

State departments may even participate in the cost of an accident where rehabilitation work is necessary or possible. And here the cost involves the expenditure of public funds.

When the statistician has compiled his report for a twelve month period over the entire country, his costs are alarming, and we cannot help wondering what could be done with this money if spent on the building of public schools, highways, or other beneficial public measures.

It is well for all of the aforementioned to carefully consider the enormity of this economic problem, for it is indeed a problem demanding serious attention. And, viewing it in such a general way, we cannot help but recognize its importance. But while its importance will serve to stimulate each and every one to greater effort, may I be permitted to remind you that none of the foregoing problem or its conclusions may be used as a weapon to combat itself? Nowhere in this entire monetary question is there offered a solution that can remedy the cost. Let us scrutinize this cost a little closer and see if there is not something that will help and do some good.

I think we will find that it is accident prevention—good safety work. Now, safety in industry, like the morale of an army, does not bubble up from the ranks to inspire and influence its recognized leaders. Unity, harmony, confidence and cooperation are all the children of good parents. Workmen of today realize that it is the owners and directors of industry that control general working conditions. They appreciate the fact that the management must decide where the quarry is to be opened, and where the plant is to be built, and that the machinery be of modern, approved type; and that the management must see to it that the equipment is so placed that there is ample working room, good light, ventilation, and sanitation.

When this part of the safety program has been carried out, as far as may be found practical, then the destiny or salvation of your problem in economics lies in the hands of those who never recognized the relationship between accident or injury and money.

Your problem may be monetary, but your salvation is in the education of your workers. Go to them, and educate them. And when you have their interest and attention in safety as a humanitarian measure, then—and then only—will you find an answer for your problem in economics.

By the education of workmen it is possible to show them that their personal safety is paramount. This done, the result you so desire, the reduction of costs, will be automatic and incidental to the educational plan.

Now, I said that it is well to get the interest of your employee in safety from a humanitarian standpoint. As I see it, safety embraces two equally important factors—the economic and the humanitarian. And no matter to which we direct our attention, both must profit equally. Since the humanitarian side of safety is the side that appeals to the men in the shop, to me it is the side that offers the least resistance and gives the best results.

As I said a while ago, in the past two years I have been called into industrial plants all over the country, to give my views on safety, to talk to men in industry, those who are in a position to be hurt, or potential hazards. The talk that I find is the most satisfactory, that gets the best results, that establishes a relationship

and understanding between the employee and employer, is a talk that is purely humanitarian.

I am going to give it to you. I want you to put yourself in the position of the men in the shop, the men in the plant, the men in the quarry, where there are hazards, and see whether or not you feel a new interest in safety.

It has never been the practice in industry to talk costs to workers, but I believe it is the right thing to do. I don't mean to take the books, and say that such-and-such an accident cost so much, and the insurance of the plant cost so much, and so on and so forth. But there is a way of making a comparison of costs that illustrates that the entire cost is not borne by the industry. That is what I try to do.

Now, quoting from a plant talk: remember, you are a group of workers in your own mill. I talk a little bit about safety, its history, its progress, and then this cost proposition. . . .

The Personal Story of a Workman

It has not been so many years ago, men, since safety was just a vague, scattered idea, and little attention was given to general safety work. There were a great many accidents then, considering that most things were done in a rather slow manner.

War needs and the increasing requirements of the people speeded up everything, including the accident rate. It grew by leaps and bounds, and in fact, all out of proportion.

There were, however, a few pioneers who had foreseen this condition—cement mills, steel mills and railroads. And I believe that the old stop-look-and-listen sign, that has since been replaced by the more modern light and bell, was one of the first notable and extensive measures for caution.

There are, however, in every community and in every plant, a few who still think that safety is "the bunk." They look with what might be called contempt or pity on men doing safety work, on safety engineers and factory committees. I want to say to the man who feels this way about it that he is so far behind the times that he is a dead number, industrially at least, and it is high time that he awaked to the realization that these men are not trying to make unpleasant conditions, but are protecting life and limb.

We have a few who are egotistical enough to think that they can beat the hazards. Men, you cannot do it. It does not matter how fast you are, you cannot duck flying pieces of rock, premature explosions, slipping carloads, or whatever the hazard may be. You know what they are in your own plant better than I do, and can pick them out for yourselves.

Now, I said I wanted to talk about costs. Whenever and wherever an accident occurs, almost immediately and invariably a monetary equation presents itself and is given considerable attention by all those involved. If costs are to occupy such a place of prominence, why not consider all of the costs? For, I believe there are some in which you should or should not be interested.

To the manufacturer, the industrial accident means a high rate of insurance, it means the expenditure of large funds for accident prevention and safety equipment. It means a lot of industrial inconvenience, replacing and retraining valued men; it means added expense of maintaining industrial relations and first-aid departments, both of which are non-productive. That is one cost.

To the insurance companies it means more claims, more bookkeeping, more paper work, more men in the field, more money for hospital bills, medical attention and compensation for time lost. That is a second cost.

To the victim it means injury, pain, suffering, and the worry of being incapacitated or handicapped, not only in a physical way but as to continued support of the family.

I have never seen a dollar, spent as the result of an accident, where everyone con-

cerned would not have been better off were it not necessary to spend that dollar. To me a compensated claim is an apology. That is the best I can call it.

Now, as I said, all of these are big, serious items. But to me they represent only a minor part of what I call the real cost of an accident, the one to be considered. I want to tell you a little bit about my own experience, and I think it will give you a new version of what we might call a most important cost.

My mother and father, like most parents, spent a lot of time and money raising me, and I guess I gave them as much trouble as most boys do, especially an only child. I was not an angel, by any means. Before the war, I was at an age where I was of little or no help to my parents. While in the service I could not help. But after the war, I settled down to the business of getting somewhere in the world and began to work and save, and in a measure to repay them for all the time and care that they had so unselfishly given to me. In the next few years I managed to save enough to pay off a small mortgage on the old home. That, of course, lifted a load from the minds and shoulders of my parents. I continued to work and save, and for the first time in their lives, it looked like they might rest a bit and let me take over the burden they had carried for so many years. As I advanced, prospered, the load became lighter. I became engaged.

Then, just as the outlook for both my family and myself was bigger and brighter than it had ever been before, the unexpected happened. I had a serious accident. In an explosion I was struck across the face with a piece of steel and the damage was great and far-reaching—more than I realized at the time. I was taken to a hospital, a torn and bleeding mass, living, still a pitiful piece of humanity. Much of my face was caved in and terribly lacerated. As I lay on that hospital receiving room table, I began to wonder just how much would be left to represent the life work of my parents. Well, there were X-rays, there were ice packs, and in five days I was in condition to operate, and in the meantime my family had been notified.

My father came to my bedside, and to this day I am thankful that the bandages hid the extent of my injury. He could not see the terrible condition of my face and eyes. But as I held his hands I felt tear-drops on mine, and I want to say to you that when a big, strong man of sixty, that has been through the mill, like my father and your father and lots of you—when he sheds tears, there is usually a mighty good reason. Right then and there I decided that, were it ever in my power, I would make every effort to prevent heartaches such as these from occurring to the loved ones of others. I knew my father would leave that hospital a broken man, and I knew what it meant when he would have to go home, and try to explain and comfort my mother.

It was seven weeks and three days before I left the hospital and made the trip from Cleveland to my home in Cincinnati. Arriving there, I was placed in a private hospital and under the care of a specialist. There was still a lot to be done—plastic work, parts of my face had to be rebuilt. I have a piece of my shin-bone over my left eye, where it was caved in. I have a piece of one rib in the bridge of my nose. Pieces of skin were taken from the backs of my ears and grafted into the eyelids. And there was still a little hope of saving the partial sight of one eye.

To accomplish all this a series of operations were started, seven in all, lasting almost three years. And each time that I came out of that hospital I had to be treated at home. That was my mother's work, and not a easy job for a mother. I will assure you. Those eyes had to be bathed, fresh bandages applied, drops administered; and I feel safe in saying it was only my needs and the hope of my seeing again that carried my mother so bravely. After that seventh operation was over and it was decided that nothing more could be done, and I would never see again, my mother relaxed from that strain that had carried her, collapsed and within a few weeks died.

As I stood at her grave I again said that I would do my best to save some other man's mother from what mine had gone through. And it was only fourteen months later that I laid that broken man, my father, to rest beside my mother. For the

third time I renewed my vows to do my part to kill conditions such as these, resulting from preventable accidents.

It was hard, men, to get over the terrible ending that had come to the lives of those two, after all their work and sacrifice for me, when it all might have been prevented by a little timely safety work.

Now, understand me, I am not telling you these things to enlist your sympathy. I don't want that. I don't need it. There is not a bit of doubt in my mind that any one of you here this afternoon could not or would not go through with all that I have, and bear it equally as well. Certainly you could. Why not? But that is not the point. For the victim it is not so bad. A physician can, with a few drops of cocaine, stop your pain or at least relieve it. But remember, fellows, that he or no one else can administer an anesthetic to the hearts and feelings of those who do the actual suffering, your own loved ones who pay a price that can never be reckoned in dollars and cents.

And so, I say to you, when you leave this or any safety meeting, forget what it costs industry. They are able to pay. They are glad to pay. Forget what it costs the insurance companies. It is their business to pay and they expect to. Forget the injury. Forget the pain and so on. But keep clear in your mind that largest cost that you and yours will have to pay.

Now folks, that is just a little bit of my own story. I have tried to make it short. There are a thousand heartaches in there I could tell you about. But what is the use? There is not any of it that is a pleasure to recall. There is a lot of it I would like to forget. But if, coming up here today and telling you, I can help to save your eyes for your mothers and fathers, your hands and feet for your loved ones, your lives for your wives and children, then I will be compensated.

The whole thing amounts to just this: I am not any different from you or any workman. What has happened to me can happen to anyone. From the time we leave our cradle to the time we go to our grave, none of us is exempt from accident. We should remember that we may be injured, and our injuries may be deep and very apparent, very painful. But there will probably be four or five more whose injuries will be deeper and more lasting than ours.

I want to sum up this talk by just asking you one question. How soon are you, by carelessness, going to let my story become your story? The best I can do is to warn you, show you what it means. Taking care of you is out of my hands. That is up to each and every one of you as individuals. I hope you do it well.

Now men, I don't know what you think of this talk. I don't know whether I have made an impression on you or not. But that story is what convinces me that the humanitarian side of safety is the answer for the problem in economics.

CHAIRMAN PARRY: I think no comment is necessary on Mr. Darling's speech. I simply ask that everybody stand and give him a rising vote of thanks for this message. (A rising vote of thanks was extended Mr. Darling.)

CHAIRMAN PARRY: It has been my pleasure to take the meeting up to this point and from this point on I am going to turn it over to Mr. Worthen, chairman of the Quarry Section. Mr. Worthen.

(Mr. A. L. Worthen, General Chairman of the Quarry Section, took the Chair.)

CHAIRMAN WORTHEN: In looking around the room, I am forced to say that doubtless the Quarry Section are guests of the Cement Section. Those of us who have followed the progress of the Cement Industry in accident prevention cannot help being envious of the record which you have made. Nevertheless, the quarry industry is making rapid strides in accident prevention work. We appreciate the importance of such things as the cost of an accident, although I don't think I ever heard it so dramatically portrayed as Mr. Darling has done.

We have reached the level now where we are considering the study of psychiatry in relation to accident prevention. Dr. H. S. Hulbert, who will be our next speaker,

has been identified with the Universities of Michigan and Illinois, in the departments of psychiatry and neurology. I will ask Dr. Hulbert to talk to you now.

Aids in Handling Oneself and Others, Especially in Relation to Accident Prevention and Safety

By HAROLD S. HULBERT, M. D., F. A. C. P.
Chicago, Illinois

Accidents are of human origin, therefore of mental origin. A man whose mind is on his work is not a causative factor of accidents, provided, of course, the man has previously demonstrated his fitness and his capability in judgment and in agility in the particular job or role in which he is engaged. A man whose mind is on his own personal problems or interests can not pay adequate attention to the work at hand, and is therefore a causative agent of accidents. The mental causes of accidents are thoughtlessness and carelessness in workmen with normal minds, rather than mental diseases or lack of intelligence. Distraction of attention permits hazy thinking about the work and indifference to its risks: in other words, accidents result from mental detours. Safety thinking is thinking about the work being done, not thinking of safety.

Psychiatry is the science of treating minds which have failed to function normally. In order to understand those afflicted, we psychiatrists were lead to work out an understanding of all human mental reaction types, sane or insane, successful or unsuccessful. One lesson we have learned is that the emotional life of an individual is of vastly more importance than the intellectual (or ideational) part of his mental life. Emotions tend to direct attention: a man while emotional about himself can not keep his attention directed toward his work.

Psychiatry also has its limitations, and when we can not cure certain types of cases we can only recommend that cases of each type be collected and segregated. There is no place in competitive American industry for the insane, the feeble-minded, the epileptic, the constitutionally frail or inferiors or the sick (arteriosclerotics, paralytics, seniles, or cases of arterio-sclerosis, cases of Bright's disease, anemia, tuberculosis, cancer, skull fracture or brain concussion). These persons, industrially unfit, can be easily identified by general observation and certain simple tests, and they had best be pensioned off or worked in groups segregated with others like themselves. The normal man is comfortable in mind and in body, at ease with himself, adjusted to his work and his environment and to his home life, and has a work record showing longer and longer periods of employment of better and better kind of employment (for a good work record shows he is neither sick, perplexed nor fatigued and also shows he is not misplaced, inadequate nor discontented). The normal man has better self-mental-discipline of the same mental tendencies as the man who is a failure, whether he learned this discipline wittingly or unwittingly. It is of some of these things of which I want to speak today.

Classification

First, to anticipate the most frequent question asked on this subject, may I not say that there is no successful or scientific system yet evolved to place men or estimate an individual's character or characteristics. Of the various tests, I think the best is the personal interview between the employment or personnel officer and the applicant, and later an interview between the manager and the man he considers promoting to foreman. The next best test is a probationary period such as has been found so successful in better organized groups, such as Annapolis, West Point nurses' training schools, and police departments. To date and probably thereafter,

common sense and experience are better than theoretical tests whose usefulness has been only partially proved by enthusiasts.

The inequalities of human nature can be graphed in what is known as the human graph. This applies equally to all humans, regardless of the standard by which they are measured, be it height, age, wealth or poverty, promptness or tardiness, success or failure. Three per cent will be practically parallel to the base line, 12 per cent slightly rising, 15 per cent sharply rising, 40 per cent top plateau, which may be somewhat domed, 15 per cent sharply falling, 12 per cent gradually falling, and 3 per cent practically parallel with the base line.

The middle 70 per cent, consisting of the sharply rising 15 per cent, the plateau of 40 per cent, and the sharply falling 15 per cent, are what we call normal. Observation of a man over a reasonable period of time will enable you to place him pretty well in this graph.

Day Dreaming

This type of thinking is known by various names: phantasy with a ph, reverie, day dreaming, or more properly wishful thinking or wishful thinking. It has been estimated that 11/12 of the thought-processes of the average person, excluding the odd, are of this character.

These thoughts may be momentarily short or they may be minutes long. They are usually vague, pleasing, and highly emotional. They are usually ambitious and are often mistaken for the foundations of plans. They are regarded as harmless and the cheapest of indoor sports. But we psychiatrists now know that these phantasies are extremely bad for the individual in that they rob him of his initiative to make sound plans and the mental energy to carry out his plans. These wishful thoughts leave the individual apathetic and rob him of his interest in his work. If indulged in extravagantly, they lead to dementia praecox. As ordinarily indulged in, they lead to indifference, and carelessness in the daily work.

This may be illustrated by a dull punch-press operator to whom Dr. Plant once remarked, "Why, you have ten fingers and you have been on a punch press six months!" To this she replied, "It's only them what thinks that loses their fingers." The operator was right, only she did not realize that she meant the phantasy type of thinking.

These phantasies can be identified and handled as follows: a phantasy usually begins with one of three phrases, "I wish," "When," or "If." Whenever a phantasy enters the mind of an individual, he should do one of two things: he should either do something motor about it now, that is, use his hands to change the phantasy into a somewhat started or completed plan, or he should dismiss the thought from his mind and preserve his mental integrity and his interest in ordinary affairs.

There is a second form of phantasy which has most of the characteristics of the previous type, except that the mood is a depressed or anxious one and that the time is the present or the immediate future. This is called worry. The mind is filled with highly emotional thoughts, the ideas of which are incompatible with each other. The advice is the same: do something about it. The worker whose mind turns to worried thoughts about his wife in the hospital and the ability of his daughter to get her own breakfast, should be permitted to phone his home before school hours and to call the hospital several times during the day, otherwise his abstraction will take his mind from his work and lead to carelessness.

Persons who worry are those who formerly indulged in anticipatory reveries to a great extent. Usually they are not in the best of health and are not living normally. Nowadays, some of the most common causes of worry are birth control or indulging in sex starvation or sex experimentation.

The third form of phantasy is the retrospective reverie. It begins with, "Oh! If the past had only been different!" This leads to an incurable paranoid insanity.

because when such thoughts enter the mind nothing motor can be done to alter the past. It is imperative that such thoughts be dismissed from the mind. People need instruction in rational forgiveness and also in rational self-forgiveness, the peril of which is indulgence.

The open, frank, non-seclusive, but reactive type of individual is the wholesome one. Ambitions should be limited to what is practical in attainment. A man should be encouraged to prepare himself for the next higher job above him. The advice, "Hitch your wagon to a star," or "Be ye therefore perfect," is so impractical that it is hurtful to personality. Ambitions which are more generalized should displace them, for example, "Be faithful and planful," or "Never get tired of doing your best".

Anger

The most common form of anger is from the thwarting of some impulse. The primitive form of this kind of anger is personalized. The person thwarted wants to destroy whoever put the obstacle in his path. Primitive anger shows itself best in a quick resentment, and at its worst in thoughts of revenge. The civilized form of anger is depersonalized anger; that is, a strong determination to overcome obstacles.

There is a most pernicious form of anger which should be avoided, and that is self-anger, or self-reproach, because it is inevitably baffled anger. Anger without an outlet is sickening; it is harmful to physical and mental health and to one's work. Conflict is normal in healthy males, but contemplations on conflict lead to abnormality. Socialized conflicts, within rules, such as quilts, baseball, or even pinochle, are vastly better than angry broodings. The angry workman, emotionally interested outside of his work, is little interested in his handiwork, and is an easy prey to absentmindedness. The determined man while at work substitutes his work for his problem, is energetic and helpful, and is not apt to cause accidents which would reflect on him.

The reaction of exasperation is often a cause of accidents. A man will tug at a piece of machinery to get it in place, using what he believes to be the right amount of strength. Then, being exasperated, he may yank it or hammer it ruthlessly and cause something to break or slip and thus precipitate an accident. Men should be taught that it is results, not efforts, that count, and that the group cannot proceed until each man's work is well done.

A persistently impetuous man cannot be deliberate or discipline himself, and the company will do well to let him go. The impetuous man makes mistakes not from fascination, but because of alcoholic inheritance or because he is hungry for something. Impetuous men are unreliable workers. They are almost as unreliable as stammerers, who have psychic ataxia as well as jerkiness in speech.

There is another form of anger which is an increase of irritability without any apparent increase of provocation. When a man is more irritable than usual for a day or so, it is safe to assume that he is in pain. The pain is more often physical than mental. It may be a symptom of some developing disease, a dental cavity, or eye strain. A man may be ill at ease because his wife is pregnant. In any case, a temporary increase of irritability is sufficient cause for a supervisor to send the man to the company doctor.

Criticism

It is important in the training and handling of men, and equally important at home in the training of children, to differentiate between an offense and an offender. One may disapprove or hate a characteristic in a person, but one should not therefore hate the individual.

Never totally criticize a person. Never let your foreman say, "Oscar, you damn big Swede, why in hell did you do that?" You should train your foreman to say,

"Why, Oscar, I am surprised that any man who is always here on time and never seen drunk on a Monday morning would make a mistake like that. What the hell?"

If the foreman handles him in the first way, totally criticizing him, the man will develop a grudge against the work, against the company and against himself. He will brood over his wrongs with the constant tendency to be abstracted and in peril of causing an accident. If the foreman handles him with the better technique, the man will tell his wife that the company has noticed that he is never drunk and that he is always on time, but will not mention the mistake. He will be more alert at work to avoid mistakes and deserve favorable comment. The ratio of two slaps on the back to one kick in the pants is a good one.

A workman should not be criticized to his equals lest the speaker be quoted and his criticism reach the workers in garbled form. It is permissible to criticize the worker to his face, and of course, to report on him to his superiors. Even in such cases, however, the offense should be distinguished from the offender, and his good characteristics as well as his faults reported.

The word "shame" should never be applied for a physical condition to any person, especially to a child or young workman. To tell a workman that he should be ashamed of himself because he did not wash his hands before eating in the lunch-room of a lead factory tends to make him slovenly and hurts his self-respect.

Forgiveness

When a man has been fired, docked, laid off, criticized or otherwise punished, he should be given a receipt in full and placed in good standing when he is forgiven and returned to work. His next effort must be made a successful one, and it is the duty of the foreman and those of still higher rank to assist him and to arrange that the return to full duty is accompanied with approval and is successfully fulfilled.

The same is true with men who have been laid off because of injury. These men have suffered more or less shock, hence when they first return to light duty and when they are returned later to full duty, the authorities must see to it that the duty is successfully performed and that the man is told that they approve of his efforts and successes.

Happiness

Happiness may be regarded as the opposite of anger. Happiness is the emotional state which accompanies the carrying out of ideas and plans if these plans were, in part at least, of the individual's own making, whereas anger is the emotional state which results when the carrying out of one's plans is baffled. Practically every sentence in this article is based on the tragic life history of one or many individuals. It was my duty during the war to become acquainted with the hospital care of sick and wounded British soldiers. These men were called "Blue Boys" because the hospital uniform was entirely blue. At the hospital where these experiments were made, the Blue Boys had been thoroughly institutionalized by being there many months. They had been thoroughly studied and records had been kept of their reactions.

One incident will show the effect of happiness on physical effort. A certain group was assigned to certain medical officers. One doctor was on the first floor and another on the second floor. All day long this group of soldiers sat in the office downstairs and at intervals one would come to the doctor's desk to have his pulse and blood pressure recorded. He would then walk up the long flight of stairs for a similar test. These soldiers would repeat the test at half-hour intervals during the day, day after day and week after week.

One Saturday morning a sergeant-major came into the room where the soldiers were waiting and read a list of names. Those whose names had been read would

not be permitted to have "shore leave" or leave to go down town for Saturday afternoon or evening. It was observed that the next time these disappointed soldiers walked upstairs their blood pressure was lower and their pulse rate was higher.

The about two hours later the sergeant-major came into the room and announced some mistakes on his list, that it was Smyth, not Smith, and Robertson instead of Robinson who had been denied leave. On the next test the men who had regained their happiness were able to walk upstairs with as little effort, as shown by the blood pressure and pulse data, as they had on previous days. This demonstrates again the fact that avoidance of unhappiness lessens fatigue hence lessens the risk of causing an accident.

Fear

The use of fear as a whip to keep men in line and to do their work well lest they be laid off or bawled out must be used in very great moderation. Fear is a poor whip. To be sure, there are many men of low intelligence who may react well to fear, but in men of average or high intelligence fear is distracting to attention. Fear limits output. It produces an unwholesome state of physical health, and should therefore be saved for a few emergencies. A disagreeable foreman or school teacher of whom all are in fear should be transplanted.

On the other hand, tenderness or solicitude should not be overdone. Workmen do not do well if they know they are pitied; they do even less well if they develop self-pity.

Anxiety

Anxiety in the mind with concomitant physical sense of tension is caused by incompleteness, repression, or by self-conflict in the inner mental life. It shows itself in a depression of mood and also in doubts and indecisions. Persons in a state of anxiety need help. Problems which produce anxiety are usually those which can be understood or helped by physicians, social welfare workers, or priests. Anxiety, if intense or prolonged, may lead to hysteria or neurasthenia.

Anxiety sometimes develops after an accident while the claim is still unsettled. Then if the claimant is allowed to "jew up" the claim agent when a settlement is arrived at, there will not be the tendency to have a chronic neurosis, whereas if the claim agent "jews down" the claimant, a chronic neurosis may follow and the company loses the efficiency of a former good workman and the community loses a self-supporting citizen.

The human mind craves certitude. Few of us can stand uncertainty. It will either give mental anxiety or produce a conversion hysteria. Almost always the cases which develop conversion hysteria are persons who tamper with sex living. Persons who are biologically wholesome are not predisposed to develop marked anxiety, but the anxiety can be about other things—finances, returning to work, and so on.

I hold no brief for persons who indulge in misconduct, but I do think a man is not as bad off if he indulges in an evening of carousing as he is spending many hours brooding about, "I wonder what my wife is doing," or "I wonder if I can't get next to Joe's wife while I'm on my way home from work". A highly emotional life is more destructive than the misconduct itself.

Fatigue

There is an increase in accidents from mental fatigue or emotional fatigue from being overstimulated or over-hurried too long. A short campaign is better than a long one and is followed by less reaction and is permanently followed by a more enduring improvement. Many slogans lost their stimulating ability when they became commonplace such as, "Watch your Step," or "Safety First". A slogan particularly

appeals to the man or group or men who developed that slogan but to others its appeal rapidly fades.

Fatigue leads to accidents. Fatigue is increased by unhappiness and decreased by happiness. Happiness also increases accuracy. That a kind word or properly spoken request increases the workman's accuracy was observed in elevator operators who stop their cars more accurately with the floor level when the passengers say "fourteen please," than when the floor number is given in an abrupt or muffled tone. Men who are constantly unhappy should be placed at work where the accident risk is small or where accuracy is of minor importance.

Monotony of work leads to indifference to the execution of that work. This flagging of interest causes wandering of attention or even drowsiness. Accidents are prone to follow. What is here said, as is true elsewhere, is as applicable to executives driving their Packards as it is to workmen in the quarry or shop or factory.

Surprise

Surprise is defined as an emotional state, that is, a state of excitement, not a state of thinking, or at least not a state of clear, orderly thinking. The surprise lasts until the individual arrives at a definite thought as to what should be done under the circumstances. Surprise leads to complications of accidents. The prevention of surprise is to permit and encourage men to be decisive and to acquaint the individuals who might be surprised with the probable complications of such types of accident.

Rehearsals, such as life saving or training in resuscitation, are preventives of surprise. In any type of accident, experience in similar accidents lead to less surprise in case of recurrence because the experienced person is now endowed with ability to make decisions based on previous knowledge.

Obedience vs. Discipline

Obedience means the giving of rewards for unusually good conduct or dealing out punishment for misconduct. A firm will not prosper if the superintendent is permitted to fire employees on the recommendation of the foreman, but must wait until the January meeting of the board of directors to promote a man for unusual ability. Rewards and punishment should be offered proportionately.

Discipline, by definition, means the setting of an example or the following of an example which has been set. It does not mean punishment. A disciple is a follower. In our every day life discipline is more effective than instruction. The foreman who violates the "no smoking" rule cannot by punishment get his men to observe fire hazards.

Morals

A man can not defy the moral code of his group or sub-group, while stupefying his conscience with excuses which are satisfactory to himself but which he knows would not be satisfactory to others, without showing a decline in personality and in usefulness. This deterioration of personality, from self-indulgence, is almost as severe as deterioration from drugs. Such employees should be once warned and then dismissed.

Respect and Self-Respect

Self-respect is based on two things of equal importance. The first is good or improving health, and the second is a consciousness of the individual's own liabilities and assets. A person who over-emphasizes his own limitations has a so-called inferiority complex and has crippled his occupational and domestic life, whereas a person who minimizes his limitations while he magnifies his abilities is proud, but ineffective as a leader.

The normal individual is equally self-critical and self-approving, but he is careful never to confess to others his shortcomings nor to boast about his exceptional abilities. He takes himself for granted, concerns himself moderately with self-improvement, and is concerned mostly with his work. He places the emphasis on his production and minimizes the emphasis on his overhead or himself. When an individual is in good health or improving health and has a proper balance in the two phases of self-regard, then automatically and inevitably he commands the respect of others without deliberately seeking it. This probably is the most important point in the development of personality and of usefulness in the world.

A good way of establishing a man's self-respect and at the same time disciplining him is to ask him about himself. "How are you getting along?" "What progress are you making?" "What can we do to help you?" "What do you think of yourself as an employee for such and such a company?" He will tell you. Then say, "Now describe yourself as the foreman sees you. Describe yourself as you think the doctor sees you," and make the man see himself from several points of view. He will take himself much more seriously after that and he will try to do those things which appeal to the superintendent, the company doctor, and the foreman. You haven't hurt his self regard. You have given him something to think about, and I think that is respect building.

Effect on the Mind of Bodily Health & Nervous Breakdown

There is a close but complex relation between a man's physical health and his intellectual capacity and emotional life. In men of 40 to 55 a lessening of mental vigor, imperceptible at first, is found in about 1/6 of all cases examined. It usually is due to heart or kidney (Bright's) or blood vessel disease; these conditions are very easily disclosed by any physician by examination of the heart, blood pressure, blood and urine. Really, you men and other executives owe it to yourself and your families and your companies to have an annual physical examination, preferably during the week of your birthday. You also owe the duty of sensible living. Drinking isn't safe, it is smart-aleck. Sweating once a week from hard work or hard exercise will add seven useful years of life to the average sedentary man.

Nervous breakdowns, so called, occur when there is at the same time a great emotional strain plus a state of poor health such as acute tonsillitis or convalescence from influenza, but they do not occur in healthy persons from emotional stress or strain nor do they occur from poor health under ordinary stress. You can not anticipate when death or other family or even financial strain may come to you, therefore it is of vast importance for men like you to maintain your own health at a high level. See that you do it!

Inferences

Men can make or mar themselves largely by their mental habits. An inference is a conclusion based on slight data. Almost all persons regard themselves as smart enough to make inferences. Actually but few are able. The most intelligent persons rarely make inferences but do engage themselves in getting more data, form a tentative opinion or judgment but are open-minded and welcome still new data while they are reacting to their provisional judgment.

Most men infer unfavorably to themselves and about others with the consequent paralysis or paresis of effort, or with diminishing friendship and diminishing approval for others. The bookkeeper receives a telephone call saying that the boss wants to see him in the office at ten o'clock. He spends the intervening time inferring unfavorably to himself about such trifles as "Did the boss see me at the White Sox ball park on the afternoon I stayed home pleading sickness?"—"Did the boss know that I had joined the bookkeepers' racket?"—"Did the boss notice that I parked my car near

a fire plug in the yard?", et cetera, ad nauseum. He might know the boss would not have sent for him unless the boss wanted something.

All conversations begin with "I want" on the part of the person inaugurating the conversation. The presumption is that the boss wanted the bookkeeper to help the boss do something the boss wanted. The bookkeeper should have inferred that he might give the boss anything from his department that the boss wanted. He would be a better bookkeeper and would soon be promoted. When one infers favorably, one risks 11 per cent error only: if one infers unfavorably, one tends to create unfavorable circumstances.

Comparisons

The habit of indulging in comparisons is very common and is very dangerous. When an individual compares himself with any other specific person or when an individual is compared by an outsider to any specific persons, an unwholesome state of mind follows which shows itself in less accurate productive work.

Persons, usually between the ages of 31 to 38, sometimes show an overdevelopment of this bad habit and we call them paranoid. Such employees are stormy petrels. They compare conditions here with conditions in Russia or in the good old days or under the former boss; they preach the philosophy that "we workers own our jobs." They are too talkative and argumentative and should be discharged for they are as bad as a rotten apple in a barrel of good ones.

Character

Character is the sum of the decisions an individual has made during his lifetime. A person of strong character is a decisive person. A person of weak character is one who cannot make and adhere to his own decisions. Others make his decisions for him or he is vacillating in adhering to his own decisions. Usually a person of strong character is also of good moral character—for example, Roosevelt, Wilson, Gary. There are some exceptions, such as leaders in our politically protected crime gangs. These leaders are decisive men of strong character, but according to our code, they are not of good moral character. Character can be developed in a person just as deliberately as ability in music or boxing.

Character should be developed in the home while the individual is a child by intelligent parents allowing the growing child to make his own decisions within the necessary limitations of his own judgment. For example, a good mother will say to her little son, "Dear, do you want to wear your rubbers or your galoshes to school this morning?" She has decided that he should wear some form of foot protection, and where it makes no real difference to his health, she allows him to make decisions for himself. Good parents so train their children that at 18 the children can be weaned from supervision and guidance, and thereafter can decide for themselves and meet the ordinary problems of life.

After 18 the parents should continue to offer their children such financial and domestic support as is necessary, and should be willing to interfere without request or offer advice and make decisions when the child is in danger, or in vital matters, such as being vaccinated against typhoid before taking a long automobile trip.

Business character can be developed in young workmen. When a new employee comes to work at a factory or office, he should be allowed some latitude in deciding how he will fulfill his duties. A clever foreman will tell him that he can turn an object on the lathe either from left to right or from right to left. A clever head clerk will tell the new office boy that he has to deliver three envelopes to three places in whatever sequence he decides to follow. For when an individual feels that he may make some decisions about his work he has started to develop a business character, and other things being equal, he will be of relatively greater value to his company in future years.

The strong character who has ability to make his own decisions must, of course, be differentiated from the opinionated person who complicates the lives of others by firmly expressing the first opinion that enters his mind without weighing the pros and cons of a situation. A man accustomed to making prompt decisions is more attentive, is less predisposed to cause accidents, is better equipped to deal with an accident which has been caused, and recovers more quickly from surprise after an accident.

Normal physical health, pleasant interest in his work, comfortable adaptation to his domestic and social life and to the changes in his environment, self respect, and the avoidance of such bad mental traits as mentioned above are important personal contributions which any average man, who is intelligently handled by his superiors, may make towards accident prevention and safety.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Refrigeration Section

Officers 1930-31

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Vice-Chairman—FRANK L. DUGGAN, Consolidated Ice Co., Pittsburgh, Pa.
Vice-Chairman—W. M. O'KEEFE, Cold Storage Division, American Warehousemen's Association, Chicago, Ill.
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E. G. HITT, Chicago, District Ice Association, Chicago, Ill.
FRED RASMUSSEN, International Association of Ice Cream Manufacturers, Harrisburg, Pa.
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J. F. NICKERSON, American Institute of Refrigeration, Chicago, Ill.

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Wednesday Morning Session
October 1, 1930

VINCENT WAKEFIELD, Chairman
City Ice Company of Kansas City, Kansas City, Mo.

The first session of the Refrigeration Section of the Nineteenth Annual Safety Congress convened with Vincent Wakefield, City Ice Company of Kansas City, Kansas City, Missouri, general chairman of the section presiding.

CHAIRMAN WAKEFIELD: The first item on the program is the report of the general chairman. I do not propose to weary you with any long and extended report. There are only two or three points on which I want to touch. One is that a remarkable record was made by our chairman of the Membership Committee. We stand this year in a very enviable position of having had an increase of some 205 per cent in our membership since the last Congress.

Another point is the report of the statistical chairman. The chairman of that committee can only start to function after the meeting of the Safety Congress, as he has to wait for a cycle of time so the figures can be collected. One thing this section needs to do is to cooperate more fully and more thoroughly with the chairman of that committee by giving him these accident statistics in your industry so as to get a broader spread and understand more clearly the causes and the degree of our troubles. The figures in one section or one state alone are of little value but if you get the figures throughout the country in forty-eight states, we will have some basis on which to work.

The third point is the News Letter. This is the means whereby you and I and everybody else interchange ideas when we can, and if we have experiences as the year goes on and have had accidents, if we do not tell one another about it, our combined experience is not of any particular value until we get down to the next Congress. If you have some new device you run across, or some bad hazard, or some depictable accident that happens in your plant, write to Mr. Fox. He won't publish names. It may be that your letter may contain some experience or suggestion that will prevent some loss of life or serious injury due to carelessness or negligence or oversight. I want to impress upon you that during the past year we have really not had from the membership at large the degree of material which I personally believe the News Letter Editor should receive. I most earnestly request that every person in the room send in some idea once during the coming year. If you do that we will have material to make a most interesting News Letter. Gentlemen, the next item is a brief report by Mr. Fox, the Secretary of the Refrigeration Section.

EDWARD H. FOX (National Association of Practical Refrigerating Engineers, Chicago): Gentlemen: Your committees have been functioning well for committees in an organization that is as new as the Refrigeration Section. On the progress made by the Refrigeration Section, you will find, in the general report published by the council an excellent picture of what the section has accomplished thus far. Considerable correspondence has been carried on between the members of the Executive Committee, Chairman Wakefield and your secretary which eliminated the necessity of more than one meeting of the Executive Committee. This was held in the Headquarters office April 16. Committee reports were received and other business in

connection with this program, the selection of subjects and speakers was handled. Your secretary has also acted as editor of the Section's News Letter.

CHAIRMAN WAKEFIELD: The next item, gentlemen, is disposing of a matter of business and we then can proceed with our program. It has been my pleasure, since organizing this section, to have had the whole-hearted support of a gentleman who has been a great strength within the refrigeration industry. I refer to my good friend Mr. Nickerson, chairman of the nominating committee, and ask that he give us his report.

Report of the Nominating Committee

J. F. NICKERSON ("Ice and Refrigeration", Chicago, Ill.): Mr. Chairman, your committee has canvassed the membership for nominations for officers and felt that it was fortunate in getting the consent of the previous officers to serve for another year. The Refrigeration Section, being little more than a year old, should be within the guidance of those who have had experience in this field. The list of the committees at this time, is as follows:

General Chairman, VINCENT WAKEFIELD, City Ice Company of Kansas City, Mo.

Vice-Chairman, FRANK L. DUGGAN, Consolidated Ice Co., Pittsburgh, Pa.

Vice-Chairman, W. M. O'KEEFE, Cold Storage Division, American Warehousemen's Association, Chicago, Ill.

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Chairman Engineering Committee, E. F. BRANDT, Middle West Utilities Co., Chicago, Ill.

Executive Committee, the officers and—

GARDNER POOLE, General Seafood Corp., Boston, Mass.

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J. F. NICKERSON, American Institute of Refrigeration, Chicago, Ill.

CHAIRMAN WAKEFIELD: You have heard the report of the Nominating Committee. Do I hear a second?

H. HILLENBACH (American Ice Company, New York): I second the motion.

CHAIRMAN WAKEFIELD: It has been moved and seconded that the report of the nominating committee be received and the gentlemen referred to be elected to the position to which they are designated.

(The motion was carried.)

CHAIRMAN WAKEFIELD: The first paper is on "How Safety Measures Affect Compensation and Insurance Rates." There are many angles to the safety problem, the altruistic side and the economic side, but at this particular moment we are considering the dollar and cent proposition from the employer's point of view. We will hear from Mr. A. W. Whitney, associate general manager, of the National Bureau of Casualty and Surety Underwriters, New York City, who will read the paper prepared for this session by Mr. L. L. Hall, of the same organization.

How Safety Measures Affect Compensation and Insurance Rates

By L. L. HALL
National Bureau of Casualty and Surety Underwriters,
New York City

Rates of insurance are in general based upon past experience. This is true in the case of most casualty insurance lines including workmen's compensation and liability. Safety activities then are the key to the rate situation because experience is merely another name for results. We might re-state the basis of rates by saying that rates for these lines are based upon the results of past safety activities or lack of such activities.

A short description of the rating processes in connection with workmen's compensation insurance will not only be interesting but will show you that this is the case. One of the first points to which I wish to call your attention is that workmen's compensation insurance rates are an expression of sales price in terms of wages. In my opinion, this produces some very unusual effects. In general commodities are sold at a price per unit of that commodity. This is true in the case of eggs, shoes, gasoline, potatoes, cloth, coal or almost anything you can think of. Even in the case of certain lines of insurance such as fire insurance and life insurance, the price is expressed in terms of the number of thousands of dollars of insurance purchased. In the case of certain lines of casualty insurance, however, for instance workmen's compensation, the buyer does not purchase a fixed amount of insurance—he buys a contract in which the insurance carrier agrees to take care of all compensation and medical payments for a fixed period, usually twelve months, and the price is a rate per one hundred dollars of payroll earned by the buyer's employees during that twelve months' period. Later on, I shall point out some of the effects which result from the use of wages as the sales unit, but I next want briefly to outline something of the technique of calculating rates.

Since rates are based upon experience or past results, it is necessary that such experience be recorded; also in order that unit costs may be calculated it is also necessary to record the payroll, that is the exposure or volume of sales corresponding to the loss exhibits. In the case of workmen's compensation insurance, the insurance company keeps a record of its experience. This information is kept for each state and industrial classification of which latter there are between six and seven hundred. The losses are recorded and a record is also kept of the wages earned by the employees who were covered by the policies. It is necessary that the record be kept for each state separately, for while within a given industry, such for instance as ice manufacturing, the chance of injury might be the same from state to state, the cost of a given injury under similar wage conditions would vary because of the differences in the benefits provided by the respective state compensation laws.

Where the volume of information so tabulated for a given industry, within a given state, for all or a large group of insurance companies, is sufficient to produce a real average, the experience of that industry in that state is used exclusively in determining the so-called manual or basic rate for that industry in that state. I have not attempted to check the situation in every state with respect to the classification of ice manufacturing, the one in which I assume most of you are primarily interested, but in states such for instance as New York and Texas the rate for ice manufacturing is determined exclusively from the experience of that industry within the respective state. In other states, such for instance as Illinois and Georgia, the industry within the state practically determines its own rate. Where the volume of experience within a state is insufficient to produce a real experience average, it is necessary to supplement the deficiency in volume by the introduction of experience from other states. When this becomes necessary the experience from such other states is adjusted

to reflect the benefit conditions of the state in which the experience is to be used.

The rate for ice manufacturing, then, is determined solely from the experience of that industry, and wherever possible the rate in any state is determined solely from the experience of the industry within that state. From this it is clear that in the case of states where the industry is important, when the insured ice manufacturers improve the experience of their industry they can bring about a corresponding reduction in their rate, and in other states where the industry does not represent so large a volume of employment the insured employers may nevertheless have an important effect upon their rate. This, however, relates only to the so-called manual rate. Most of you, I think, know that this rate is used as a basis and that super-imposed upon it there is the system of experience rating.

This system of rating recognizes the experience of the individual buyer of insurance. If his experience during the preceding five year period was better than the experience represented by the basic or manual rate, and his operations were large enough to have the results represent a really superior condition rather than mere chance, he receives a rate reduction, while if his experience is worse than that represented by the average, and again his operations were large enough so that the showing is significant, he receives a rate increase. The use of experience for a five year period brings in one problem. The experience for the earliest year of the period is not as representative of present day conditions as is the case with the experience for the most recent year. This situation is recognized by use of a system of weights which have the effect of diminishing the influence of the experience of the earlier years in relation to that for the later years.

Admittedly, however, there are some cross currents which also affect rates. I pointed out that the benefits provided by the laws of the different states are not uniform and that consequently the cost of a given type of accident would not be uniform from state to state. Consequently it is apparent that if the benefit provisions of the law of any particular state are changed, the loss payments will be correspondingly changed, and this will have a corresponding effect upon the rate. To that extent your rate depends upon the benefit conditions of the law in your state as it is at present or may be in the future.

In addition to this there is one other point which I mentioned, and now wish to recall to your mind, the point which I stressed at the outset, that is, that in the case of workmen's compensation insurance, payroll seems to be the only practicable sales unit. The business of ice manufacturing requires the employment of men doing different classes of work. For instance, in the operation of an individual ice plant there will be men whose work is relatively non-hazardous, and there will be those whose work is more hazardous. These men are all grouped together in the plant, and for compensation insurance purposes are rated under a single all inclusive classification. The rate for the classification being based upon the past experience of ice manufacturing plants necessarily represents the average of the hazard to which those men are exposed, but like all averages it may not necessarily fit a single individual to whom the average applies. There will be within the ice plant men who are exposed to hazards less than those represented by the rate, and there will be men exposed to hazards greater than those represented by the rate. Consequently, any process or organization change which affects the distribution of the men as between high hazards and low hazards will have an effect upon the rate.

If, for instance, revolutionary process changes eliminating the men now exposed to the higher hazards were to be introduced in the industry it is quite obvious that the average hazard of the industry would be reduced. Similarly, if such revolutionary change were to eliminate the men exposed to the hazards which are lower than the average for the industry, the average would immediately go up. This does not mean that more men would be injured in the industry—it merely means that with fewer men exposed to slight hazards the average hazard of the remainder would be higher. It would not be a case of increasing the number of men who

do get hurt so much as that of decreasing the number of men who do not get hurt. Such a reduction in the number of non-hazardous employees through increasing the average hazard of the remainder would necessarily increase the insurance rate unless at the same time the payroll were increased in an amount sufficient to equalize the hazard increase, but even though the number of non-hazardous men in the industry were to be reduced it would not necessarily mean, as just pointed out, that the industry was becoming more destructive of human life and limb. It would merely mean that the non-hazardous element of the average was being eliminated. Neither would a rate increase resulting from such change necessarily mean that the cost of the insurance was rising in terms of the number of tons of ice produced.

You are, of course, all aware of the fact that during the last ten or eleven years there have been tremendous changes in American industry. One of the important changes has been the substitution of machinery for hand labor, and in other cases it has been an increase in the amount of assistance rendered to the individual employee by means of mechanical methods. Figures taken from the reports of the Census of Manufacturers, issued by the United States Bureau of the Census and applying to the business of ice manufacturing, may be of interest. In 1919 the average ice manufacturing plant used approximately 18.9 horsepower per employee. In the 1921 census no horsepower figures were taken, but the 1923 figures show that by that time each employee controlled 31.46 horsepower, while by 1925 the figure had increased to 37.05, and in 1927 to 43.64. During the same period the production per employee increased. The number of tons produced annually per employee for each of the above census periods being respectively as follows: 924, 1,304, 1,612, 1,821, and even though the average annual per capita wage rose from \$1.124 to \$1.475 in 1927, the production per employee increased so rapidly as to decrease the wages per 100 tons. These wages for the census years above referred to, beginning with 1919 were respectively as follows: \$122, \$104, \$101, \$87, and \$81. From this it is apparent that inasmuch as the wages per 100 tons were 50 per cent greater in 1919 than in 1927 it would have been possible for the insurance rate per \$100 of wages to have been 50 per cent higher in 1927 than in 1919 without increasing the premium per ton of ice.

This is interesting in that it indicates that insurance and accident rates must be looked at from more than one point of view. Certainly they must be looked at in terms of men or wages, and they must also be studied in terms of production. The latter represents the cost in terms of units in which the buyer thinks and constantly deals. This has a very much closer relationship to the basis of real competition than when expressed in terms of wages.

Another interesting point is that safety is not merely a matter of safeguarding present industrial methods. If such were the case the safety problem would be rather simple. As soon as all the hazards in the present set up of industry were located and cured the job would be completed, and there would be no need for further safety work. Such, however, is not the case. Industry is not static—it is constantly moving and changing. New processes and methods with new hazards are constantly being introduced. We are in the position of the man in a row boat on a swiftly flowing river. We must work hard to keep from being swept backward.

At the beginning I said that the matter of rates was almost entirely in your hands. Yet the insurance company, in addition to its function of distribution of risk, also has a very important service function to perform. Its duty is to study accidents and accident causes, to analyze processes old and new in an effort to anticipate accidents and to furnish you with the benefit of its accumulated information at the same time that it receives the benefit of your experience. It acts not only as the organization which receives and distributes risks, but it also receives and distributes information to be used in reducing or eliminating those risks, and in collaboration with you is constantly striving to promote safety activities for the dual

purpose of reducing human suffering and economic loss, such results being of mutual benefit both to the employer and to the insurance carrier.

CHAIRMAN WAKEFIELD: Gentlemen, we have a few moments for discussion and I am sure Mr. Whitney will be glad to answer any question.

H. HILLENBACH (American Ice Company, New York): How is the rate fixed in the State of Massachusetts on public liability for automobiles?

A. W. WHITNEY: The automobile rates for Massachusetts are fixed by a state rating board, and they were not willing to have the national organization act.

Mr. HILLENBACH: On what basis do they fix their rates, on large trucks \$81.00 and small trucks \$51.00 a year?

A. W. WHITNEY (National Bureau of Casualty and Surety Underwriters): In general they are based on actual experience. We always run the danger of not having experience enough, and in that case, we have to use judgment.

A. J. HECKER (St. Louis Refrigerating and Cold Storage Co., St. Louis, Mo.): You make a rate for a certain industry. In this company we have three industries, warehousing, pipe line and ice plant. We must accept the highest rate for warehousing. Why is it that we can't divide the different industries under their different rates?

Mr. WHITNEY: That is one of those practical problems with insurance people which put us between two fires. We want to get down to as fine distinctions as possible and yet when we do get down, we run into other difficulties and you must have some kind of average between the two things.

Mr. HECKER: Is anything being done to take care of segregating plants instead of taking the highest rate where you have three plants under one head. In other words, there are certain plants that have a lower rate and yet we can't take advantage of that lower rate because in this industry we have a high rate and everything comes under the high rate.

Mr. WHITNEY: Where you use the high rate, it is based on average. It is definitely anticipated that in that average there will be certain low hazards but it is not practicable to get down to the detail.

CHAIRMAN WAKEFIELD: Frequently the various activities within any of the several industries or classifications affected by our industry tend to show better experience, and there is always some underlying notes of criticism because the rate doesn't follow it quickly. Can you give us some idea as to how quickly you amend your rates following the efficiency in the industry?

Mr. WHITNEY: I think it is about three years before it really gets into effect. Here is the situation. Our rates are based on the last policy of the year and must expire before that year is completed. You have to wait a year beyond the end of the year for the last policy to expire. More activities have happened which do not materialize for a long time; a man is injured, it runs into a case of blood poisoning and it may be a year or more before you know how soon that is. We have to wait almost another year for the experience to ripen enough to be of value. You don't know how serious the accidents are as some times there is litigation. After that you make the data up in the home office and they send it to the bureau and we compile it. It is a task and after that it is reviewed and rates made. Then it is published.

CHAIRMAN WAKEFIELD: I wanted the point brought out because it runs in the mind of the individual, "I am doing so much better but you have charged me the same old rate."

Mr. WHITNEY: We try to push it but in the experience range in which we take the account of an individual risk we can push it up there considerable with the use of experience within a few months. If you people have any questions we will be very glad to serve as a clearing house if you would like to refer them to us.

CHAIRMAN WAKEFIELD: Thank you very much, Mr. Whitney. Gentlemen, the

next subject is the "Importance of Cooperation Between Employer, Employee, Surgeon and Claim Department," and is to be presented to us by a very eminent authority on the subject. I take very great pleasure in introducing to you Doctor C. R. G. Forrester of Chicago.

Importance of Co-Operation Between Employer, Employee, Claim Department and Surgeon in the Prevention and Handling of Injuries

By DR. C. R. G. FORRESTER
Chicago, Ill.

A more important subject could not be discussed, although as a rule men prefer something more unusual and sensational. However, even in this comparatively simple paper I will, before I get through, at least interest, if not actually startle you. In order to arrive at something of a tangible nature we should discuss all angles that apply to the handling of the work and do it freely, frankly and fearlessly in accordance with the old phrase—

"Hew to the line and

Let the chips fall where they may."

Therefore, we start at the top and work down.

The Employer and His Obligations

In my work I come in contact with every type of employer from the large one to the "Vest pocket contractor." Their ideas range from the educated employer possessing the ideas of humanity, liberalism and personal interest down to that of indifference and downright penuriousness.

I realize that the big business man has his hands full and must necessarily deputize some one man to look after the matter, and the result is he is often careless in his choice, appointing a man not experienced or interested along accident prevention lines; in which event he will wonder at the end of the year why his premium cost goes up and blames everybody but himself.

Therefore, choose the right man for this position, likewise the superintendent, the bosses and the foremen for their positions of responsibility; men who understand the far reaching, disorganizing effect of wounded employees.

I know of one instance where the superintendent of a certain company succeeded in removing a competent surgeon from his company, a surgeon who had carried on the medical work very successfully, and in his stead had appointed a personal friend of questionable ability. Under such circumstances the one who suffered most was his employer.

The employer often is under the impression that once he pays his premium under the compensation law his obligations cease and the entire responsibility from then on lies with the claim man, who to him is the insurance company.

Such an impression is wholly wrong as the claim man actually is your representative and can not protect you unless he has your entire confidence and co-operation in every way. For instance: you are obligated to give to that claim department or claim representative immediately, a complete report of accident, as soon as it happens (no matter how trivial). That means a good organization in your own company. If the claim department then sees fit to ignore that notice and not check that case, you are absolved and the resultant loss should not be charged to the employer. If your report is forthcoming immediately after occurrence of an accident, it enables a claim department to make an investigation immediately, preventing subsequent family, legal or other complications, so that when the investigator commences his work, he finds a closed door.

Failure to report an accident on the part of the employer, may end in a year's time, in increased insurance cost and he probably will be inclined to blame the claim department. It is really his own fault.

Some employers are prone to have a physician handle their industrial surgery for reasons of his own, family or otherwise, and although the physician may be proficient in most lines of medicine and surgery, yet he may be a total failure in traumatic surgery and lacking in knowledge of compensation law and its demands upon the employer, claim department and injured man. As a result, such a surgeon is a liability rather than an asset.

There is a tendency on the part of some employers to "stretch" the coverage under an insurance policy. You would be surprised to know how often an employer will attempt to force his policy to cover an un-insured injury; even going to the extent of making out false reports, pleading with his insurance agent to have the insurance company accept that particular accident, or having his friend, the physician, make out a false report, without realizing that in doing so, he is not placing the expense on the claim department, but is simply developing a throw-back for which ultimately the employer clearly pays.

It behooves the employer or his representative to know the meaning of his policy coverage and abide by its contents or attempt to get one that does satisfy him.

In the case of a self insurer it is equally essential he carry a cost department for this work, as in any other department in his business; likewise pick a capable man, hold him responsible and it will not take long to find out whether self insurance, mutual, or stock insurance is most economical provided he has an effective statistical department.

If the employer has an effective statistical department, it will not take him very long, if he reviews accident reports, to establish means of precaution and prevent repetition of costly accidents.

The Employee

In the majority of instances the employee does not know what the compensation law is nor what it covers. Therefore, notices simply worded and suitably posted about a plant are a great value not only to the employee but to the employer.

In some states the employee can choose his own physician; in some he must go to the doctor designated by the employer. Many employees have no knowledge of compensation when under disability.

I feel that if the elements of the compensation law were explained to the working man, and he realized that he would get only \$15 or \$16 a week when disabled as against \$30 to \$50 or \$60 a week when he is working, I firmly believe that he would see to it that no accident did occur to him if he could help it. Very often the working man is misled by false information as to the monetary value of his injury, and upon poor advice, indulges in foolish legal procedure with the result the company naturally loses interest in his case and in the end the "shyster" lawyer is the gainer.

The employee should be gradually taught the value of a preliminary physical examination. It works to the mutual benefit of both employer and employee. While some unions object to it, it would be an economy in the long run, provided such medical examination was carried out in a careful, scientific way, and not in an indifferent manner.

The employee should also be taught the importance of promptly reporting all injuries to his employer, no matter how trivial, and should he fail to report, you can then devise a standard of penalties.

It is not the big injuries as a rule, that cost money; often it is the comparatively simple, unreported or untreated injury that ends disastrously. I will attempt to show later, where only one man in your plant may have a broken leg, compared with 15 or 20 minor unreported injuries, such as slivers in fingers, infected blisters or

callouses, those minor cases will result in a yearly loss of thousands of dollars as well as amputated fingers and toes.

Some ice companies supply their employees with a special type of shoe to protect their feet should they drop a piece of ice. In many instances the man will not wear them; the same is true with goggles and many other types of protection. Under such circumstances your superintendent should take radical action the moment indifference or carelessness is observed. You are not harming the working man; on the contrary you are helping him to learn caution.

The employee should be required to report his accident immediately, otherwise he may come in with a claim when it is too late to investigate. An investigation properly conducted might prove that the accident occurred in some place other than that of the place of employment.

The employee has his obligations to carry out as well as the rest of us.

1. Reporting his accident as soon as it occurs and if the employer or claim department see fit to ignore it, he at least is not to be blamed in the event of complications.

2. Complying with the use of certain safety precautions offered by the employer.

3. By not attempting to collect for injuries not arising out of or in the course of his occupation.

Of course, in this country I realize from years of experience that we have a distinctly cosmopolitan people to deal with, hence our difficulties. But in the majority of cases these men are not antagonistic to advice when properly given.

The Claim Departments

I put these under an abstract classification as some are self insurers, some are mutual, and others are covered by stock insurance. This subject however, is one that applies to all three.

To begin with, the claim man acts only as your agent, and can only protect your interests after accidents are reported. If you do not supply him with complete detailed information he can not make the investigation necessary to protect you. At the same time, as I see it, we have two types of claim departments or claim men. One is the underpaid man and naturally if under paid, he is usually inexperienced in the fine art of handling claims; once in a while he may be competent but forced by necessity to accept a salary not in accordance with his experience; in either event he is not an asset.

The underpaid, inexperienced claim man may do one of several things; he is either going to stick to first principles and attempt to improve himself and help his company or he is going to take his profits in his own way, at the expense of his company through a subsidy of some kind, perhaps from the doctor or from the "shyster" lawyer, or possibly both. Furthermore, in so doing he has to sacrifice his company.

It is not necessary to discuss the claim man who is competent and paid what he is worth. Although even here, "God did not make us on the same yard stick."

Some claim men are inclined to be lax in their methods in that even they will take it upon themselves to judge the nature and severity of an injury and decide that an investigation is not necessary until it is too late.

Often they are inclined to pass on medical conditions without possession of sufficient medical knowledge, in which event they are a liability to their company. They are apt to tell the surgeon what he should do, whereas if they would attempt to conduct their own department and allow the experienced surgeon to conduct his, and work toward a common objective, the situation would be more harmonious and undoubtedly more economical.

Several years ago when I became chief surgeon of a certain insurance company, the first time the manager came into my office, before my appointment, he said: "Now, Doctor, you may be chief surgeon for the company, but I am running it and I want that thoroughly understood."

Naturally, such an arrangement could not be a success; at no time did I have that man's confidence nor at any time did he ask me what I thought ought to be done, but attempted to prescribe surgical treatment. I never knew what costs were, nor was I asked to consult with the officials, all my suggestions were over-ruled.

My purpose of drawing this picture is to show that if the claim man realizes he is responsible to a certain department and at the same time freely and openly discusses his problems with other departments, he will make a wonderful success.

The claim man can not expect his associates to work successfully with him, such as the employer, the injured and the surgeon, unless they understand his difficulties.

The other angle is that the claim man certainly has his troubles. The employer expects him to take care of friends and strangers, when an accident occurs, whether covered or not under the policy. The claim man is blamed by the assured or employer for losing money and increasing his premium rate, while the employer insists on having Dr. J., his family physician, handle his injured employees when he is not trained to that particular kind of surgery. The agent also comes in and gives the claim man "H" for not taking care of a certain case when the agent knows full well the case is not covered, but in order to "stand in" with his client, blames the claim man when in reality it is the agent's fault in not explaining the terms of the policy.

The claim man is supposed to be a sort of "good man Friday", in overcoming obstacles and "God help him if he does not." As a matter of fact it is not up to the claim man alone; it is up to all of us to make our each and every department a cohesive part of the workable organization.

A good claim man can do more to satisfy a disgruntled working man and avoid a lot of useless, costly litigation than can be seen on the surface.

The claim man should, of course, put capable men in his department, hold them responsible and in this way demonstrate that he is capable by showing actual figures in black instead of red, in which event he is bound to be recognized in a substantial way by his superior.

The claim man should not put all medical men in the same category, but recognize medical fees based on results. Brow beating all medical fees as a matter of principle, is not good judgment and leads to misunderstanding and eventually putting his company in bad standing. The result of such tactics is that many times I have heard the remark from a doctor "well the claim man cut my last fee in half but believe me I got him this time."

In the long run it pays to pay the capable doctor who saves you money and eliminate the incapable one. "Comparisons are odious" and when the claim man says to Dr. "G" "your fees are much higher than Dr. "B", he is only "baiting the bear", as there is no basis for comparison. The ultimate degree of recovery of the injured workman is what counts.

One claim man said to me, "Doctor, your fees for hernias are too high; I can get the same operation for \$25 less from other surgeons." I replied, "I know you can; go ahead." He did so and a few months later came back, apologized, and asked me to re-operate the case for which he had paid \$25 less. Such experiences are expensive.

The claim man sometimes leaves a bad case in the hands of a local doctor, who is experienced in minor but not major surgical work, until after the damage is done, thereby doubling his medical cost. He can improve in this condition by a check up system and soon decide just what each doctor can or can not handle.

The Surgeon

This department is one that requires analyzing. To begin with there are two types of surgeons handling traumatic surgery; the capable traumatic man, and the incapable.

Then too, traumatic surgery or the treatment of injuries is becoming more and more specialized because of the demands brought upon all departments of business through the enactment and changes in compensation laws.

Therefore, surgery in its different departments has had to keep pace accordingly. Competent surgeons have had to do one of two things; develop along with the times or stand still. Hence, the capable and the incapable. We either attend clinics to improve ourselves or continue along iconoclastic ways.

Surgery, for instance, has progressed so far and so rapidly that we are today minimizing the death ratio by much more use of local anesthesia. Those who do not care to learn these methods continue, from a surgical standpoint, to be a financial loss to a corporation. I might talk indefinitely along lines of different types of advancement.

For instance, practically all types of fractures can today be set under local anesthesia, thus protecting poor surgical risks and thereby cut down the death rate from anesthetics.

The American College of Surgeons is attempting to improve the treatment of traumatic conditions but they are only beginning where some of us, who have been at it for years, are still finding new ways to minimize results of injuries and conserve human life.

The incapable surgeon is a liability. You may be under the impression that by getting a man at a salary or a low rate of medical cost, you are saving money. It can be proven by a very simple experiment.

Taking those same cases, total up what each man cost you on the temporary total disability; then find out what each man cost you on the ultimate specific loss and earning power of that man. I think you would unearth some startling figures.

One thing I can not understand is why a large corporation will obtain the services of an expensive firm of attorneys to save them money, but have the cheap doctor to handle lives.

I understand some may take offense at some of these remarks, particularly those of you who have a good costly medical organization, or you may subconsciously feel that I am upholding you and the other type may take umbrage at my remarks.

There is also the type of incapable doctor who subsidizes your claim man or your employees, in order to get business, and the heads of your organizations can not know what is going on except by the careful analysis of results.

Personal attention of a physician to your cases can eliminate a great deal of friction. The working man lives in a small circle but that circle is to him just as important as your big circle is to you. Therefore, each man should be treated as an individual personality.

So the doctor enters the picture, in this respect, in a very responsible position. If he takes a personal interest in each case he can do wonders toward keeping the employee in a good frame of mind, amenable to reasonable adjustment by the claim man.

Unfortunately, many physicians fail to see this condition and are not a help to the claim department.

There is also a tendency on the part of the surgeon to have under him assistants of two types: first, the medical student; second, the indifferently educated graduate who works on part time.

The first type is distinctly a liability because he has not the practical knowledge to make his work a success and secondly, the senior has not the ability, inclination or time to educate the junior. Furthermore, the surgeon who hires an undergraduate is the man who is doing the work at a nominal figure and can not afford to pay for the services of a capable man. There is no question as to the outcome.

The second type is equally dangerous because he does not know the fundamentals of traumatic surgery or the business end of its practice and yet, because he is a graduate, he takes exception to suggestions from his superior and makes mistakes equally as costly as those of the first type mentioned.

There is the occasional man on "part time", who is well educated, open to suggestion, and is taking this opportunity to enlarge his knowledge; he is not a liability, providing the man over him is competent and supervises his work.

There is another element which I think should be discussed: the attitude of the surgeon testifying for the companies. In this respect we have some very vicious elements to deal with.

One is the doctor who testifies for a fee and not for a principle, or with respect for his own knowledge. This man you will find one day testifying on one side and maintaining certain conditions, and on the next day he will testify on the same type of case in a manner diametrically opposite.

It is unfortunate that such conditions exist, but the doctors are not altogether to blame, because I find that the claim man and the attorney will occasionally use this type to gain their own ends.

The physician who lives up to his ideals, therefore, has a hard time because he is usually called on cases where it is felt he will win.

To a certain extent the blame lies, with the many different industrial commissions in that it is rather natural they are partial to the working man in their consideration of the testimony, thereby making it difficult for a self respecting, honest, capable surgeon to go in before a commission and give an opinion that he feels in advance will be overthrown by a representative of the industrial board who pays little or no attention to the surgeon's standing or ability.

I have had as many as four or five clean-cut, capable men, men who do not depend upon companies for their living, but through consideration for me have been willing to testify. Then the situation has arisen where one or two physicians of questionable standing on the other side testify and the result is a finding against us. Under such circumstances is it really worth while to go to such expense? I say it is better to settle with the man and if necessary give him the money it would cost to try the case.

To say the least, such situations are disheartening as it is getting to the point in some states where we can not get a capable, self-respecting surgeon to interest himself. As one man said "Forrester, it is an insult to ask me to testify because I know my opinion is not even given consideration." I realize I am stepping somewhat outside of my topic, yet these matters are of great importance.

Again, it is disheartening to accomplish a fine piece of surgery and know by past experience that the patient can go back to work and earn his same "per diem" as before and yet have the commission give him an unreasonable award.

This is not mere idle speculation or abstract statement, as I have seen too many such cases, that I have personally operated upon, come back to me later for some minor injury and advise me they are doing the same old work at the same old pay.

And yet, certain physicians at the time of trial will testify that such a man can never again do that type of work.

There are, of course, faults on both sides. There are physicians on the company's side who will get up in court and swear that man is capable of doing the same work he did before the accident, knowing that he can not. They do this, as well as minimizing a man's disability, thinking they are "standing in well with their company." It is true such physicians may be impressive for a time, but if that company has brains or reasoning power at all, it will eventually realize the true situation.

Of course, I realize it is most difficult for you gentlemen to see a way out of these difficulties, and some of you are probably saying, "Well, it's the same old story, what can we do about it?"

There are many ways out, as I have tried to show you, if you will analyze it carefully and keep in mind:—

A poor piece of surgical work at the hands of an incapable surgeon nearly always results in a dissatisfied man taking action costly to a company.

A good piece of surgery performed by a capable surgeon should result in a satisfied employee, a proper settlement, and of even greater importance to society, the restoration of a wage earner to his previous earning ability.

CHAIRMAN WAKEFIELD: We have this problem, Doctor, operating in small towns far removed from a large center like Chicago. We have a number of cases where a local doctor is not progressive and we do not have an available hospital with suitable equipment. We get a medical report which is not satisfactory. What is the best type of medical supervision with which to handle that kind of a setup.

DR. FORRESTER: If you have a chief surgeon, let him have those reports and do the checking up with that local physician.

CHAIRMAN WAKEFIELD: By mail?

DR. FORRESTER: If he considers it advisable. If he doesn't, call him up; a few cents on the telephone is much more economical than a few dollars or a loss of a finger. If you do not have a chief surgeon, then the logical thing to do is to have a live man in your claim department who has enough experience to justify him in using some judgment to get in touch with that doctor immediately. If the claim man will spend an hour with that doctor explaining to him the claim man's troubles and what they are, he will get that doctor's cooperation.

CHAIRMAN WAKEFIELD: Any other questions? If there are no other questions we will continue the program. The next subject on our program is a "Model Safety Meeting for an Ice Company". I am going to ask the cooperation of the audience. From the moment I move from the Chair, everybody in the room will please consider themselves as employees on the payroll of an ice company, coming in to attend the monthly safety meeting. I am now going to turn the meeting over to the man who will act as Chairman, who has written and prepared this part of the program and we are very grateful to him. Mr. R. A. Finch of the Bureau of Safety of Chicago. Mr. Finch took charge of the meeting with Mr. C. C. Rosenbarger acting as secretary.

(This playlet has been mimeographed, and copies may be secured by writing the National Safety Council headquarters offices, Civic Opera Building, Chicago, Ill.)

CHAIRMAN WAKEFIELD: I want to express my appreciation to Mr. Finch and the Bureau of Safety for the safety meeting you have just witnessed.

ADJOURNMENT

Thursday Morning Session
October 2, 1930

VINCENT WAKEFIELD, Chairman
City Ice Company of Kansas City, Kansas City, Mo.

The second session of the Refrigeration Section convened with Chairman Wakefield presiding.

CHAIRMAN WAKEFIELD: The first paper on our program this morning is by a member of our Executive Committee, Mr. George C. Baker.

Modern Methods of Accident Prevention in the Refrigeration Industry.

By GEO. C. BAKER
Assistant Secretary, Consumers Company, Chicago, Ill.

We know time changes; we have seen remarkable changes in our methods of transportation, in the style and construction of buildings, in our dress, in the introduction of labor saving devices, in types of sports and amusements, and particularly in the manner and speed of production of commodities and our general attitude toward labor, skilled and unskilled.

Now, in order to keep abreast with the apparent terrific progress of time, to be consistent, we must modernize our efforts to prevent accidents. The splendid old phrases, "Safety First" and "Always be Careful" have lost a lot of their original "punch" unless they are presented and enforced in an up-to-date manner. An automobile was called by that name fifteen years ago, but who today would purchase and operate a car made then, so long as the present improved style is obtainable? Then why be satisfied with an old style of accident prevention program, which may have become obsolete, ineffective and probably does not fit your situation now?

The question which naturally arises in your minds undoubtedly is: "All right, tell us how to modernize and make more effective our efforts to promote safety?"

My answer probably will stir up in your minds the obstacle of doubt, as it will at times border on and even overlap the field of theory. But didn't our predecessors theorize and experiment to a considerable extent when they started this great humanitarian work? For instance, where we cannot foresee a definite result as the answer to a specific act, we must speculate as to the effectiveness and ultimate outcome of our efforts. Someone has to do the pioneering.

Practically all the machinery in our refrigeration industry today is guarded as much as possible without interference with its operation. So strong has become the demand of safety in all commerce that manufacturers are constantly designing their products to make them more foolproof and safer. They are protected at every point where even remote danger may lurk.

This being the case, we must of necessity turn our thoughts and efforts to the other element in industry, the greater and really more important element, i.e., the human being. I say this without reservation. A machine can always be replaced but a life can not. And who would trade his arm for an artificial one?

Right here, let me tell you the effective safety spirit must start from the top of your organization; and it must be sincere in order to remain potent as it filters down through your superintendents and foremen, to the men who actually perform the laborious and hazardous tasks in your plants.

Don't let your safety spirit fall into the category of the old southern negro who

said he had just shot a bull frog which weighed 102 pounds. His statement sounded preposterous, and his listeners demanded that he produce the frog, which he did. When it was placed upon a scale it weighed exactly 2 pounds. As an explanation he said the 100 pounds was "the bull."

But how to get this highly important lesson to your men and make it "stick" is the question. When a new man is employed his foreman should first firmly impress upon him the fact that he will be expected to perform his work in a manner that will insure not only his own safety but that of his fellow workmen as well; that injuries benefit no one; that they are costly to his employer, and may result in his dismissal if they occur too frequently and can be charged to his conduct; that the injured is *always* the greatest loser; that the compensation he may collect for an injury will reimburse him only partially for lost time, and that the cost of all injuries is ultimately charged back to him indirectly in the price of the commodities he purchases. He should be acquainted with the complete operation of any machines with which he may come in contact. There should be no air of mystery or discovery about anything he is to do. He should be physically able to perform, without strain or quick fatigue, the work assigned to him. He should be taught to be alert to observe conditions or situations so that he might be able to safely adjust himself to them. Instruct him as to the importance and use of guards and other safety devices; that they are for his protection. Be courteous to him. Start him right. Make him feel free to come to his foreman with any worth while subject. He may develop valuable suggestions. Create in him the feeling that he is a part of the entire organization and not merely a puller or a handler. Observe him for a few days to see that he does his work in a safe and efficient manner. If he does anything in an exceptionally fine way, compliment him. We are all susceptible to praise, and its distribution does not appear adversely in your cost sheets. Let him know that he is not forgotten.

Also—and this is important—observe all your employees to see that they do not develop careless or inefficient habits. We are very prone to become victims of common surroundings, and frequently require the aid of someone else to set us to rights again. Furthermore, if your employees know that their actions are observed at irregular intervals it will have a tendency to keep them on their toes.

Teach your employees to keep their tools in proper order. Never require them to use a tool that is a potential danger. Urge them to be orderly; to bathe frequently in warm weather, and to exercise common sense in their diet. A slovenly person invariably is a careless and undesirable employee. If you start your employees right they should respect the authority of their superiors, and if they do it is surprising how easily they may be moulded into safe, efficient and loyal workers. If they do not respond to reasonable rules, instructions and supervision, then they are not worthy of their hire. Some men are careless only because of improper or inefficient supervision. Analyze your situation, and if this is the case correct it. Others may be just awkward. These latter cases have to be dealt with individually. If a man cannot be trained to overcome his awkwardness, it is best to dismiss him. A person may be an honest, industrious employee, but if he is frequently injured through his own acts—and I mean by this accidents which can be traced directly to his own actions over which he alone has control—an analysis of the cost of his injuries may prove that he is an expensive man to keep on the payroll. In some instances this can be corrected by assigning him to other work. However, if this does not solve the situation then you should take summary action. Do not permit sympathy to become a factor in your judgment. A wise employer does not keep a man in his employ who is not an asset. Keep and consult your accident statistics for information on this subject.

Fatigue, improper ventilation, poor housekeeping and crowded working conditions are conducive to accidents. First, be sure the men you engage are sufficiently healthy and physically able to perform their work without undue fatigue. Quick fatigue may result from several causes, the most prominent being poor health, unsuitableness

to the task, and improper ventilation. It is my opinion that it is good insurance to subject your men to a physical examination. By this method you may forestall many so-called accidents which are in fact only an aggravation of some pre-existing condition. You may also discover that some of your men are hypersensitive to certain fumes and contact with certain chemicals and therefore unsuited to employment in a refrigeration or ice manufacturing plant. The three latter features are more or less mechanical and should be attended to by the plant management. However, they should receive immediate attention. Set a good example for your employees. Study your individual conditions. Perhaps by the expenditure of a small sum of money along these lines you may be able to prevent an accident which might cost you a much greater sum. Forestall accidents. It is by far the more economical and happier method.

Now, to keep your employees safety minded, don't keep the circumstances surrounding an accident or its cost a secret. Most men are amenable to reason and might be considerably more careful if they knew the actual cost to their employers of the more serious injuries, which, of course, is in addition to their loss—monetary and otherwise. Let them know of the pain, suffering, misery and distress suffered through injuries, for which there is no recompense, so that they may avoid similar accidents. Advise them that major injuries frequently interrupt the promotion of the injured to a better job and in cases of protracted disability oftentimes disconnects him entirely from industry, necessitating a new start in life. Drive home indelibly this adage: *It takes less time to avoid an accident than it does to report it.*

Provide attractive bulletin boards—weather-proof if they are located outside. These should be placed in positions where the men can see them frequently and can congregate about them without crowding and without interference of operations. From time to time call the attention of your employees to these boards. Ask for their comments on posters. Be sure to attach the posters in a neat and orderly fashion and see that they remain that way. Consult the *National Safety News* and order posters which are most suitable to your needs.

Posters are a splendid vehicle to convey the safety idea to your men and are indispensable to keep it before them. They silently "speak" a universal language and can be understood even by those who are illiterate. The length of time a poster should remain on the board is largely a matter of individual opinion. If a poster is worth while, it is my thought it should remain sufficiently long that the men may learn its lesson well. If they are changed too frequently they may be given, so to speak, just a passing glance and then are as quickly forgotten. One poster well learned is worth many that are merely seen. It is pleasing to see the kaleidoscopic view from a train window but try to remember the details. The majority of men in our plants may not have had the benefit of a higher education, and consequently can not assimilate and retain the message of posters if they are changed too frequently. They might become confused. Some posters warrant a longer exhibition than others. Exhibit seasonal or commemorative posters at the proper time.

Do not be fearful to inject sternness into your accident prevention program. Let your men definitely understand that their employment is predicated upon their willingness to perform their tasks in a safe manner, to observe the use of guards and other protective devices and to comply implicitly with your safety rules and regulations. Teach them; demonstrate to them that you are their leader; that the matter of accident prevention is a mutual enterprise, and that the end result is a reflection of your combined efforts.

Your safety investment should be required to pay pleasing dividends. Audit your efforts and see that it does.

CHAIRMAN WAKEFIELD: This meeting is now open and I would like to hear a full discussion on this paper.

HERMAN HILLENBACH (Director of Safety, American Ice Co., New York City):

Do any members of the Refrigeration Section require a physical examination of their men and what benefits or results have been obtained?

R. F. BROWNE (Secretary-Treasurer, Southland Ice Co., Dallas, Texas): Just recently we inaugurated a system and require physical examination in our organization. We had two or three men sustain minor injuries that developed seriously. These cases went into the courts and cost us a considerable amount of money before we finally disposed of them. We have learned our lesson in that regard, and all men who come into our organization are required to have a thorough physical examination.

C. C. ROSENBERGER (Safety Engineer, Bureau of Safety, Chicago, Ill.): We had two construction jobs and on one we did not require physical examinations. This company had more than 100 lost-time accidents. The other company that required the physical examination had 5 lost-time accidents. I think it is profitable to have the examinations.

CHAIRMAN WAKEFIELD: About four years ago our company started physical examinations and we wouldn't go back to the old plan under any circumstances. We have found that the application of the old adage that you should never try to save money on medical attention goes down to the point where you should make sure that the individual coming in is reasonably fit. It is not just a cursory examination. The surgeon completes a rather exhaustive report. We have found many benefits from requiring the examination.

E. A. BRANDT (Assistant to Vice-President, Middle West Utilities Co., Chicago, Ill.): We had one case which occurred during the construction of an ice plant. A rather sketchy examination was made by the physician but this particular man had varicose veins and it wasn't noticed. He was injured and claimed he hit his shin against the cross-bar of a wheelbarrow. It developed into a rather serious injury due to infection. The fact that we had a certificate from the doctor was not very good protection because the examination has not been thorough.

CHAIRMAN WAKEFIELD: It is particularly worth while in these days of compensation. Most of us operate in a state where there are compensation laws, and while states exempt any claims from hernia, you will find that virtually every commission will allow the hernia claim if there is any attempt to show that the hernia has been increased since the man was employed.

MR. BANEY: I heard a doctor speak on the extent of physical examinations, and he brought out a remarkable point: He suggested that the patient be stripped from head to foot. He discovered that a great many so-called back injuries and strains are due to flat feet, showing that the examination should be thorough if it is going to be worth while at all.

CHAIRMAN WAKEFIELD: The next item is a round table discussion on the safe handling of refrigerated products, separated into three groups. "The Safe Handling of Ice Cream" is the first item and will be presented by Mr. DREUX.

The Safe Handling of Ice Cream

By A. J. DREUX
Rieck-McJunkin Dairy Company, Pittsburgh, Pa.

The particular hazards in an ice cream plant are not many in number and those present cause accidents of a minor nature.

Ice cream manufacturing machinery is not, in most cases, of a design which is at all dangerous to the operator and the few places of danger have been well guarded by modern design. We have no belts and no open drives. The very nature of the product requires complete enclosure; first, to hold the liquid product; and second, to

insulate it against loss of heat for refrigeration depending upon the stage of manufacture.

The two most general hazards present are slippery floors and ammonia gas.

The raw material, consisting mainly of cream and milk, is received in ten gallon cans. This material is dumped and passed from one process to another. In this handling there is a certain amount of spillage. The fatty nature of the product causes almost any surface to become slippery. This is especially true in this case, because all workmen wear rubber shoes on account of the large amount of washing necessary. The combination of the last two conditions makes it imperative to use floor surfaces which are fairly rough. Tile and very well floated concrete are not at all suitable. We have found that a rough finish concrete with a steel grid plate incorporated to provide protection against cans and trucks gives the most satisfactory floor.

In the case of ammonia gas, the chance for leakage is slight and if one is immediately removed from such gas, the effect is not dangerous. In fact, it is almost always possible to get away from the point of leakage. Proper protection includes high pressure relief valves on lines and gas masks properly located. A gas mask should never be located at a point of possible leakage. It should always be located at some point convenient to the point of leakage which has little chance of being affected by a leak. In this way, it makes it possible for someone to get to the mask, don it, and then proceed to the point of danger well protected.

The previous discussion covers the general hazards of an ice cream plant and I will now outline the condition peculiar to each process in the manufacture of ice cream.

The first process is the dumping of cans containing cream and milk which are pumped into storage tanks. The lids of these cans are closely watched to see that they are in good shape. A broken can lid is liable to cut a man's hands either in rolling it or in removing the lid. These cans are sealed and occasionally, if a man is careless, it is possible for him to scratch himself. Modern design in glass-lined tanks has eliminated almost every possibility of injury. The manholes are placed low so that no ladders are needed to get in them, also so a man cannot fall in while steam sterilizing the tank.

In the pasteurizing and freezing rooms there is practically no point of danger. Previously, the lifting of sugar and fruit barrels constituted a possible cause of strain and hernia. This has been eliminated in most large plants by the use of overhead storage bins filled from upper floors.

In the hardening rooms, there are two hazards which can be easily overcome with proper procedure. First, is the low temperature of 15 degrees and 25 degrees below zero. By proper clothing being worn and scheduling work so that a man is allowed to come out every half hour, there is little danger of being frost-bitten or taking cold.

The ice cream in cans is stacked in these rooms, and if the proper stacking methods are not used there is always the danger of a stack falling. Some plants use shelving, but this method uses a great deal of space. The best plan I have seen is the use of heavy galvanized steel racks which are placed between each layer of the stack to prevent a slip.

In the loading and shipping of ice cream, the only real danger is the ice crusher. To prevent accidents, this is placed overhead in little used space and so enclosed that there is only room for a cake of ice to slip in to the crusher. In some places the crusher is so placed that the block must be lifted from the floor about eighteen inches to the opening of the crusher so that it is not possible to slip into it.

CHAIRMAN WAKEFIELD: Gentlemen, are there any questions you would like to ask the speaker, or have you any comments to make? There must be some points about this paper that can be discussed. What experience have you had in the use of dry ice, and what do you furnish your employees to protect them when handling it?

Mr. DREUX: We use quite a bit of dry ice for shipping various products. At first it caused a lot of discomfort to the men, and in some cases slight burns due to the fact that it was cut up by hand. The men would have to hold the block of ice and cut it. We have since started to use band saws, and the man is provided with heavy gloves, so there is not much chance of burns.

The greatest hazard in dry ice is not with our own employees; it is with our customers. The public doesn't know just what this dry ice is. They pick it up, and there have been cases of very severe burns so each piece of dry ice is put in a paper bag, and on the outside of the bag is printed the word "Danger" in large letters, and then we tell them of the danger of holding this dry ice or of putting it in the mouth or in anything else. Each package of ice cream is marked that way, and we haven't had one accident reported to us in Pittsburgh as the result of the handling of dry ice.

CHAIRMAN WAKEFIELD: I asked that question because when the dry ice first came out in Kansas City, one of our ice drivers got mixed up with one of the ice cream drivers. Our employee didn't realize how dangerous dry ice was. The ice cream driver knew that this product was peculiar and that every one was interested in it, and he said, "I'll tell you what I'll do. If you will hold this piece of ice for a few minutes, I'll give you a block of ice cream."

Our man said he would hold the piece of ice, which he did. About nine o'clock he called the doctor as he had a severe burn. We paid fourteen weeks compensation because he did it in the course of his employment.

We will go on to the discussion of the safe handling of ice. We have the pleasure of hearing from Mr. Arthur E. Scott, Director of Safety and Insurance, Central Illinois Public Service Company, Springfield, Illinois.

Safe Handling of Refrigerated Products—Ice

By A. E. SCOTT

Director of Safety and Insurance, Central Illinois Public Service Co.,
Springfield, Ill.

To assemble in convention such as this for the study of accident prevention, has been of immeasurable value in this great humanitarian endeavor to those who are privileged to attend, but for such conferences to result in the greatest amount of good in our safety work, the information developed at these meetings must be conveyed to the individual employee.

The News Letters published by the Refrigerating Section of the National Safety Council are mailed to the officials of member companies. However, they are of little or no value as file material, but they are of great worth when distributed and used as program material in employee meetings. Therefore, it would seem that there is a great deal yet to be done in harmonizing operation with policies of the Council.

It is now the policy of many of the operating companies to foster their own organization bulletins covering sales and service, and yet the reading topics rarely, if ever, make reference to accident prevention, and in the mind of the individual employee this work is relegated to an unimportant position. Many member companies are conducting definite programs of employee training. They are trained to become better salesmen, also trained in the importance of public contact, and yet the task would be no more difficult to train them to become their own safety agents. They are unable to carry with them their instructor in these efforts, and it is equally impossible for them to take with them their safety instructor; therefore, it is vitally important that safe practices become a habit if accident prevention work is to succeed. It is an individual rather than a group responsibility.

We have the problem of responsibility of accidents and it is important that this be made individual and undivided. Too often when safety work is being presented at group meetings, the individuals agree that it is all well enough, but it does not apply to them personally, for they have not had a recent accident and conclude that they are immune. Safety work, to be most effective, must be directed to the man who has not figured in a recent accident, for the employee who has figured in such an accident realizes the importance of safety work.

Since the ice business is a very seasonable one, safety work becomes an important responsibility due to the added hazard of working hurriedly, which is often necessary, and it is only through the careful selection and training of employees that such hazards are recognized and safe practices are followed.

An unusual accident was reported in the August issue of *Ice and Refrigeration*. In Oakland, California, an employee of an ice plant was drowned in an ice can 48 inches deep, with an opening 11 x 22 inches. His body was discovered, slowly freezing, by the night operator at the plant. The operator was unable to remove the body since it was wedged into the can and it was indicated by the bruises on the body that the injured had struggled desperately to release himself, but apparently the struggling only wedged him deeper.

This tragedy is unparalleled in the ice industry and it probably would have been thought impossible for such an accident to occur.

The early history of safety in the ice industry was confined to prevention of ammonia burns and ammonia gas asphyxiation, hence the advent of gas masks was one of the early developments in safety appliances. Today the majority of accidents are classified as miscellaneous, such as slipping, tripping, falling, straining, crushed and punctured fingers and toes; therefore, a small number of accidents are due to unprotected equipment. In the delivery of ice, safety work is concerned with provision of traffic rules and ordinances, stopping and starting as well as backing, of motor equipment.

Some of the more important accident prevention work is in the selection of higher type employees, giving consideration to environment, personal habits, fatigue factors, health, strength, and general physical condition, as determined by a thorough physical examination. Other influences in safe practices might include increased wages, improved equipment, such as waterproof ice bags for delivery of ice, uniforms for ice delivery salesmen, pick sheaths, back pads and safety-toed shoes.

Interest in safe practices are improved through employee training in the fundamentals of refrigeration, a more comprehensive understanding of ammonia tables, and charts, high and low pressure and temperatures, a keener conception of existing hazards in connection with high voltage electricity and a thorough knowledge of the application of the Shaefer Prone Pressure method of resuscitation.

Efficient and economical operation has made necessary the conservation of time and energy; as an example: the front end delivery equipment has the effect of increasing employee production without sacrificing safe practices and in addition to this, has eliminated the hazard of children climbing onto the rear steps of the trucks using the old method.

A careful analysis of the facts causing accidents and the adoption of proper safety appliances and accident prevention measures, are of vital importance. Foot injuries have been materially reduced by the use of safety-toed shoes and should be made a part of standard equipment for ice employees. Before safety appliances are accepted, a thorough examination and tests should be made to guard against inferior equipment, which may prove an added hazard. Many accidents are due to a lack of proper examination of new equipment such as scoring machines, cubing machines and ice crushers, and then the necessary steps must be taken in order to safeguard their operation.

In summing up the subject and problems involved in the safe handling of re-

refrigerated products, we are again confronted with the old perplexing question of finding a solution. It is very little different from the situation that has existed to a greater or less extent in other branches of the utility business. We do not know of any way to gain the objective desired other than the method that has been employed in the past. That, we feel, has been in some measure effective; supplying the employee with safety devices and making every effort to instill into each worker's mind how it is to his own advantage as well as to that of the company for which he labors to acquire an attitude of safe thinking that will react to his own welfare and at the same time make him a more valuable employee.

CHAIRMAN WAKEFIELD: I would like to hear from some of our friends in the same industry in Pittsburgh. I am from out in the Middle West and would like to know a little more about what you do down here. I want you to help us and we would like to help you if we can in discussing these common problems.

FRANK L. DUGGAN (Consolidated Ice Company, Pittsburgh, Pa.): I would like to ask Mr. Scott if they operate their own delivery equipment?

MR. SCOTT: Yes.

MR. DUGGAN: What success are you having there and under what system do you operate your accident prevention crews? Do you have your men grouped in your different delivery organizations?

MR. SCOTT: Yes.

MR. DUGGAN: Under what plan do you have them?

MR. SCOTT: We hold regular safety meetings, and at these meetings such programs are conducted as to callist the personal interest of each individual. Especially do we give attention to the new employee. During the rush season, we have extra employees, and we have, through these employee meetings, been able to reduce the accidents to a minimum. These meetings are held every two weeks.

MR. DUGGAN: That answers my question.

It may be of some interest to know that at the present time in the city of Pittsburgh we are conducting what is known as the Interfleet Contest. There are 97 fleets entered in this contest, with nearly five thousand drivers involved.

Our own company had a remarkable record over a six-month period, which was from October to March, and was awarded a bronze medallion for the record which we were fortunate enough to make. But we haven't been as fortunate in the last three or four months. We attribute this, of course, to our summer pick-up. We all realize that the ice business does not give us sufficient time to train or drill the new men whom it is necessary to put on during our rush season, but this contest has created considerable interest among the drivers, and we feel that the moment we dispose of many of our summer drivers and get back to our winter men, we will again be one of the prize winners in this contest.

It has been very satisfactory, not only to our company, but to all of the other companies that have participated in it. The drivers are keenly interested in it. And the Western Pennsylvania Safety Council has been assigning speakers to these various companies that want men to come and discuss safe practices with their drivers.

CHAIRMAN WAKEFIELD: There are quite a number of devices, such as ice tongs, which, under the urge of colored advertising, are being sold as especially safe tongs, or especially safe shoes, or especially safe this, that, and the other thing. There apparently is no restriction on the use of that adjective, and the individual who has not gone into it thoroughly or who may not be able to know whether that is a safe shoe or a safe tong, is immediately misled by the fact that it is represented to him that way.

Wouldn't it be wise for this industry to set up some clearing house, where manufacturers of such equipment can get the approval of a competent committee, and

until that has been done we can take good care that the entire industry knows that until the approval of that committee has been received, they shouldn't purchase any such equipment?

We can have a competent engineering committee to look into it, and through the various trade journals we can popularize any of those devices that are submitted to us. We should not select one manufacturer of tongs. I am perfectly willing for the committee to put their approval on fifty manufacturers of tongs so long as they can satisfy our committee that they are safe equipment.

I would like an expression from you. Don't hesitate to tell me if you don't think the idea is any good. We are here to discuss these things.

MR. DUGGAN: I am in favor of it. If it is in order, I would like to move that a committee be appointed.

CHAIRMAN WAKEFIELD: It is perfectly in order. Do you mean that it should be referred to the Executive Committee?

MR. DUGGAN: Yes, refer it to the Executive Committee.

(The motion was seconded, put to a vote and carried.)

CHAIRMAN WAKEFIELD: Is there any further discussion on Mr. Scott's paper?

MR. DUGGAN: One more question. Mr. Scott mentioned side icers. Do you refer to the different wood bodies?

MR. SCOTT: That is right.

MR. DUGGAN: What success have you had with them?

MR. SCOTT: Good success. I might say that our lost-time accidents were largely due to that, and the first eight months of this year we have made a reduction of exactly 50 per cent over the same period last year.

MR. DUGGAN: You save considerable time on your delivery, too?

MR. SCOTT: Yes sir.

CHAIRMAN WAKEFIELD: I am going to ask Mr. C. C. Rosenbarger of the Bureau of Safety, Chicago, to read the paper prepared by Mr. Trask on the Safe Handling of Cold Storage Products.

The Safe Handling of Refrigerated Products in a Cold Storage Warehouse

By H. L. TRASK

General Superintendent, U. S. Cold Storage Company,
Kansas City, Mo.

Safeguarding life and limb in the operation of a cold storage warehouse has been, and always will be one of our chief concerns. Since the early days of cold storage business, better buildings have been built for cold storage purposes, better equipment is now available, and more attention is given safety devices for the protection of the employee. Safeguarding the employee has played no small part in bringing about changes for betterment in the planning of cold storage warehouses. Practically every move in the advancement of the refrigeration industry has had as one of its foundation principles, the safety factor.

The majority of operations in the handling of cold storage commodities involve hazards. From the time the car door is opened or goods are received by truck at team docks, until they are piled in the rooms, the possibility of injury is prevalent.

Let us follow operations necessary in unloading a car of goods, or goods received at platform, placed in a cold storage room and delivered back to either car or team dock:

The door is opened. Care should be exercised in opening car doors so that fingers are not caught in hinges or levers.

Goods must be taken out of doorway of car before permanent door plates can be placed from platform to car floor. A slip at this point would mean injury if employee slipped between platform and car, falling to track level.

Car plate is adjusted from car door to platform. Fingers or feet could easily be caught between car plate and car floor, or car plate and platform, if care is not used.

Trucks are usually placed in cars for balance of unloading and trucks loaded are moved to car door and over car plate to platform. Again care in the operation and enough man power to properly handle the loaded truck is essential.

During the unloading of cars, inspections are often made by either warehouse employees, or railroad inspectors. To slip on the car plate, or to back out of car and stumble, usually means a bad fall from car dock to track level between car and platform.

The handling of power tractors for moving loaded trucks from either track dock platforms or team dock platforms to elevators, should be undertaken by only experienced operators. In this connection, electric light extensions used in the cars should be carefully placed so that tractor operators will not come in contact with them in the operation of the tractor. The writer has in mind one case where extension was attached to a plug on the track dock and extended from this point across into the car. The tractor operator, in the operation of his tractor, did not notice this obstruction and the extension struck him just below the chin, pulling him backward far enough so that he lost control of the tractor. The tractor fell into the track pit and the operator narrowly escaped injury.

Probably most modern warehouses have regular elevator operators. Should this be the case, when elevators are protected properly, there is little cause for accident. However, in warehouses not so arranged and regular elevator operators are not available, only experienced employees should be allowed to operate elevators or handle loads to and from elevators.

Elevators operate very quietly. Never pull non-automatic elevator gates down, or push them up to locate elevators. Very often elevators are just above or below, in which case, on account of the quietness of operation, an accident will occur as the inquisitive one usually has the head and shoulders into the elevator shaft.

In piling barrel apples in a room on their bilge, great care should be used in bracing the first tier. After the first tier is well secured, it is well to only allow experienced pilers to complete the operation. Many accidents have occurred where inexperienced pilers have been used in this operation.

Pike poles used in warehouses to handle and roll tierces on their bilge are very dangerous if care is not used in handling. A sheath should be furnished with each pike and suitable storage space should be provided when not in use. Pike poles are used to roll tierces from platform into car. This operation is more or less dangerous if the car is above the dock platform level, necessitating extra momentum to propel the tierces from the lower level to the higher level, for which pike poles are ordinarily used. In this case the man in the car is usually crouched in readiness to assist in receiving the tierce into the car and is in a stooped position to grab the chimes of the tierce as the tierce is rolled within range of his arms, but the man is in a position to be dangerously injured should pike pole slip off the tierce. Great care should be used in this operation if pike poles are used.

The ordinary four-wheel warehouse truck should never be pulled (possibly with the exception of grain wagons which have the fifth wheel and extended handle). When a truck is pushed the trucker can, at all times, see any obstacle

in front of him. If the truck is pulled, a slip may mean injury should the truck have enough momentum. When two men are operating loaded truck preparatory to entering cooler, the truck is put into motion by one pushing, the other pulling. Quite often the man pulling the truck, and nearest door, makes an effort to open cooler door without stopping truck, with the chance the cooler door will not open easily. The cooler door quite often is blocked in some way and will not open without a good deal of effort. In this case the momentum of the truck with the load will crush the man making the effort to open the door without stopping first.

Protruding nails should be driven into boxes, crates or barrels upon receipt of goods. Protruding nails are quite often cause for minor injuries.

When driving nails into wooden packages it is well to be sure the nail is firmly imbedded in the wood before the final striking process. A flying nail is liable to cause serious injury.

Actual accident experiences are always interesting to those who have safety at heart. Often the experiences of others help to correct similar hazards and prevent possible accidents in the future. Here is one that has come to my attention.

Two men were operating a four-wheel truck, loaded with produce, this operation in a warehouse where regular elevator operators were not employed. The two men in question were old employees of the company who had but very little experience in operating elevators. The elevator had been stopped somewhat below the floor, prior to truck being placed on the elevator, with the elevator gate down in safety position. The elevator gate is raised, one man steps down to the elevator to bring it up to the level of the floor. The elevator is stopped slightly above the floor; the second man pulls the front wheels of the truck on to the elevator with a good deal of effort. Knowing the elevator is above floor level, considering the effort he has made pulling the front wheels of the truck on the elevator, he commands his partner at the control to lower the elevator.

On account of lack of experience, the man at the control lowers the elevator too far below the floor level and his partner immediately calls to raise the elevator again. In the excitement, the elevator operator starts the elevator up to floor level again and loses control. His partner is holding the truck close to the front of the elevator platform. The operator has lost control of the elevator and his partner is in a similarly excited condition.

It happens that truck handler was too close to the edge of the elevator platform and as the elevator proceeded upward, elevator gate hit him on the top of the head, knocking him to elevator platform just as the front wheels of the truck slipped off the platform to the floor just left, truck and load then falling down elevator shaft. In a dazed condition, the man hit by elevator gate starts to slip off elevator platform and before he had slipped entirely off, elevator platform met the floor above, pinioning the man's legs between platform and floor above with feet above the floor and body below. This man's limbs were badly broken and crushed, which, although did not prove fatal at the time, eventually caused his death. This accident could absolutely have been prevented had an experienced elevator operator been employed.

A fatal accident occurred in one of our warehouses when a man who had had very limited experience in our warehouse, lowered the elevator gate a short distance and peered over into the shaft to locate the elevator. The elevator, instead of being below, was above and descending just above the floor on which this man was standing. The elevator, operating silently, struck the man's head and shoulders so suddenly it knocked him down, pushing the elevator gate

with him. This probably rendered him unconscious, however, we do not know this.

The elevator operator just above, sensing that he had hit someone, reversed the elevator, which left the pinioned man free, allowing him to slip into the elevator shaft and fall three or four floors to the elevator pit. In this case there was no necessity at all of locating the elevator as this man had no particular work to do which required elevator service. Absolute carelessness caused this accident, which probably could have been prevented had the man been experienced in the workings of elevators in general.

Most of the above mentioned possible accidents are less liable to take place if at least one thoroughly experienced man is put in charge of each warehouse operation.

The skillful placement of experienced help, combined with the co-operation of warehouse organizations with local and National Safety Council movements will, in the opinion of the writer, minimize accident experience in the cold storage warehouse industry.

CHAIRMAN WAKEFIELD: We are now to hear from Mr. Hillenbach, Chairman of our Statistics Committee, and although that may sound like a rather dry subject, I can assure you there is more romance as to safety and the results of safety in Mr. Hillenbach's committee than in any other.

Accident Experience of the Refrigeration Section During 1929

By H. HILLENBACH
Chairman, Statistics Committee

Although we are one of the youngest sections of the Council, our activities are expanding rapidly. The continued safety interest of Refrigeration members is reflected by the rapid increase in the number of annual records reported to the Council since 1926. In that year, it was represented by only two reporting organizations. The following year five establishments, working over two and one-half million man-hours, reported. In 1928, the accident experience of refrigeration members appeared in the Council's industrial accidents statistical publication as a separate section, reporting establishments jumped to twenty and hours of exposure to over fifteen million man-hours. Our rapid growth continued during 1929 when 44 organizations, more than twice the number that reported in 1928, with an exposure of over 20,000,000 man-hours sent their accident records. This is concrete evidence of the spirit of the safety movement in our industry. Specifically, it means that the data collected on accidents in our industry is becoming more reliable and accurate each year.

What progress have our members made in eliminating accidents? We have five plants that have reported their experience each year since 1927. Their combined experience shows a decrease of 34 per cent in the number of lost-time accidents per million hours worked and a drop of 38 per cent in the number of days lost per thousand hours worked. We had eighteen organizations, however, that reported their accident experience for both 1928 and 1929. They, too, had fewer lost-time accidents per million hours worked in 1929—the reduction was 15 per cent—but days lost per thousand hours worked showed an increase from 2.37 to 3.42 or 44 per cent. This increase in severity was largely due to more fatalities in 1929 than in 1928. An inspection of the individual records of these 18 plants reveals that, though nine companies had higher severity rates in 1929 than in 1928, nine others also had lower rates. Improvements in frequency rates were decidedly more numerous; 13 plants had lower rates against only five with higher ones.

The experience of our plants during the last year is quite in line with the experience of industry as a whole; the frequency of lost-time accidents has declined, but the severity has gone up.

Please note that these comparisons are based on the experience of those plants that have reported consistently. By using the records of the same plants from year to year, a reliable measure of progress is obtained. It is therefore important that every member of the section realize the importance of consistent reporting. We are making progress in our safety work, as you have seen, but much room for improvement still remains. In the list of 27 industrial groups given in the Council's annual Industrial Accident Statistical publication, we rank twenty-fourth. The average frequency rate for our section in 1929 was 43.35, in comparison with 25.53 for industry as a whole. Our severity rate of 3.04 was likewise considerably above the average of 2.23. The construction industry had an average frequency rate of 55.94 during 1929, only slightly higher than ours, the meat packing industry, a rate of 55.94, paper and pulp mills 28.43, steel industry, 18.13 and cement mills, 9.55. Our severity rate was exceeded by such industries as mining and quarrying, lumber and woodworking, and construction, but others, such as steel, public utility and petroleum, had considerably lower rates than we. Some of these industries have fewer hazards than ours, and not a few have been active in solving their accident problems for years. The cement industry, for example, had an average of 43.47, in 1919, about equal to our present rate, which was gradually reduced to 9.54 this year. I see no reason why we should not accomplish equally favorable results.

We had five organizations in our industry, ranging in size from two to sixty-five employees, that established no-accident records during 1929. On the other hand we also had seven plants employing from nine to over six hundred men that had frequency rates higher than 60.0. More plants of all sizes had frequency rates from 20.0 to 39.9 than in any other equal range, though the average frequency rate for the entire industry was 43.35. If low rates can be commonly achieved by our members, is it unreasonable to think that we cannot all reduce our accidents?

Our average severity rate of 3.04 does not entirely reflect the favorable severity experience of many of our members, because 36 of the 44 reporting establishments had severity rates less than 2.00. Serious accidents were, therefore, confined to comparatively few plants. One out of approximately every 1,290 employees met death in our industry last year. This compares with one out of every 2,409 employees in the paper and pulp industry, one out of every 1,336 in the steel industry and one out of every 1,300 in the petroleum industry. Our experience with permanent partial disability cases likewise compared favorably with other industries. But are we not having too many temporary disability cases? We cannot afford to have conditions in our plants that may give rise to these minor accidents because too often an apparent minor hazard results in a major injury.

Let me urge, in conclusion, that every member of the section should keep accident records and report annually to the Council. Make frequent comparisons of your experience this month and last month, and with this year to date and the same period last year. Keep your foreman informed of the record which his department is making in safety. When your Sectional Officers request your accident records for the year, fill out the form and send it to the Council so that you may know how your experience compares with others in your industry, so that we, as a section, may determine our progress in comparison with other sections, and that industry as a whole may know the results of its accident prevention activities.

CHAIRMAN WAKEFIELD: Gentlemen, I think you probably have learned one or two things about the refrigeration industry that you hadn't thought about before. Sometimes when I travel around the country, I meet people who say, "There isn't any need for safety in our industry. We don't have accidents," and yet according

to the report the chairman of the Statistical Committee has laid before you, we rank with the most dangerous industries in the United States.

We are about twice as bad as the public utilities who are working among high voltage lines, climbing poles, and so on, and yet they have been able to so organize themselves that their experience is remarkably good.

There is one thing that sticks out right through that report, and that is that you can name the industries over, and the industries that have the favorable reports are the industries that are well organized in their sections, to the point that their safety activities are going on continuously and intelligently. And in those industries where the rate is high, you will find that they are either very young in the Council, or else they have attacked their accident prevention work in a haphazard way.

The next item is something in which every ice man is always interested, something that causes a great deal of trouble and costs a great deal of money. This concerns our old hazard of foot injuries.

The man who is going to speak is the Employment and Safety Manager of The Michigan Steel Corporation, Ecorse, Mich. I take pleasure in presenting Mr. Nils Juell.

Guarding Against Foot Injuries

By NILS JUELL

Employment and Safety Manager, Michigan Steel Corporation, Detroit, Mich.

Are foot injuries of enough importance to separate from other industrial accidents and discuss them at such an important conference as the Annual Congress of the National Safety Council?

For the sake of argument let us say we all agree because:—

1. More accidents are caused by falling objects than from any other cause.
2. The foot is the member of the body most often punished by this type of accident.
3. The toes in particular receive the brunt of attack.
4. A toe accident requires a bandage of sufficient bulk to protect the wound which necessitates elimination of footwear.

We have all had demonstrations which prove that a worker may continue his daily task with injuries to other parts of the body equal in severity to those we observe on the foot, which, however, invariably lead to lost time for whatever department the accident occurs.

Production, or the employer, is the heaviest loser and it would perhaps be apropos to remind ourselves of the undisputed facts brought out by the Travelers Insurance Co., that the indirect cost is four times that of the direct cost.

Direct Cost. By direct cost we mean compensation, doctor, hospital, and X-ray expenses. Mr. Heinrich, of the Travelers Insurance Co., compiled the indirect cost in the following concise and practical table and emphasized the fact that these things are not insurable.

Indirect Cost

1. Time lost by employee from production as a result of an accident.
2. Time lost by other employees who stop work.
 - a. Out of curiosity.
 - b. Out of sympathy.
 - c. To assist injured.
 - d. Because of nervous shock.

3. Temporary slowing down of production in department because:—
 - a. Employees gather together in groups to talk about accidents.
 - b. Thought of accidents continue to direct their attention from their work. (This may lead to another accident or spoiled material or equipment.)
4. Time lost by foremen, supervisors, and executives for:—
 - a. Aid to injured employee.
 - b. Investigating cause of accident.
 - c. Arranging for injured employee's production to be continued by some other employee.
 - d. Select men or break in new employee to replace injured.
 - e. Prepare accident reports for employer, insurance carriers and the State.
 - f. Attend hearings before State commission.
5. Time of First Aid attendant and hospital department staff (when paid by insurance).
6. Spoilage and waste of material caused by accidents.
7. Damage to machines, tools, buildings or other property.
8. Losses due to interference of accidents to production, such as failure to fulfill orders on time, loss of bonuses, payments of forfeits, loss of customer's goodwill.
9. Loss of profit on productivity of employees affected by accident and on machines temporarily idle.
10. Loss in putting injured employee back to work and paying full wages when the injured is not fully recovered and is unable to earn the wages paid.
11. Loss through inferior production effort due to inability (when high accident rates prevail) to attract and hold high grade worker.

With this schedule in mind it is also well to remember that in the introduction we have brought out the predominance of falling objects as a cause of accidents, the foot and toes being the most frequent sufferers, I will now attempt to bring out for your consideration some of the most efficient remedies.

Safe Handling. While preparing this paper I recalled a clipping I had in my scrap book from the Michigan Mutual Shop Man, July, 1927, from which I quote:

"Wrench slipped" or "ran nail into foot" are the old reliable standbys that come through with great regularity. The dominant hazard of all industry and a familiar line in accident reports is 'dropped heavy object on foot', how many times this happens every week!

"One factory in Michigan has eliminated this hazard entirely, the secret formula on application".

Of course I was curious enough to write the editor and get the secret formula and here it is:—

"Eliminate the lifting and carrying of all objects by substituting mechanical handling for crude and unsafe manual labor methods."

The circumstances which lead to the remark occurred seven or eight years ago in the Oldsmobile engine plant at Lansing. They were pioneers in the use of roller table conveyors at table height and had gone more than five years without a serious foot injury, when that was and still is the dominant hazard in gas engine building as well as the gray iron foundry. If workers do not handle or lift objects they cannot very well drop things on their feet, also, the use of the four-wheeled hand truck gives rise to many foot and leg injuries.

W. J. Graves, industrial engineer, writes, in a personal communication, "We had a very bad foot injury the other day when a millwright dropped a 50 pound electric drill. The drill bit that was in the tool at the time punctured the man's foot, a real safety shoe would have lessened the injury if not prevented it."

The manufacturers of such portable tools should make a model for the millwright's use, equipped with shackles and a webbing shoulder strap which would aid in carrying the drill and support it while drilling and would prevent foot injuries.

There seems to be some inherent quality in the portable drill which makes it susceptible to being pushed off work benches and of slipping out of hands, they are peculiarly shaped and generally smooth and slippery. This is only one example of equipment somewhat unusual.

J. L. Juhl's talk before the Detroit Industrial Safety Council's Engineering Division is worth reading. "Safe handling of material" is a subject to which he has given much time, both in thought and in action.

He reminds safety men of their opportunity in the study of the handling of material and discusses and suggests innumerable ways by which handling can be simplified or averted by planning and cooperation with production men.

Often, he says, orders come to reduce production and it is when such sudden changes come that a safety engineer can do his real stuff. Material piles up and the chances of getting hurt are increased in times like that. He also reminds us of the possibility of suggesting to the vendors a package of satisfactory safe weight and size to suit the situation and assures us that they are always willing and anxious to cooperate with customers by doing their bit in eliminating hazards which may lead to foot injuries and for other obvious reasons of course.

Some great man once said, "I don't care how many mistakes a man makes, just so that he does not make the same mistake twice."

There is comfort in that for some of us who at times may feel a little discouraged. If we are to reduce our foot accidents to the irreducible minimum we must build a real safety organization made up of every man on the job. We must study each accident which caused, or nearly caused, an injury and scrutinize the cause and seek a remedy which will prevent its recurrence.

Physical Defects. If those who have industrial health so much at heart could unite in their effort and standardize in medical and dental examination in industry, we would soon eliminate, or greatly reduce, the psychological causes of accidents, if I may be permitted to allude to this, which are such frequent contributors to thoughtlessness, ignorance, inattention, forgetfulness, indifference, and recklessness.

Service to Employees. If those who have charge of production and those in charge of industrial relations and safety could unite in a strenuous campaign, such as the National Safety Council has set as the ideal—if we could educate all men to the fact that safety shoes are comfortable and of respectable appearance, then we would have arrived at that Utopia when safety directors and safety engineers would be no longer needed. But, as Will Rogers said about Prohibition, "there will be a liquor question as long as there is a bottle left."

Safety Posters and Bulletins. R. T. Solensten, display editor, tells us in his talk which many of you may have heard or read that, generally speaking, safety bulletins have three functions.

1. They stimulate safety thinking.
2. They create goodwill for the accident prevention work you are doing.
3. They instruct workers in safe practice and warn them of the hazards of unsafe practice.

Bulletins and safety posters have been the principal medium and the occasional spoken word at safety meetings or the printed word in the pay envelope and the shop rule book are about the only other means used in the past. As to the relative value of the printed and spoken word, there is of course, a great difference of opinion.

The road of least resistance is usually the travelled path. How often we find ourselves slackening up in our varied program and confining ourselves to posters furnished by the National Safety Council and other agencies and let it go at that. I do not wish to discount the value of the posters we receive, we have had a splendid reaction from them.

At one safety meeting, I asked men in different parts of the room to mention a theme and describe a poster, the text of which had made a certain impression on them.

It surprised me to have the men recall posters which we had not used for six

months or a year. We took occasion to announce this story on the bulletin board and to state that these posters would again be shown on the bulletin board tomorrow.

We have devised a filing system for posters and we often file away those which have a peculiar appeal such as we have reported.

With the posters and their advancement comes the improved understanding by the artists of the psychology of color and variety of emotional appeal. I would like to suggest that posters are to safety work what hymns are to the church.

This is not enough alone, the other components of good service are good advice, good example, and vigilance in insisting on observance of the good Rule Book, and to lend your wholehearted support to your local Safety Council and foster the closest relationship with the mother organization, the National Safety Council.

Helping the New Employee. "Give the new man a helping hand" was the suggestion on one poster; tell him he can get safety shoes, charged against his wages, also other safety clothing his job may require. Trained foremen can be depended upon in this respect and in instructing the new man about the dangers of the job. "Foremanship training" will put your safety teaching in the hands of men who are competent.

In discussing this with a representative of the Michigan Mutual Liability Co., I got a reaction which is worthy of credit and reflection.

Picture two or three careless workmen working in the factory yard crew handling material. One of them is likely to drop a heavy object on his foot. Does he see or read or heed a bulletin depicting a man dropping pig iron on his foot? We are not so sure.

On the other hand, suppose his foreman gives him intensive detailed instructions how to do his simple tasks, and gives him repeated callings for disobeying his instructions—with only one more chance to hold his job: which method will go furthest in preventing accidents?

The Home-Made Poster. I am a firm believer in the home-made poster and the plant cartoonist as a valuable auxiliary service and I told about our Mr. Frank Strickland in the *National Safety News*, (Sept. 1928) how he was discovered and how we use him.

Undoubtedly you have a cartoonist among your workers and can develop him by assignments with which he is familiar and give him a task which benefits him and his fellow men.

Whenever we want an idea put across we can depend upon Strickland to carry it out. I have mimeographed some of his stuff and have it here for anyone who wishes to see it.

Staging scenes of recently occurred accidents and photographing them for the story on the bulletin board has been effective in our plant.

"How to drop things" and "How to duck things" are titles which suggested themselves to me after reading an article in the *Literary Digest* of June 6, 1930, entitled "How to fall down."

It dealt with the individual's power to cultivate certain preservative instincts that are usually dormant within us.

Children fall often and are rarely hurt. "You may think", they quote from a Berlin scientific journal, "that this is because they have not far to fall and because their joints are still very supple. Not at all, children's falls are almost always harmless because they react more naturally than adults, instinctively they assume the safest posture."

How to Fall Forward. Avoid raising your arms suddenly over your head, a useless and dangerous movement. On the contrary you should at once bring your arms to the front that they may serve as an elastic buffer at the moment of contact with the earth.

How to Fall Backwards. In case of a backward fall, the unskilled person seeks, above all, to ward off with his hands the contact of his head with the hard surface.

He contracts his back and legs violently and falls with all his weight on one point, he thus runs the risk of breaking some delicate bone.

On the contrary he ought to unfold his body flexibly in the direction of the fall, keeping his head up, while his extended legs serve as a counterweight and his hands and arms meeting the ground flatly constitute valuable shock absorbers.

The article sums up by a thought we can apply to our safety work. "Keep your head." In this way you will acquire control of your reflexes and will be the happy possessor, in certain emergencies of daily life, of the elements of a minor acrobaticism which will prevent unfortunate accidents.

The cat, the baby, the drunken man, and the circus clown are all examples of natural instincts or acquired control. Perhaps some day, some writer will tell us that the more simple minded a man is, the less influenced he is by his own intelligence and the better guarded he is by natural instincts; thus being less responsible for his accident experience than the man we have always considered his more fortunate brother.

If this should ever happen and be accepted as a fact, the statement I made previously about the inferior worker would indeed be very conflicting and highly hypothetical.

Safety Shoes. By what further means can we guard against foot injuries? By the use of safety shoes.

Prior to 1890, it has been said, it was not customary to have the fancy toe cap on the shoe; that was put on the toe and decorated by specialists to create new styles only.

One shoe manufacturer conceived the idea of putting on a tin cap between the leathers so as to produce a shoe that would retain its shape; then, many years afterward the virtues of a safety shoe were accidentally discovered.

The tin cap prevented an accident and a new branch of the shoe industry, which was to assume its present importance, made its modest bow.

So much for the Saga of the Safety Shoe.

When safety engineers in their quest for accident prevention plotted the results of their investigations and found that in general more accidents were due to falling objects than any other cause and that the foot was the member of the body most often punished by this type of accident, and that the toes in particular were receiving the brunt of the attack, they logically sought means to reduce this hazard by giving the foot, and the toes in particular, greater protection than they had been having in the past. That meant designing a shoe for definite purposes.

Among conservators of natural resources the safety shoe should have a prominent place and be recognised by those in the engineering departments of state universities. Our museums should give space to the evolution of the safety shoe, its progress and benefit to mankind deserves it.

Although many costly mistakes have been made by most manufacturers they have patiently developed the safety shoe of today. Nothing is perfect, everything is relative. Man or merchandise must stand or fall by comparison.

We have received many letters from shoe manufacturers and we will let them discuss the merits of the different types, we quote from four of the real progressive ones.

1. A's letter. "Many types of protection-giving toes have been developed, tried, and abandoned. Metal toes, cellulose toes, latex toes, single ply, double ply, and triple ply. The most satisfactory toe yet evolved for our shoe is a triple ply weight, asphalt impregnated felt, of good quality, which is fused in a unit with the leather through a heat process during the course of forming the shoe toe."

2. B's letter. "In our first experience we used a composition toe box with the understanding that it would stand up under a very heavy pressure and would withstand oil, heat, and perspiration. We were discouraged and finally developed our present last, also the present toe box we are using. After considerable testing

we found this box to withstand fully as much pressure and with less danger than the metal box which is being featured by some manufacturers today——"

3. C's letter. "We have incorporated in our shoes such features as experience has taught us to be the most desirable and feel sure that after 35 years of specializing in the work and industrial shoe field exclusively, we have developed a line best adapted to the various demands of industry."

4. D's letter. "The special features are designed for additional protection and are incorporated principally in the box used in the toe. This is constructed in various ways. The principal materials are metal and heavy felt impregnated with various asphalt and pitch combinations.

The metal box, of course, gives greater strength but it has a certain hazard of its own, the injured foot is removed with greater difficulty due to the fact that the toe box is crushed on the foot. We know of one case in our locality that proved very disastrous, a hack saw had to be used in removing the shoe from the injured foot. It goes without saying that considerable additional suffering was occasioned by the box toe itself."

5. E's letter. "Some safety shoes are safety shoes while they are new. After being worn a short time the cap becomes soft due to water, oil, heat, and perspiration. "We are proud of the fact that we have conquered this and that the U. S. Patent Office has awarded us a patent on our cap which is guaranteed to stand oil, water, heat, and perspiration."

I quote from a descriptive catalogue of a manufacturer:—"In analyzing the accidents in various factories, coal mines, steel mills, and various other industrial plants, it was found that approximately 20 per cent of all accidents were to the feet, with three-quarters of these accidents resulting from falling objects."

Various elements are displaying a keen interest in promoting foot protection in different industries and it is possible that it may soon be compulsory to provide adequate foot protection to industrial workers, even now, the laws of human kindness and self interest demand it.

Michigan Steel Corporation has not found it necessary to make it compulsory but demands of the employees in the employment, safety, and first aid departments a thorough knowledge of fitting shoes as well as a sincere interest in selling shoes for safety's sake. We treat our customers with courtesy and attention and are getting increasing sales and reducing our accident cost by the policy of Wanamaker's famous slogan, "The customer is always right."

We consider it of great value to sell shoes in the Employment Department and our customers are being waited on where those who are calling at the Safety and First Aid room can see and hear as well.

Time will not permit me to go into detail in explaining the types of shoes selected for various purposes, neither can we take time to tell about the service we have developed or mention hundreds of examples of practical cases used to great advantage in furthering our sales.

We realize that conditions vary in different plants and that it is not necessary to convince safety men of the importance of safety shoes. What they are more interested in is how to go about the installation of this service and where sales would be most stimulated.

In this respect we may say, from our experience, that we may be of assistance. If you will address your inquiry to Michigan Steel Corporation, Detroit, Mich., we shall be glad to tell you about our experience and answer any question which may occur to you when you study your own conditions and plan your campaign of foot protection to eliminate from our accident statistics, an item which has been costly in the past and has added to the production cost of yours and our product.

CHAIRMAN WAKEFIELD: Thank you very much, Mr. Juell. Are there any questions?

GEORGE C. BAKER (Consumers Co., Chicago, Ill.): I just want to thank Mr. Juell for his splendid reference to posters and bulletins, and for the advertising that he has given that department of our Section.

HENRY J. MINEUR (Borden Co., New York City): Are the shoes used water-resisting or water-proof?

MR. JUELL: Some of them are. We found it necessary to adopt seven different types of shoes to fit the types of feet and conditions in the plant.

I'll relate an experiment we made in the first aid room. We gave orders to make drawings of the feet of the first one hundred men who came in for first aid. We had each man step on a piece of paper, and made a circle around his toes and heels, and we compared that with the shoe lasts. You will be surprised how many different types of shoes are required, and how much discomfort you can create with shoes if you don't know how to sell them.

MR. MINEUR: In small plants where the units are broken into organizations of from 125 to 300 people, we can't very well have some one delegated to shoe sales. Perhaps our approach to the solution of the foot problem hasn't been quite right although we have a great many injuries due to the dropping of ice cream freezers and milk cans. We are much concerned about finding a solution. We haven't found any shoe on the market that is sufficiently water-resisting to be attractive to the men. That is their principal objection, and I have talked to some of the manufacturers' representatives to see if they couldn't develop a shoe that would resist water to a greater degree than the shoes that have been available.

MR. JUELL: We have a shoe used in our pickling department. Although we do not guarantee satisfaction, we oil the shoe around the seams and tell the men to be careful not to step in acid. We have found a shoe that will resist the acid solution that is spread over the floor in the pickling department.

CHAIRMAN WAKEFIELD: Mr. Juell, I am sure we would all be interested in knowing—I gather from what you say that it is your practice to buy these shoes and resell them to your employees. Do they pay for them in cash out of the next pay check, or do you let them pay for the shoes over a period of time?

MR. JUELL: No, we charge them against the next pay.

MR. MODERWELL (Chicago Ice Producers' Association, Chicago, Ill.): We have experimented with a safe toe shoe for three years. We had an Eastern manufacturer cooperate with us, and he made us various shoes that we have turned over to our men. A 400-pound weight can be dropped with safety on the shoe that we are using now. We have something in the neighborhood of, I would say, 400 pairs of shoes among the employees now, but in spite of that fact, toe injuries cost us over \$4,000 this year. You can readily see, if it were not for the fact that we have those shoes, how much we would have spent in those toe injuries.

We do not attempt to make any money whatsoever on these shoes. It is being handled through our trade association, the Chicago District Ice Association. We sell these shoes at about \$3.25. It is about as good a shoe as you can purchase in any store for about \$5 or \$5.50, but you know that human nature is such that when you tell a man he ought to wear a certain kind of a shoe, he immediately feels that he ought to wear some other kind of a shoe and we find a lot of resistance among the men to wearing that shoe, not that they have any real objection.

This shoe has no metal. It is a composition shoe. It isn't awkward and it isn't unsightly. It is about as good a shoe as is ordinarily used by that class of labor.

CHAIRMAN WAKEFIELD: The next, and final item on the program is a round table discussion on four subjects in which you are all interested. We have talked about most of the divisions of our industry, but there is one section of that activity that we haven't referred to yet. I am talking about car icing. The Hazards of Car Icing will be discussed by Mr. O. O. Mills.

The Hazards of Car Icing

By O. O. MILLS

General Superintendent, Fruit Growers Express Co., Washington, D. C.

In discussing the hazards of car icing, I will consider the subject from the viewpoint of personal injury rather than from service failure hazards which may be incident to the handling of perishable freight, realizing that your association is interested in minimizing personal hazards and the adoption of safety measures. While personal injury hazards are always presented when workmen are not careful, in my opinion there is no greater hazard involved in the icing of refrigerator cars than in many other lines of work—in fact there is less. Some of the operations connected with the icing of refrigerator cars necessarily subject employees to such hazards, and it is essential, therefore, for care to be exercised by them in the performance of their duties. I will direct attention to some of these hazards and suggest precautionary measures that should minimize accidents.

So you may understand the details of car icing and the hazards incident thereto, which I will later refer to in detail, I believe it will be helpful to describe briefly the types of refrigerator cars and kinds of icing service in use.

There are two types of refrigerator cars used for transporting perishable products: the standard bunker type, and the brine tank car. The standard bunker type cars have bunkers or ice compartments in each end in which ice is contained to produce refrigeration in the car. The bunkers have an opening through the roof of the car by which ice is placed. These openings, when the car is used for refrigeration service, are kept closed with air-tight fitting plugs, designated "bunker plugs." Over the "bunker plugs", there are hinged covers known as "hatch covers." The brine tank refrigerator has chambers or tanks in each end into which ice and salt in proper quantities are placed, to produce brine at temperatures required to give the proper degree of refrigeration. These types of cars are also equipped with tank plugs and hatch covers.

There are two classes of icing for the standard bunker type car—that which is designated "chunk icing", and that which is termed "crushed icing." "Chunk icing" usually consists of using ice broken into pieces ordinarily ranging from 25 to 100 pounds in weight, although it is essential to break some of the ice into smaller pieces to fill crevices which may develop between the larger pieces of ice when put into the bunkers. "Crushed icing" requires that the ice shall be broken into pieces weighing approximately 15 to 20 pounds, but as in "chunk icing" it is necessary to break some of the ice into smaller pieces so that crevices which may develop between the larger pieces of ice will be properly filled. At the time standard bunker cars are iced, it is necessary to chop or pike down and level any ice that may be in the bunkers when the icing is commenced. Long-handled, sharp-pointed tools, referred to as car icing pikes, or similar instruments are generally used for this purpose. Icing necessitates standing on cars to remove and replace hatch covers and bunker plugs and to level and properly place ice in the bunkers.

The method of icing brine tank cars is different from that followed when icing standard bunker cars. Ice used for icing this type of equipment is crushed to about the size of a man's fist, either by the use of mauls or other instruments or with a mechanical crusher. The ice after being so crushed is placed in containers of some sort, such as carts, wheelbarrows, shovels and the like, and transferred to the car to be iced and there placed in its tanks. At the time of icing, employees must stand on tops of the cars to remove and replace the hatch covers and tank plugs, and to see that the ice is properly placed in the tanks. It is also essential for the employees on the cars, by the use of a long-handled pole, to stir and settle ice in tanks, and to release excess accumulated brine.

Roofs of refrigerator cars are generally about 12 feet above railroad rails. To

place the ice into bunkers or tanks it is necessary to elevate it to the bunker openings. Two methods are ordinarily employed for delivering ice to the car bunkers or tanks—the one by the use of platforms, generally constructed with tops or decks slightly higher than the tops of cars; the other by hauling ice in trucks or wagons to individual cars wherever located on tracks in yards, and elevating the ice to the bunker openings either by use of mechanical contrivances or by hand. The platforms are used at intransit icing stations, in loading territories and to some extent at destinations. Truck or wagon icing is used largely at destinations where cars on team or hold tracks may be awaiting delivery.

Ice required for use at platforms is either manufactured in a plant or accumulated in a storage adjacent to the platforms or shipped to them in freight cars and transferred to bunkers or tanks of the refrigerator cars. When ice is made or stored adjacent to a platform, the car icing operation requires that the ice must be handled from the building in which it is contained, to the platform and along its surface to the cars that are to be iced. Modern icing platforms are usually equipped with mechanically operated chain conveyors upon which the ice is placed and carried to the point on the platform at which cars to be iced with chunk ice are spotted. If platforms are not equipped with such a conveyor the ice is pulled or shoved by the icing forces along the deck to the point where it is needed. When ice is shipped in freight cars to icing stations, it is general practice to have a lower platform on a level with car floors and a mechanical arrangement for elevating the ice to the high platform. At these types of facilities the ice is elevated by the use of vertical hoisting arrangements or an incline from the low to the high platform with a chain traveling the entire length of the facility, which moves the ice from the lower platform to the point on the upper platform where it is required to be placed in bunkers.

Mechanical ice crushers are generally used for crushing or breaking ice in proper sizes as required for icing brine tank cars. The ice is elevated from the plant or storage or unloading platform to a point slightly higher than the hopper of the crusher through which it passes into the containers which are used for transferring it along the platform to points where cars are to be iced.

While it may appear that to describe, as I have, the types, methods and general procedure of icing cars, is to depart from the subject, I have done this so you may visualize the kinds of work which icing forces have to perform and in connection with which hazards may exist.

In transferring ice from plants, storages or bodies of cars to icing platforms, labor must be employed to handle it to the elevators or conveyors which will start it on the way to where it is needed. Employees must also keep the ice, as it moves along, from falling off the conveyors, and to remove it at the point where it is to be placed in car bunkers. When chain conveyors are not used, icing forces must pull or shove the ice along the platforms. After the blocks of ice reach the car, it is necessary to break them into pieces of the sizes required.

In the icing operations, different kinds of tools must be used. Icing hooks or tongs are utilized for handling the blocks of ice in the plant, storages or cars to the conveyors for movement to the upper platforms. Icing pikes or tongs are employed to guide the ice on the chain conveyors and to pull it off at the proper places on the platforms. The same tools are used to pull or push the ice on platforms which do not have conveyors. Except when icing brine tank cars, icing pikes are essential in the operation of transferring or shoving the ice from the deck of the platforms to the car bunker openings. The pike or a similar tool is used to break or chop down ice in the bunkers. Men step or jump from the decks of platforms to tops of cars to open and close the bunkers and to settle and properly place the ice in them. Ice is frequently transferred from the tops of platforms to car bunkers by the use of a skid, consisting of a board or assembly of boards on which the ice slides. Employees must place these skids properly so the ice will slide directly into bunkers. When brine tank cars are iced, employees must handle or guide ice from storages, plants or cars, to the

ice crusher, and to transfer the crushed ice along the platforms to the cars to be iced. The crushed ice is usually transferred from platforms to the car tanks by use of a spot or chute. Icing forces must properly place these spouts or chutes so the ice will flow directly into the tanks.

Personal injury hazards exist in connection with all of the operations described. There is chance for injury and necessity for carefulness in the handling of ice from bodies of freight cars to elevators or conveyors. Floors of the cars get wet and slippery and tend to cause employees to lose their footing and fall when pulling ice around. If the blocks of ice are loaded in an upright position there is the possibility of personal injury by the blocks falling on the limbs of employees when the ice is "pulled down" to be handled to the lower platform. In the use of ice tongs or hooks for pulling the ice, there exists the hazard of these tools not securing a firm hold in the blocks of ice with the result that they slip and employees fall and are injured.

When ice is moved on a mechanically operated conveyor along the top of a platform, as previously described, it is necessary for icing forces to guide it properly so it will not fall off. Platforms frequently are wet and slippery and there is the hazard of men slipping when they take hold of the ice with hooks or pikes to guide it. Ice is usually removed from the conveyor by the use of hooks or pikes, and this operation presents the possibility of men slipping, of blocks of ice falling on their feet, or of their limbs becoming jammed or caught between the block of ice that is being handled and other ice on the platform. After the blocks of ice reach the place on the platform where the ice will be transferred to car bunkers, it must, by the use of pikes or other sharp instruments, be broken into pieces of the required sizes. A hazard exists in this operation by careless use of the tool employed for the purpose, for if the tool is allowed to slip it may puncture the body of the employee or some other nearby.

As previously stated, skids are often used to facilitate the movement of ice from platforms to car bunkers and their use presents a hazard. If care is not exercised when the skids are being placed in position for use, men may fall from platforms or tops of cars, or the skids may fall to the ground and injure someone. If the ice is not carefully handled when it is transferred over the skids from the platforms to car bunkers, it may strike someone on top of the cars, resulting in injury or even death should this cause a man to fall to the ground. When skids are not used, the ice is pulled or shoved from the platform directly into bunkers, and it is quite necessary for icing forces to exercise extreme care to prevent the ice from striking employees on the cars, or from dropping and injuring persons below. When removing and replacing bunker plugs and piking ice in bunkers, there exists the hazard of men losing their balance and falling from tops of cars.

Icing forces frequently attempt to ride on moving chains instead of walking carefully when they move about on the platform. This presents a grave hazard because of the possibility of employees having their feet caught in the chain or of losing their balance.

CHAIRMAN WAKEFIELD: We will now have the pleasure of hearing from Mr. Hillenbach on the subject, "Safety on the Route and at the Platform."

Safety on the Route and Platform

By H. HILLENBACH
Director of Safety, American Ice Company

Since the motorization during the last few years of practically every up to date delivery system, the problem of safety on the route has become a vital factor.

The hazards connected with the old time system of horse-drawn vehicle, among which the runaway was the most dreaded and usually constituted the most serious accident, have been replaced by others of more serious nature. Where the horse

was, in many cases, the contributing cause, it is now the operator with whom rests the entire responsibility, providing the machine he operates is at all times in good mechanical condition. The side-swiping of automobiles or other vehicles by an ice wagon, or even the puncturing of a car with a wagon tongue, were minor accidents compared with the collisions of trucks moving about at a speed of from 20 to 30 miles per hour.

When automobiles first appeared on our streets, many a dog came to grief before he realized that he could not continue to follow his old habit of running in front of a moving object with his hasty bark, the same as he had done to the horse. So it is in many accident cases of today. The motorist still thinks he can beat the ice man at the crossing, often with serious results.

As the ice delivery system is practically conducted along the same lines in all cities, I assume that the accident experience is also very much the same in nature. Now, what is being done to eliminate or at least reduce these many hazards connected with our already expensive operation of delivering our product?

Those who are not self-insurers are well aware of the ever increasing cost of insurance against public liability, property damage and workmen's compensation. Our company became a member of the National Safety Council several years ago and since that time we have made quite a study of the problem of safety on the route.

Accidents comprise two classes, the first of which are collisions, resulting in public liability and property damage; secondly, personal injury to the employee. In the New York Division, which is the largest unit of our company, the latter class accidents are the most numerous, due to congestion and adverse conditions under which service is rendered. Aside from a financial point of view, the humane side, to keep our force free of injuries, is our company's greatest endeavor, for we realize that an injured employee, or a new man on the job, is always a serious handicap in rendering the kind of service of which we are proud.

In 1929, 15 per cent of all our personal injury cases were found to be injuries to the feet and toes, and while we are not compelling our men to wear safety shoes, we have been quite successful of late in reducing among them this added protection.

The ice pick, which appeared with the introduction of artificial ice as a necessary tool to be carried by the men, axes being extinct, has proved another source of many serious injuries to the public as well as to the employee. Leather sheaths, suspended from the driver's belt, are now their repose when not in use, instead of being exposed point upward from the men's hip pockets.

Nearly 45 per cent of the injuries to our men consisted of injuries to fingers, hands, knees, and legs, principally caused by improper handling or keeping of tools. The improper attention given, due to the men not reporting these injuries in time, was the cause of many infections and serious results. We are urging our men to report an injury immediately, no matter how trivial. "No Rider" signs displayed on windshields, safety slogans inside of the cab, and governor's placed on motors to cut down their speed, are all contributing factors which help us to reduce our accidents.

With the ever present turnover of labor and the impossibility of constant supervision while men are on their route, it is obvious that only constant vigilance and education in safe practices will keep the men safety conscious. Some drivers are rarely involved in accidents where they are at fault, due to experience, good judgment and knowing what to do when occasions arise. Others become involved, very often due to the inexperience and carelessness of the other fellow. While it cannot be denied that the severity of our accident experience depends a great deal upon the man behind the wheel, we also realize that many accidents cannot be avoided and always will have to be taken into account as a factor in the final summary of the expense of conducting business.

With regard to accidents at the platforms, it may be said that these are a rarity

throughout our company. Wherever possible a standard width of seven feet should prevail in their construction, and where conveyors are used to bring ice onto the platform, proper starting systems should be installed, pits of sprocket wheels should be properly covered, and above all, the platform should be well lighted during the busy hours of the early morning. Axes and tongs, as well as pike poles, where such are still being used, should be in their proper places when not in use and not lay on the floor of the platform. Floor of platform should be kept in good repair and free from fine ice to prevent falls. Where there are conveyors running parallel with platform, it is important to have track of chain nearly flush with platform floor in order to prevent ice from tipping over when taken off by the loader.

One of our vital safety problems at the platform in the summer is keeping away the neighborhood children who are attracted by the waste ice and who are very often sent for the gathering of this ice by thoughtless parents. Constant vigilance by the platform man and the observance of safe practices as outlined above should reduce platform accidents to a minimum.

CHAIRMAN WAKEFIELD: At this time Mr. F. C. Lynch, the Director of the Kansas City Safety Council, will talk to us on something that the ice man certainly needs to know, and that is Good Housekeeping. There are very few ice plants in the country in which the housekeeping conditions are what they should be.

Good Housekeeping

By F. C. LYNCH

Director, Kansas City Safety Council, Kansas City, Mo.

This subject of good housekeeping is one which your industry is concerned with as much, or more, than the other industries, because of the possibility of the equipment becoming disarranged.

I am going to talk to you on the general subject of good housekeeping. Correlate some of the things I say and their application to your particular problem.

I have jotted down the memorandum, What is housekeeping? Good housekeeping at home is really a matter of the arrangement of the equipment. A good housekeeper must be some one who can arrange the equipment so that it will function properly for the purpose for which it is intended.

There is another item of good housekeeping and that is the products and the by-products. For example, we can say that one of the by-products of good housekeeping in my home is my boy's dirty shirt. Now, it doesn't matter at all what condition a home might be in so far as the equipment and the arrangement of the equipment and all is concerned, if my wife continues to permit my boy to throw his shirt down in the front room.

Some of us become so concerned with the immediate job, the immediate production problem, we more or less forget about the by-products, the scrap.

The previous speaker mentioned the condition of your dock, the chipped ice that comes off until you have accumulated not a direct production item, but you have accumulated a condition by permitting this scrap to lay there on the dock, which introduced a very definite hazard.

Not only does the accumulation of some of the by-products of industry contribute to the hazard, but there is a mental condition which many of the managers of industry have overlooked. Let me give you a very specific example and see if this isn't right in the matter of good housekeeping and equipment. Who is most liable to have an accident, the man whom you start out with a nice new truck, all painted up and shining, or one of the boys whom you are sending out with an old rattle-trap truck, with the fenders bouncing along as he goes down the street? Just analyze it your-

self. If you were driving the two trucks with which one would you be the most careful? There would be a sort of pride, wouldn't there, with the new one?

Isn't that true of the man in the plant as regards the immediate vicinity in which he is working? If you give him nice equipment and keep it in good shape, isn't he going to have a certain pride in his job, a certain consciousness of his responsibility for keeping that equipment in good condition and carrying on, and isn't the frame of mind of the workman the thing with which we must work? Isn't this good housekeeping problem a basic one that has to do with the attitude of the man toward his job and his company, and isn't the easiest way to get a man in the way of careless habits to let him operate with tools and equipment in a way, we will say, that is bad housekeeping?

If you walk up to a man in a machine shop, for example, and find the tools all laying around on top of the bench and some of them on the floor, obviously that man isn't doing good work in the first place, and in the second place, he isn't a safe workman, because it so happens that the right way is the safe way.

I remember that a few years ago when we talked safety some of you hard-boiled industrial people said, "We haven't time for it. We have to do the job. Production has to be gotten out, and safety interferes with it. You are all the time talking about safety first, and it isn't right. Production first, that's the thing." That was a wrong conception that you executives had of the problem.

I would like to give you a more specific example. It is something outside of your industry but you will, perhaps, be able to see the application to your industry. The traffic lane down here on the street represents the acme of good housekeeping in traffic, doesn't it? Those lanes are merely a housekeeping item, but what do they do? Does having these lanes permit more automobiles to be on the street, or would more automobiles be accommodated if the lanes were eliminated, and the cars permitted to go just any way they wished to go? That is just an illustration of how good housekeeping increases production and makes it safer and that is how it is in your plant.

I used to be superintendent of a bus garage. One of the most common things around garages are the blocks to jack up the busses, and upon investigation we had any number of sizes of blocks; not only that, but that they were everywhere except where the fellow wanted them.

What was the result of that kind of housekeeping? Time was lost looking for the right size block, and so the mechanic took the first block he found, whether or not it was the proper one for that particular job. You would see busses sitting on wiggling blocks, and some of them would fall over. I put a boy to work making the proper size block stand so that we had a definite place for the blocks, and from then on our accidents caused by busses falling over were eliminated. They did the jobs quicker than they had done them before, and there was a certain pride about the men and myself in going through the shops and seeing the blocks and tools in a definitely arranged place.

When you get right down to the final analysis of what we have to do with the housekeeping problems in our industry, it is to analyze them just as the housewife analyzes her housekeeping problems. It is a constant problem and we must study and study it. A housewife doesn't just fix the house up and forget about it. It is a continuous proposition, and you will find in your industry that the attitude of your men is influenced by the conditions under which they are working. Furnish them with the proper equipment and you will find that they will be anxious to keep it that way.

Alertness is the biggest problem that has to do with accident prevention. An alert, keen man doesn't have accidents. He produces a high quality of product, he produces it safely and he is a happy man. Good housekeeping is a mighty important factor.

CHAIRMAN WAKEFIELD: It is a pleasure and a privilege to have Mr. W. H. Cam-

eron with us. I don't need to introduce him. He is the Managing Director of the National Safety Council, and I want to present Mr. Cameron to the baby section.

W. H. CAMERON: I just do the work in the kitchen. We of the staff are simply managers of the association, of course, helping you members to function.

I am proud indeed that this section is making such fine progress. When we care enough we get this safety proposition over. I think a great many of our people don't quite understand that it takes a long time to start an idea and to work it into our public conscience.

In the September issue of the *National Safety News* there is an article about the president of one of our member companies in Louisville. His company went more than one thousand days without a lost-time accident. It took him seven years to get this thing started.

We must be enthused and go ahead with our sections and do all we possibly can, but it does take time. When people say to me, "These statistics don't show any progress, and I don't see that you are getting anywhere"; my own inner thought, being in the center of this thing for almost eighteen years, I can see a tremendous progress.

Industries, railroads, and so forth, are reducing the number of their accidents, and, of course, it is phenomenal and indicative of what can be done. If I were giving you a key thought, it would be that you can accomplish good results when you care enough.

I don't know of any movement in the United States—I am in touch with most of them—that has made as much progress in eighteen years as the safety movement. I do know, through contact all over the world, that we are making more progress in America than is being made in any other part of the world.

That is not braggadocio. We are very humble about the work we have done, but I think it is encouraging to know that we have a considerable influence, and that when we do care enough we can establish these safety principles and reduce accidents to a minimum.

CHAIRMAN WAKEFIELD: The final paper of the round table discussion is to be presented by Mr. Henry Knoch, president of the Pittsburgh Chapter of the National Association of Practical Refrigerating Engineers.

Hazards in Construction and Maintenance of a Refrigeration Plant

By HENRY KNOCH

President, Pittsburgh Chapter No. 1, National Association of Practical Refrigerating Engineers, Pittsburgh

The National Safety Council stands for Safety—at work—on the street—in the home.

The N. A. P. R. E. member is the type of engineer who is very much interested in eliminating all "Hazards," in construction and maintenance of the refrigeration plant. After all it is intelligence on the part of the operating engineer that prevents many hazards and accidents, the practical experience of erecting and operating engineers with the education derived from being a member of the N. A. P. R. E. makes us also a safety engineer.

In the erection of a new plant, refrigeration or ice, detailed consideration must be given to the general location of the plant, and the placing of equipment is of great importance, especially in getting away from hazards in operating same.

It is probably beyond the erecting or operating engineer to assist in the selection

of a suitable location for the plant, however, he is very often more able to place the refrigeration equipment with a thought for less hazards and by so doing make it a safer plant to operate.

The requirements that should be considered in the location of the apparatus are the sanitary conditions in the rooms, lighting, ventilation, space requirements for inspection and adjustments, the relations of auxiliary units to the main units, the safety of the operator, etc.

The most important factor in the erection of a refrigeration plant is the proper construction of the foundations of the machinery. If this is right, many hazards are eliminated right here, it is evident that the foundations must be of ample size, good material and workmanship. Foundation bolts for the secure anchoring of machines to foundation are $\frac{3}{4}$ inch size for small machines and $1\frac{1}{2}$ to 2 inches for large machines made of medium steel and long threads on both ends to afford proper adjustment. Cement grout for leveling and grouting in machines is used quite extensively at present, other materials have been used, such as iron fillings, sal ammoniac, sulphur, type metals, etc., from 36 to 72 hours are allowed for setting of grouting before foundation bolts are tightened up.

Piping to and from refrigeration units must be accurate and with special care, the typical refrigerating plant has ammonia, steam, and exhaust, air, brine and water connections, and of course each type of system must have its share of attention. The erecting engineer as a rule has his own individual method of erecting the various piping systems, usually of moving the heavy pieces of machinery, the construction of rigging for heavy lifts, etc., however, it may be of interest to note some of the methods that are employed to make tight joints in the ammonia piping system.

The principal means of making tight joints are first a perfect thread on pipe, a clean thread after which they may use litharge joint, or the sweated soldered joint or the ordinary soldered joint. The soldered joint is probably more permanent than the litharge joint, while on the other hand with the litharge joint if made properly, it will be easier to make repairs in the future, however, welding of pipes and headers is taking the place of joints.

After all the equipment is properly installed and pipe work completed it is desirable to go over each and every part of the equipment to check up the erecting work, all parts of the apparatus should be carefully examined before they are put in for operation. All rotating and reciprocating units should be turned over by hand in order to make sure that nothing interferes with the moving parts. Next important is the proper lubrication of the various apparatus, attend to oil cups and force feed system so that the oil reaches the proper moving parts and avoid the hazards of running hot bearings, etc.

In starting ammonia compressor, be careful, always open by-pass valve first; if there is no by-pass as on old type machines, open discharge valve first. However, all later type compressors are equipped with by-pass valves, and after machine is up to speed close by-pass valve and open discharge valve quickly. This adhered to will avoid many hazards.

The packing of the piston rod of the ammonia compressor should be the very best, and metallic packing is mostly used for this purpose, and so far has proven the safest and most economical for ammonia, air and other gases.

As a rule the new plant is tested with air at 150 pounds for the evaporating side and 300 pounds for the high pressure side, if there are any leaks they should be carefully repaired and the plant will then be ready to do business.

In charging a new plant with ammonia, a vacuum is pumped on the evaporating side of the plant, after which anhydrous ammonia in steel drums are connected to the charging header of the plant, these headers are made up so they will take care of from one to five cylinders at a time, according to the size of plant, etc. The ammonia will then flow into the evaporating side and build up a working pressure, which

the engineer calls the low pressure, up to fifteen to twenty pounds which corresponds to a working temperature from 0 to 5 degrees F. above zero. However, these low pressures, and temperatures are governed by the engineer of the plant depending on the work to be done in each particular plant; for instance the lower the temperature the lower the back pressure. This is the point where the operating engineer must make himself familiar with the properties of ammonia or other liquids used in refrigeration, otherwise he will not be a safe engineer in the refrigeration plant.

The so called high side of the plant consists of ammonia compressor, condensers and ammonia receivers, this part of the plant converts the evaporating gases taken from the low side or evaporation side of the plant in to its original state of liquid anhydrous ammonia. The compressor removes the ammonia gases or the evaporated liquid ammonia (having absorbed B. t. u.'s from its surrounding) to the condensers where the cooling water in turn removes the heat or B. t. u.'s and completes the cycle of refrigeration by liquefying this gas which is now ready for a continuous cycle of operation. The high pressures in refrigeration plants are regulated entirely by the amount and temperature of the water. Hazards in high pressure have been greatly eliminated in present practice through the adoption of electric signals which warn the engineer if water supply goes down and non-condensable gas separators which separate air and foul gases from ammonia, therefore reducing high pressures considerably.

Ammonia receivers or storage tank for liquid ammonia coming from condensers, should be equipped with gauge glasses to indicate the amount of ammonia in the plant automatic stop valve controlling shut-off in case of glass breaks, this will enable the operating engineer to hold a liquid seal in the plant at all times which is one of the most important factors for production and safety.

There should be a safety valve on top of condensers and on top of ammonia receiver these to pop at 300 pounds at condensers and 350 pounds at receiver, in this way the hazards of dangerous pressures or in case of fire in the plant will be greatly eliminated, the outlets of these safety valves should be piped to the roof of the building or sewer where there is considerable water flowing. In the larger cities of our country there is a law or city ordinance compelling the installation of safety valves, and the ice machine manufacturers in later years are installing safety valves in all new plants, yet there are many plants throughout the country with no safety valves which has had the result of explosions, etc.

Large receivers should be installed in all plants, this is a real safety measure which will enable the operating engineer to get capacity out of the plant, and if repairs have to be made he has ample room to pump out the parts of apparatus and store his ammonia, there are still many plants where receivers are too small and the engineer has to resort to getting empty cylinders and withdraw the ammonia from the plant in order to make repairs. Ammonia should not be withdrawn from a plant into cylinders without weighing the ammonia placed in each cylinder, overfilling these cylinders is very dangerous.

Purging of foul gases and air from the ammonia system is very important and practically eliminates the extreme high pressures by using a non-condensable gas separator, these machines remove the undesirable gases which are located above the liquid level of the receiver. Air being heavier than ammonia gas will go to receiver instead of to top of condenser.

No-freeze-back control valves and multi-feed headers will eliminate many hazards in the refrigeration plant in so far as keeping a proper temperature difference and no slugging over to machine.

The cooling water is the only agent that removes all the heat from the refrigerating plant, therefore considerable care should be taken to distribute same uniform over condensers and other apparatus, and keep condensers free from scale forming matter. The hazards of leaks in ammonia pipe lines and fittings can be greatly eliminated by

rigid hangers and supports. If possible, all piping should be put up so men can get to them with ease in case of repairs.

Ammonia purifiers or regenerators if properly used will eliminate many troubles in refrigeration plants, this apparatus separates the oil and other impurities from the ammonia and restores the good ammonia back to the system.

The low pressure side or the evaporating apparatus consists of many different types, such as freezing coils, brine coolers, air coolers and conditioners. The operating engineer can avoid many hazards by making himself familiar with every apparatus of this kind and keeping the gravity of the brine at proper strength as the type of apparatus may require.

It is really a fact that most plants, some of them very large plants, operate on too light a charge of ammonia, and paying very little attention to the gravity of their brine, causing great losses in a year's time. Here is where the N. A. P. R. E. has done some wonderful work through its Lecture Course, instructing the operating engineer in handling the chemicals required in the refrigerating plant, which means fewer hazards.

A few "Don'ts" for safety in operation of the plant:

Don't attempt to run your plant with insufficient charge of ammonia; if you do, you lose in capacity and fuel.

Don't run your plant without gauge glass on the receiver. Unless the gauge glass shows sufficient ammonia you may lose your liquid seal between the condenser and freezing coils, thus circulating gas instead of liquid ammonia.

Don't purge by hand, use a non-condensable gas separator which separates foul gases and air from the ammonia while plant is in operation.

Don't pump an unnecessary vacuum on the ammonia system. You may start leaks, never subject submerged coils to a vacuum test, always use pressure; this is safer.

Don't place cylinders full of ammonia on hot floors, steam lines or near boilers, the heat will expand them and explosions have occurred on account of carelessness.

Don't run your liquid ammonia lines over boilers or alongside of steam or hot water pipes. Hazards will be eliminated by following this rule.

Don't open an ammonia joint before venting same carefully; you may think the pipe is empty, but valves may leak and it is safer to first "crack the joint" by loosening it only.

Don't run your plant without thermometers in suction and discharge line, in reading same regularly, will enable you to run plant more economically and safer.

Don't use small lines to convey liquid from condensers to receiver; give liquid a free flow by using nothing less than 1 inch pipe on atmospheric condensers, and larger on shell and tube type. Many hazards are overcome in this way. Condensers are for the purpose of liquefying refrigerant, not for liquid storage.

Many other hazards are eliminated by the operating engineer by constructive thinking. Each plant requires special attention at the storing of foods, ice and ice cream manufacturing, chocolate and candy manufacturing, air cooling for theatres and large buildings, etc., and it may be proper to add the N. A. P. R. E. through its Lecture Course and Educational Committee has been and is today, the best school for the constructing and operating engineer.

It is true we have made wonderful progress in refrigeration up to date, but greater things will be done in the future and that is by thinking constructively along spiritual lines which is the factor of all life, and in doing so we will make this world a better and safer place in which to live.

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



Rubber Section

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**Tuesday Morning Session
September 30, 1930**

**J. T. KIDNEY, Chairman
The Goodyear Tire & Rubber Company, Akron, O.**

The first session of the Rubber Section at the Nineteenth Annual Safety Congress convened with J. T. Kidney, of The Goodyear Tire & Rubber Company, Akron, Ohio, presiding.

CHAIRMAN KIDNEY: The Rubber Section has done a good job, generally, in the last few years, and as an indication of what a good job they have done on accident prevention I refer you to Ohio, where most of the rubber companies are located. The rate on compensation was at one time very close to \$1 per \$100 of payroll. Today that is down to between 47c and 50c, which has all been brought about through the experience of accident prevention in the rubber companies in Ohio. And the same thing, I am sure, applies to the rubber companies all over the country.

So our work in the Rubber Section, in the last few years, has not been without fruit.

With just those few words, I now take pleasure in introducing Mr. C. B. MITCHELLA, chairman of our Engineering Committee, who will make his report for the year.

Annual Report of Engineering Committee

**By C. B. MITCHELLA
Chairman**

In previous years this Engineering Committee has been composed of a small number of members, usually three. The writer's previous experience as chairman of this committee developed the fact that these three members could be overburdened with work, and therefore were unable to function thoroughly and to the fullest extent. It also limited the facilities for carrying on the work. The writer thought that a much better showing could be made if the committee is not limited in its personnel, and have some person, preferably an engineer, from each member company to be part of the committee.

After corresponding with Mr. Kidney, chairman of the Rubber Section, this scheme was put into effect, and he furnished the writer with a list of all the member companies and their representatives. Each representative was informed of the plan, and requested to submit the name of someone qualified to serve on the committee.

At a meeting of the Rubber Section in Columbus, January 13, 1930, a resolution was passed to have the Engineering Committee submit at the next annual meeting a list of subjects upon which safety pamphlets could be written. To comply with this, each member company was written to for suggestions. Of all those written to, eight replied, submitting suggestions as follows:

1. Safe Practices for Maintenance Men.
2. Safe Guards for Bias Cutters.
3. Safe Guards for Tubing Machines having Power Driven Rolls Above the Feed Box.

4. Safe Guards in Tire Curing Room. (It was suggested that most accidents in Rubber Factories are in the Tire Curing Room.)
5. Proper Use of Hand Tools.
6. Handling of Miscellaneous Materials.
7. Bring up to date our previous pamphlets and treatises on heaters and vulcanizers, and give additional information on type of hooks for supporting heater doors and methods of lifting and handling these doors.
8. General pamphlets on Banbury Mixers, Tire Building Machines, Cutting Machines, Windups, and Conveyors.
9. Safe handling of molds in Machine Shop, Production Department, and Storage.
10. Cement Mixing in Churn Rooms, and Varnish Rooms.
11. Methods of testing gravel of mill and calender rolls after safety stop has been thrown, and give data and records of stops on various types and sizes of machines which have been satisfactorily attained.
12. Dust collection in the Rubber Industry.
13. Safe Guard to be used at the bite of calender and doubling machine rolls to prevent operators' hands being caught.
14. General pamphlet on cleanliness, orderliness, etc., particularly with reference to promiscuously strewn around tools, unused articles, materials, and scrap.
15. Treatise on tobacco spitting, cuspidor types, distribution, collection, and cleaning.

It is suggested that the Advisory Committee of the Rubber Section choose a certain number of subjects to be covered each year, and that each subject be handled by a special committee of three, who are well qualified on the specific subject. This committee may be chosen by the chairman of the Section. After each preliminary draft is completed, it should be submitted thru the chairman of Engineering Committee, to each member of the Section for criticism, and then returned to the committee with these criticisms for final execution and submission to the Advisory Committee for their acceptance and distribution.

It has always been the practice of the Engineering Committee to help various members solve safety problems of an engineering nature. During the past year, one member asked for recommendations on a device to prevent operator's hands being caught between the rolls of a rubber washing machine. Six member companies were written to for recommendations, and replies received from four. This is a very difficult subject to handle, and it seems that most everyone relies upon the precautions and good judgment of the operator to prevent injury to himself, and also to the safety throwout for quick stopping. However, reply was given to the member as follows:

"Referring to your letter of December 31, requesting suggestions from Engineering Committee on safety devices and precautions for washer mills.

"In order to take full advantage of the talent available in the Rubber Industry, your questions were placed before six member firms of the Rubber Section. To date, replies have been received from four, and the writer thinks that it would be unfair to hold up, awaiting information from the other two, and that if the data will be of any value to you, you ought to get it as soon as possible.

"Your problem has been divided into three parts, and data requested from the members in accordance therewith.

1. Method or device for preventing any accident on a roll.
2. Device for forcing rubber into the bite of the rolls without direct use of the hands.
3. A device which will warn operator of danger before his hands can get to the danger point.

"Copies of the various replies are enclosed herewith.

"You will observe that none of the replies offer anything which can be considered

very constructive. One of the greatest problems in rubber mills has been the prevention of accidents on these mills, and many devices have been offered and tried, but there has been considerable variation of practices among the various factories, and there seems to be no possibility of agreement between them.

"In addition to the comments made by member companies, the writer wishes to submit his personal suggestions as follows:

"1. As pertains to a device for helping prevent accidents.

"Most any piece of equipment placed in the vicinity of the rolls will make it difficult to feed rubber into the rolls. Rather than resort to such a device, the writer has preferred to make the height of the rolls above the floor, and also provide means for keeping the operator far enough away from the bite of the rolls, that it is impossible for him to get caught, unless he deliberately crawls into a position whereby he can reach the danger point. The rolls can be placed at such a height without making it difficult to handle the rubber, and also the operator can be kept a safe distance away by providing a cross bar across the mill from housing to housing, at a height that he can rest his body against it if necessary, and not having the bar so low that man can fall over it.

"2. Forcing rubber into the bite of the rolls.

"In handling sheets this is necessary, but for washing wild rubber in biscuit form, it may be necessary to use force. The writer installed at one plant, a cross bar across the mill attached to the housings, at a height slightly greater than the top of the rolls, and under this bar was placed a wide board or paddle as we called it, long enough to extend from this bar to the operator's position, enabling the operator to pry down upon the top of the rubber biscuit, the bar mentioned serving as a fulcrum for the paddle. This worked very nicely and no objections to its use were made by operators."

"3. Means for warning operator when his hand gets near danger point.

"Reference is made to Farrel-Birmingham's letter and their blueprints, illustrating a leaf suspended by its upper edge above the front roll. With this device, it is very likely that an operator would never push his hands beyond the leaf. I think this device would work very nicely for washing sheet rubber, but it might be in the way for feeding in chunks of biscuit rubber. As the device is shown, it is doubtful if its use would be appropriate on a mixing mill or warmer mill where the stock is rolled up, and allowed to fall over the top of the mill roll.

"For washing all kinds of rubber, the writer installed at one time a series of tank washers, and so far as the quality of work done and safety are concerned, they were very successful. However, the maintenance was rather large, and it was hard to prevent leakage of the water at the ends of the rolls.

"The writer is of the opinion that methods used today for washing, mixing and warming of rubber between two rolls is crude, and that the time must come when a different process will be used, not only to enhance safety, but to get greater and more uniform production.

"If replies from the other members are received, they will be forwarded to you immediately.

"If there is any other service the writer can perform on this subject, he shall be glad to hear from you. It is a difficult problem to handle, but if a lot of questions are asked, it may be the means of bringing out some new idea and development."

Work was also done in connection with the American Society of Safety Engineers which is the Engineering Section of the National Safety Council, and the chairman of your Engineering Committee automatically becomes a member of the Executive Committee of that Section.

The principal work the past year with that Section involved the study of a large number of proposed safety pamphlets and codes which were prepared by committees of that Section. This work is being carried on by them very rapidly

and completely, and they are covering industries of all kinds. It is their intention to publish the various pamphlets as soon as the final drafts are completed.

The writer believes that the method of operating the Engineering Committee this past year can be made to produce excellent results, and the following suggestions for improvement are submitted.

1. That members asked to give service, DO SO, and within a reasonably prompt time, without requiring further reminders.
2. That members in making their replies, confine themselves to the specific subject given.
3. That the subjects be given careful consideration, and hasty last minute replies avoided.

CHAIRMAN KIDNEY: That was a very good report, Mr. Mitchell, and we all owe you a vote of thanks for the efforts made along those lines. I think you have pointed the way for other Engineering Committees to carry out their work successfully.

The next report will be by Mr. H. W. Low, Chairman of the Statistics Committee.

Accident Experience in Rubber Section During 1929

By H. W. LOW

Chairman, Statistics Committee

The Rubber Section for the years 1927, 1928 and 1929 has shown a steady decrease in frequency rate, and at the same time a steady increase in severity rate. This picture is the same as presented by the total of all industries reporting to the council. The following figures are quite interesting.

	RUBBER SECTION		ALL INDUSTRIES	
	Frequency	Severity	Frequency	Severity
1927	30.84	1.00	25.85	1.92
1928	24.95	1.17	23.39	1.97
1929	20.15	1.29	22.90	2.02

The Rubber Section may well feel proud of the reduction made in frequency which amounts to 35 per cent in 1929 over 1927 while the reduction in all industry was 11 per cent for the same period.

Our showing on severity however is not so good the increase in the Rubber Section being 29 per cent while all industry increased only 5 per cent. An analysis of the 29 per cent increase shows that it occurred in all three classes of time losses, i.e. fatalities, permanent partial disabilities and time lost from temporary total disability.

In our efforts to prevent the minor injuries which result in a few days lost time, are we neglecting the more serious hazards where employees may be killed or maimed? There is sufficient evidence in the figures to make us give this matter serious thought and check our plants over with this in mind.

The increase in days lost per case due to temporary total disability brings the thought to mind that we are trying too hard to keep the man on the job after he is injured in order to keep the frequency rate down. Carried too far this practice results in infections, stiff joints, etc., which cause loss of time far in excess of that required for complete recovery, if the man had been sent home a few days immediately after the injury. We had a striking example of this in our organization a few years ago when a change in hospital personnel was reflected in an increase of 21 per cent in frequency and a drop of 9 per cent in severity.

Fatal accidents in the rubber industry numbered one to every 5,183 employees compared with one to every 1,888 in industry as a whole. We had one permanent partial disability accident to every 937 employees which compares with one to every 430 in all industry.

The frequency rate of our industry also compares favorably with industry as a whole. The frequency rate of all industries for 1929 was 25.53 and the rubber industry 19.25 or 24 per cent below the general average which places us ninth in the 27 industrial groups listed in "Industrial Accident Statistics."

The records of individual plants showed a wide range of variation as did the grouping into large and small plants. In this connection it may be of interest to quote two very similar records turned in from a large plant and a comparatively small one. During the month of June the tire division of the B. F. Goodrich Co. worked a total of 750,000 hours without a single lost time accident. The Corduroy Tire Co. are to be congratulated on equalling this record by working 697,183 hours from September 13, 1929 to September 13, 1930 without a lost time accident. These two records make it quite plain that regardless of the size of the plant a real safety minded organization can put it across when they really try.

CHAIRMAN KIDSEY: It is now my pleasure to introduce Mr. A. P. Regal, of the Philadelphia Rubber Works, of Akron, Ohio, who will talk on Rubber Reclaiming and its Hazards.

Rubber Reclaiming and its Hazards

By A. P. REGAL

Process Engineer, the Philadelphia Rubber Works Company, Akron, Ohio

It has been suggested that relatively few rubber men are familiar with reclaiming processes or equipment, and would welcome a description of the machinery and methods; hence this talk, with specific reference to the safety hazards, and some things we are doing to improve unsafe conditions.

Because we sell only to the manufacturer of rubber goods, the magnitude of our industry is not apparent to many, but to say that the amount of reclaimed rubber consumed is half that of crude, in other words reclaimed rubber constitutes one-third of all rubber products, may make the comparison a little clearer. Two hundred and fifty thousand tons, or five hundred million pounds per year of reclaimed are used in this country, and thousands of tons exported.

The accident experience of the industry in the past has not been particularly good, whether due to unusually dangerous equipment, or to failure to keep pace with our friends in the safety movement, may be a question. However, let me call attention to some possible reasons. The largest reclaiming plant does not employ over 500 men and when compared with establishments of similar number of employees, in other industries, our experience is favorable. Again, some 40 H. P. of power is used per employee; an unusually large amount, indicating that the quantity of machinery per employee is large, naturally meaning increased hazard. Even then, most of our accidents, especially serious ones, are due to causes not peculiar to the industry, with the possible exception of burns and scalds, to which our processes render us particularly liable.

Today, most reclaimed rubber is manufactured by the alkali process, though the acid process is also used to a considerable extent. Since the writer is less at home with it, however, this description will be chiefly of the former.

All reclaimers find it necessary to maintain a considerable supply of raw material, scrap tires, air brake hose, boots and shoes, etc. Efficient and low cost handling from cars to stock pile, and from pile to processing, requires conveying equipment of some kind, usually one or more gantry cranes. Hazards exist here, both in pile and crane. We have known men to fall from the pile, or tires from the pile to fall on men below. It is surprising that more do not stumble while working on the piles, with consequent sprain or fracture. Where cranes operate on elevated runways, there is less danger, but with rails upon the ground, men have been caught

and crushed. Others have been beneath when a loosely caught box or bale fell. In more than one instance, the crane has left the rails and toppled over, fortunately causing minor injuries.

Since reclaiming is basically a chemical process, and formulae are followed, it is necessary throughout to keep check on quantities, so, whether from car or pile, the first handling is that of weighing. Usually the scrap will be loaded on skids, or in boxes, delivered by crane to ground, picked up by an industrial truck, or hand lift truck, taken to scales, then on to pile, if to be stored, or to the next step, if going in to processing.

This next step is usually that of removing the beads, on tires. Sometimes done by hand, the man pulling a knife around as he revolves the tire on a table, it is more usually done by machine, a revolving circular knife, motor driven, separating the bead as the tire is revolved in the machine. Whatever type of equipment, there is the hazard of the knife, hands sometimes being caught and drawn in, usually with serious injuries. Some machines are more automatic than others, the operator being in such a position that he cannot be caught. Others are fitted with safety devices, not greatly unlike those on the household washing machine wringer, the release of the operating pedal, or the striking of a safety trigger, opening and stopping the feed rolls, or bringing the machine to an abrupt stop through a plugging control on the motor.

The tire is then reduced to smaller pieces through the medium of one or the other of several types of machines; the chopper, or rag cutter, having knives on the surface of a revolving cylinder, cutting the tire into pieces the size of your hand; the hog, an adaptation from the lumber industry somewhat similar but reducing to rather smaller pieces; or the cracker, a two roll mill, the rolls being corrugated, which grind and tear the tire into pieces and strips.

However this initial breakdown may be done, somewhat similar crackers are usually used for the final grinding, which produces particles passing through a $\frac{1}{8}$ inch or $\frac{1}{4}$ inch screen, the larger pieces falling back into the cracker for regrinding.

About two or three tons of the ground tires are then charged into steam-jacketed digesters, either horizontal or vertical, about 5 feet in diameter and 18 feet long. A solution of caustic soda, sodium hydroxide, is then added, the digester headed up, the agitating paddles inside started turning, and steam turned into the jacket. The charge is cooked in this manner for from 10 to 20 hours, during which the action of the caustic under heat and pressure, destroys and dissolves all cotton fibre, removes free sulfur and soluble compounds and swells or polymerizes and plasticizes the rubber.

At the conclusion of the run, the contents are dumped into some arrangement for draining off the liquor, and applying water to wash away the caustic. A travelling screen is sometimes used for this, a vertical tank, with agitators and water spray, or a long vat with a partition along the center, around which the contents are circulated by agitating paddles, while water is added, then drained off.

Since tires frequently pick up nails, other metal, and stones, it is customary to separate these out by pumping the washed stock over a "riffle", a long, inclined trough with frequent baffles, or dams, over which the water and lighter stock flow, leaving the heavier material, sand, stones and metal, on the bottom behind the dams.

The stock may then go into large tanks where the rubber settles, the excess water being drained off. The stock next drops into screw presses, a machine which consists of a screw decreasing in pitch from receiving to discharge end, likewise usually tapering down in diameter, revolving in a cylinder either perforated, or made up of a series of bars forming slots, so that the cylinder walls are screens, through which the screw forces out the water in the stock, finally discharging the rubber at the small end.

This is taken to driers, of which there are many forms, some using flat screens on which the rubber is placed, hot air being forced through from underneath, others, a continuous belt-like screen enclosed in a casing, the wet stock being fed on at one

end, dry stock being delivered from the other, heated air passing through screen and stock. Still others use an oil, gas, or powdered coal-fired rotary drier, a long revolving cylinder, inclined somewhat from the horizontal, the stock being fed at the upper end, gradually working down past baffles and against the flow of hot air and gases which enters at the bottom, to discharge at the lower end.

All this time, from the initial chopping or grinding, the stock has been in a granular form, capable of being shoveled like buckwheat coal or fine gravel, and flowing from conveyer, box or bin. When sufficient water is used with it, it can be pumped and will flow as would these substances. After being dried, however, it has a tendency to mat together.

The remaining stages of processing are located in the millroom, where the stock may go directly to refiners, or first to warming mills, usually about as large as rubber mills are made, with 26 inches diameter by 84 inches long, rolls, the stock being repeatedly past through the rolls until it becomes warm and coheres. Now in the form of a spongy mass, it goes to the refiners. These are sturdy 2 roll mills, the rolls being relatively short and large in diameter. Sizes vary according to the ideas of the reclaimer, one commonly used consisting of a 21 inch and a 24 inch diameter roll with a 32 inch face. These rolls, of chilled cast iron, though alloys and steels are beginning to be used, are carefully ground and polished, and are set together so tightly that the rubber issues in a sheet whose thickness is measured in thousandths of an inch, .003 being common. These rolls are so geared that they do not travel at the same speed, the surface of one roll moving, say, twice that of the other. This ratio of surface speeds, called the friction ratio, varies according to the desires of the manufacturer.

The action taking place is a rubbing, almost a grinding, so that the pieces of stock, previously like grains of wheat or corn, become crushed and flattened and rubbed into each other so that the sheet coming out is as uniform and smooth as a sheet of paper.

Some manufacturers will repeat this refining, or even pass the stock through a third time. Either between these refinings, or following, the stock will go through a strainer similar to a tubing machine, 10 inches in size or larger, having a perforated head instead of a die, which is lined with screen cloth of a satisfactory fineness to screen out the flakes of metal which may have escaped the magnetic separators, the washers and the rippers.

The stock, leaving this machine in strings quite like macaroni, is dumped into a leaf-sheeter, for the final stage, issuing in laminated slabs.

It is now ready for the market, requiring only weighing, packing or loading or transmission to storage.

Where scrap rubber is reclaimed by the acid process, much the same methods of reducing the scrap to small pieces will be employed, but the stock will then be loaded into some form of open vat or else into towers. Such a vat might be rectangular, a convenient size being about 8 feet wide, 3 feet deep and 12 to 18 feet long. Or round, say 10 feet diameter and 10 feet high. A tower, probably rectangular, might be 6 feet square and 15 feet high.

Several thousand pounds of stock will be loaded into such a container, a sulphuric acid diluted with water to the desired strength applied either as a spray, where the tower is used, or as a bath, in the vat, the whole being kept at the desired temperature, 150 to 200 degrees F., for 24 to 72 hours. Washing, drying and milling is then carried on much as previously described.

Since dilute sulphuric acid attacks iron and brass, wood and concrete, lead is used as a lining for such containers, and washers must be of vitrified brick or tile, or similar construction, to withstand its action. Pumps and piping must also be of lead, or acid-resistant material.

From a safety standpoint, there is little to choose between acid and alkali, either causing severe burns unless promptly neutralized.

We now have a finished product which goes into the manufacture of all kinds of

rubber goods, helping greatly not only to toughen the article in which it is properly used, but also enabling you to enjoy this article at a much lower cost. The general use of reclaimed rubber, in partial competition with crude, also keeps down the price of crude, a double saving to the buyer of rubber goods.

It is apparent that conveyors of many descriptions play an important part in handling this large tonnage economically. Before the tires have been chopped, they may be handled by the chain type, carrying hooks which automatically dump, or the belt type which has a wide application, both here, and in later steps of the process.

Where stock, after being chopped, must be carried to a higher floor, the bucket elevator, or the inclined scraper, will be used. The spiral conveyor also has a wide field of successful application. A favorite method of handling stock after digesting, when naturally there is a superabundance of water, is with centrifugal pumps, an unusually economical and satisfactory arrangement.

Pneumatic conveyors, blowers, tubes and delivery cyclones, are much used as long as the ground stock is not too wet.

The handling of the material in process in boxes, wheeled tubs, or on skid boards, either by gantry cranes, as referred to, by overhead monorails, either motored or hand propelled, or by industrial trucks, gasoline or battery powered, is common, expediency and low cost determining which form is employed. The battery lift truck is certainly a flexible piece of equipment, and in some of the many forms available, or adaptations, frequently will be found the most satisfactory method of handling many steps between processes.

We referred to certain inherent dangers associated with cranes and scrap piles. Conveying equipment of all kinds is a possible source of injury. We have known men to be caught by the suspenders, or other parts of their clothing, by hooks on a chain conveyor, and carried considerable distance before the clothing gave way, or a fellow-worker shut the power off. Even the belt conveyor, or the scraper, as well as the spiral, has caught the foot of a workman, due to someone's carelessness in displacing a cover.

Choppers and hogs sometimes throw with considerable force pieces of metal which may come through with stock, or break off in the machine itself, while occasionally, perhaps due to too large a piece of iron or of wood getting in, the machine may fly apart, the high momentum of the necessarily heavy revolving parts producing almost an explosive effect.

We have known men cleaning out while the machine was running, forbidden of course, to stick their fingers into the revolving knives. We had one man, an old employee, a shift foreman, for years on the job, lose a portion of a finger between the corrugated rolls of a cracker, while thoughtlessly pulling out a piece of scrap which had caught.

Steam heated digesters offer several potential hazards. Before the application of a mechanical safety interlock, the door of a horizontal heater had not been properly fastened, and blew off when steam was turned on, impelling the heater body through a brick wall and a small wooden shed, to lie some 60 feet away, the door, after traveling about 20 feet, coming to rest against a column. The entire room was filled with scalding steam. Had this occurred 15 minutes earlier or later, loss of life and injured would have been heavy, but fortunately no one suffered a scratch, excepting a mechanic who, though out of harm's way, was so frightened he endeavored to crawl through a hole too small for him, with minor abrasions.

When a digester's run is over, in some plants, the steam is turned off the jacket, and the internal pressure is gradually reduced to atmospheric by opening valves connected to blow down piping. The head may then be removed, and the contents dumped. Sometimes the crew, unwilling to allow all of the prescribed time for this important procedure, will remove the head bolts, and loosen the head while there is still considerable pressure. The steam, issuing around the head has caught the men, bad scalds resulting, and death in some cases.

In some equipments the dump head is piped directly to a receiving tank and the opening of a valve allows the stock to be blown out under pressure.

It is self-evident that a man going inside a digester to clean or repair it, should assure himself that there is no danger of the paddles within being started. Yet that has happened, with narrow escape from injury.

These agitating paddles, revolving slowly, are usually driven through worm wheels. We have known these wheels to break, due to something going wrong, and fall to the floor, endangering whoever might be beneath.

Caustic soda must, of course, be handled carefully, and we have frequent first aid stations, with neutralizing solutions. Boots, aprons, gloves and goggles, are worn, still we have burns, though seldom serious.

Stock, after being pressed quite free from water, is elevated to bins above the driers, by bucket elevators outdoors. In cold weather, to keep the boots from freezing, a jet of steam is turned inside the boot, a drain connection carrying off whatever water there may be. During the week-end shutdown, these boots, as is all similar equipment, are thoroughly cleaned of any accumulation of stock. Though cautioned about checking the closing of steam valves, and the drain, one poor fellow, working on a ladder, opened a hand hole above his head, and since it happened the drain had clogged, received a quantity of hot water on his back, dying from the resultant scald.

Whatever safety equipment you may install on your mills, and however experienced and thoroughly cautioned your men may be, still men get caught, though we are glad to say, not nearly so frequently as formerly. But the writer is ready to throw up his hands, when two mechanics, old employees, and at least average men in mental capacity, with "safety" hammered into them in every way possible, will climb on top of a mill housing while the mill is running, and, worse yet, stretch in an unbalanced position, without hand-hold, for the end of a counter-weight cable above their heads, though tongs were easily available with which to reach the cable from the floor. In this particular case, a drum-head court was held by the Safety Committee, though perhaps even more effective, was having to repeat the posture, for the benefit of the photographer, the mills being shut down of course.

In plants where there are ramps or raised platforms, there is always danger of industrial truck wheels slipping over the edge, upsetting the truck, or pinning the operator against the wall or column, or, perhaps, freight car slide. Or, the pedals may be run into wall or column, skid or box, catching an unwary operator's foot, if it overhangs. The steering handle may in like manner catch his hand.

To prevent such injuries, a guard rail may be installed along the edge of ramp or platform, a rigid fender frame around the pedals, and a sabre guard on the steering handle, or perhaps a disk on the end, may prove effective. Doorways and corners, where a pedestrian may be caught by a swiftly moving truck, must have signs calling attention to the hazard, inclined mirrors giving a view of what is approaching, or drivers must be thoroughly schooled to give warning of their coming. Do not let your horns get out of order, for by some strange law of happenings, just then is when your accident will occur. Nor should it be necessary to suggest that industrial truck brakes need to be kept adjusted and lined, just as automobile brakes.

Freight elevators have their hazards, though per mile traveled, or too-mile, or passenger, there may be fewer accidents than on most other transportation agencies. With all the safeguards, men do get caught between cage and floor, and trucks and men do tumble down shafts.

Two boiler-tenders were badly scalded, spending months in the hospital, because of neglect to wear gloves. A gasket on a blow-down line gave way, as they will, the billows of steam driving the operator away, since his hands were bare. With another, he secured his gloves and returning, they groped through the steam until the valve was found and closed, but not before their legs were severely scalded.

There are undoubtedly many dimly lighted areas in every plant. Because little work is done in the section, or the nature of the equipment makes an adequate lighting

installation difficult or expensive, or just because it is not recognized that hazards lurk, doubly dangerous because not seen, little attention is ordinarily given such regions. Shadows may cover a hole, into which a leg easily slips, or hide an obstacle to be the cause of a contusion, if not a fall. Electric light is so cheap in these days that it may be decidedly false economy to turn out lights just because no one is working in the section, if there is chance that the trap attendant in his rounds, or the chart changer, must grope his way from point to point.

Electrical hazards not always sufficiently recognized exist in every reclaiming plant; 110 volts have proven fatal so frequently that it is realized to be a dangerous voltage, yet almost without exception lighting circuits are the customary 220/110 volt three-wire system. A digester cannot be charged, dumped, washed, cleaned or repaired without the use of an extension cord, and in cleaning and repairing, the workman is inside. In any event, he is standing on, or in contact with, the perfectly grounded iron of the machine, usually wet, or he is standing in water. Broken down insulation on his extension cord, or coming in contact with a live part of the lamp or socket, provides every opportunity for a fatal shock, which has happened before in our industry, and will happen again. The same condition exists in boiler-cleaning, in fact wherever extensions are used where floors or men are wet.

A scheme which has been successfully applied, and which is highly recommended, is that of supplying the extension circuits from a transformer the secondary of which, not connected with the primary, is 110/55 volts, the 55 volt tap, or middle point, being thoroughly grounded. Standard 110 volt lamps, and other equipment such as fans or portable tools, can thus be used, but the highest voltage to ground is 55, recognized everywhere as not dangerous. So, even should the code regulations providing for grounded socket shall be disregarded, through careless work on the part of electricians, the man is safe.

Electrically operated cooling units for drinking water are coming into wide use. A caution from experience may not be amiss. At least one make has a control on the top, the cover of which may be readily pushed a little to one side, causing it to ground on live parts within. Anyone drinking with a hand on an exposed metal part of the top, may get a severe shock, the water jet and faucet being perfect ground. Probably the real remedy is to connect the metal top to ground, but if that seems too difficult, the control cover may at least be lined with fish paper or thin fibre.

So called "safety switches" have proven a repeated source of injury, particularly on 440 or 550 volts. The cover interlock rarely continues effective after a few months service, and should the switch be opened under load, or closed on a short, or should some abnormal condition in motor or circuit cause a fuse to explode, usually the switch will short across terminals, the resulting explosion blowing open the door, burning face and hands of the operator if he is close, as he usually is.

The later types of this device, are better designed and if care is exercised in selection, should give little trouble of this kind, especially if the load-break, rather than the disconnecting, model is used, which is recommended.

In surveying potential hazards, or in considering a situation where an accident has occurred, there is an unfortunate tendency, especially on the part of those responsible for spending money, to take the attitude that since this is the first time an accident like this has happened, and, since probably it will not happen again in a thousand years, therefore the spending of good money to correct the situation is not warranted. Of course the answer, and the only possible stand taken, must be that every place where an accident has occurred, or where there is a possibility of accident must be made safe; that there will be injuries a-plenty from causes difficult to anticipate, or from hazards which have been overlooked.

It is taken too much for granted even today that a reclaiming plant, because much steam and water are used, must be sloppy. We know that such processes can be kept clean, and equipment so arranged that hazard is reduced to the minimum. Light, in such locations, is a valuable aid to safety. Cleanliness and order, throughout, are

so tied in with good management and efficiency, that it would seem unnecessary to particularly demonstrate how intimately they are connected with safe operation and low cost production. Yet there is many an earnest foreman who fails to realize this relationship until the safety engineer or superintendent has convinced him by object lessons or data. We do not believe any one theme can better be continuously, persistently, hammered on than this, "cleanliness and order."

All in all, the hazards in the reclaiming plant differ little from those in your own factory, and success in safety work with us depends upon carrying out the same methods which have reduced your accidents. We must constantly check our equipment, to see that guards are not laid aside. We must constantly watch for that unappreciated accident opportunity, to rectify it before the accident occurs.

We must use every facility reasonably available to us, posters, bulletin boards, contests, and other graphic means to arouse and maintain interest.

We must keep constantly before our own minds, as well as before the workman's mind, that accidents are avoidable. We must eternally educate, and constantly change our appeal, so that it comes freshly to the men. We must so reiterate safety to our employees, that their mental attitudes will change, that safe thinking will be normal to them, that chance-taking will cease. A task, for our traffic casualty reports indicate how deeply rooted carelessness is, but how worthy a task! And what a reward to know that some of our comrades now alive and whole, but for our work would have died or been maimed, that homes are happier and misery less, because of our efforts!

CHAIRMAN KIDNEY: I'd like to call your attention to the fact that Mr. Regal is not only a Reclaiming Engineer of first rank, but also an Electrical Engineer. I certainly appreciate the effort he has made in preparing this paper, and I know that you do, too.

We will next have the discussion on Mr. Regal's paper, which will be led by Mr. Charles F. Smith, of the U. S. Rubber Reclaiming Corporation, of Buffalo, N. Y. Mr. Smith.

Discussion

CHARLES F. SMITH (U. S. Rubber Reclaiming Co., Buffalo, N. Y.): Mr. Chairman, I can quite agree with you that Mr. Regal's paper was most complete. In fact, if it had been written in our own plant there would have been several parts of it that would have been almost exact descriptions of accidents that have happened.

I refer particularly to the accident that happened with the bucket elevator, where the man broke his arm. We had the same thing happen. A foreman on the third floor of our building kicked the elevator over without assuring himself that the man who was cleaning out the boot of the elevator was away, with the result that the man's arm was badly broken, so that a good recovery was never obtained. The man is still a cripple.

In connection with what the chairman said about our forming a union with the Chemical Section, it just made my blood boil to think that after the American Chemical Society came into the National Safety Council it can have incorporated with it the Rubber Section, which is the most vigorous of all the Sections, and that we should have to unite with the Chemical Section to discuss our problems.

I believe that the rubber men, as a whole, if you get them aroused, are a bunch of live wires and go-getters, and that they can put over a Section like this as well as any group in the country.

What I have to say about the paper is in connection with a few points, where the Philadelphia Rubber Works process differs from ours, and I shall try to make it just as brief as possible.

We use the same sort of debadders that they do. We recently bought from Riker & De Groos a double debadder, with a knife both above and below, to take both

beads off at the same time. We hadn't had that machine very long before we found it to be very unsafe, because the man couldn't see where his bottom hand was going. As he ran the tire through, the bottom knife was exposed and cut his hand. So we had to abandon the use of that machine as a safety measure. We couldn't see any way of properly safeguarding the double debadder.

We had another case of a man pushing a tire into the debadder with his knee. The bottom feed roll underneath the knife of the debadder rotates quite rapidly, so that he caught his overalls and was dragged into the machine. Fortunately the machine was shut down before he was seriously hurt, but he was pretty badly bruised up.

Our machines, by the way, are driven from a shaft, so that makes it rather difficult to shut them down quickly.

Now in the crackers and other rolls that are used, I don't think people appreciate the hazard of burrs or hooks on the edges of rolls. We had a foreman who very nearly got caught in a cracker roll, due to a burr on the edge of the roll. He was reaching about halfway down the circumference of the roll, to pull a piece of scrap rubber out from between the bearing boxes, and his glove caught. He was dragged right over into the roll before he could release himself. Fortunately, the glove gave way, and he was not drawn into the roll; but we have had men drawn into the roll and quite badly hurt before the machine could be shut down.

We had a case of a man feeding from the level of a cracker, who had his hand forced into the mill by a tire coming down from a chute above. We feed the crackers from both the second floor level and the ground floor level, in order to get blends of stock; and this tire came down and knocked the man's hand right into the roll. We have recently fixed it so that a man can't get so close.

We had an accident where a fine ground rubber was issuing from a spout of a screw conveyor. The bottom of the spout was probably six feet above the floor level and we had an operator there who pushed his hand up into the spout and cut his hand. He had to get up on a box to do it. We asked him why he did it, and he said that he could never figure out where that rubber was coming from, and he wanted to stick his hand up there to find out. He did and it took his fingers off.

We had quite a peculiar accident, which might be of benefit not only to the reclaimers but others. We stored a caustic liquid, and through carelessness, if not thoughtlessness, the bungs of the containers were screwed up tight. They stood overnight, and in the morning these bungs had all blown out with the pressure. Another foolish move we made was that we tried to loosen other bungs. Two of the containers burst spraying caustic all over the men. We had some very serious burns as a result.

One foreman, receiving a splash of soda, instead of letting the nurse put olive oil, or sweet oil, in his eyes, thought he would be smart and let the rest of them get the regular treatment while he dashed water in his face. The result was we had to pay a 10 per cent loss of vision for that man, because he knew more than the Medical Department.

When containers are swollen or thought to be under pressure we recommend that you shoot it with a gun, or puncture it by other means from a distance. That is what we had to do with our drums. We couldn't open them in any other safe manner.

We have had bad burns from our devulcanizer gaskets blowing out, and from the stuffing boxes around the paddle shaft blowing out. We try to prevent those by watching the hands and seeing that they are not too far down, and also by putting in new gaskets when the others show any signs of wear.

But the worst cause of accidents has been with apron mills. We have had two men break their arms by trying to clean out pieces of rubber which have gotten lodged between the apron and the rolls. The reclaimed rubber, being crumbly, gets down into the rolls and works around. The men see a piece sticking out, and the next

thing you know their hands are caught. It is the same problem that you have in your wind-ups, from a bias cutter.

We had two men in the same mill who had bad breaks that way. In our No. 1 Mill, which we thought would have profited by the experience in the No. 2 Mill, the same accident happened in the same way. We have since put on a guard that consists of a piece of rubber belting actually flopped over the edges of the apron. So far that has proven effective.

CHAIRMAN KIDNEY: Is there any further discussion on reclaiming accidents?

F. S. WILSON (Service Mutual Insurance Co., Boston, Mass.): I'd like to ask Mr. Smith or Mr. Regal if they can use gloves on that debanding machine. Is it practical?

MR. REGAL: Yes, we do so constantly. In fact, several of our men have escaped injury because a glove was caught and they were able to draw their hands out. However, in another case, a man's glove was caught and he was unable to draw his hand out, and his hand was drawn in, whereas otherwise it would not have been.

That is the only objection I have to gloves. Ordinarily it is safer to use gloves, and our men use them.

MR. WILSON: I'd like to have an expression from these gentlemen as to whether they find a bonus system is practicable on the safety work in a reclaiming plant; and, secondly, if they have used a suggestion box and found it practical.

MR. REGAL: I can not speak on the bonus question. We never have tried that. We have used and are using a suggestion box scheme, with reasonably good results. I can not say that it is startlingly successful, but we have managed, perhaps, more to get an appreciation of the men's viewpoints. That is worth more than the actual suggestions they have made.

CHAIRMAN KIDNEY: Is there anybody here who has had experience with a bonus system on safety work?

S. W. SLAWSON (Lavarick & Heath, Buffalo, N. Y.): I might say, in connection with the bonus system, that possibly I get a little wider vision on this work and see it in all kinds of industry. I have never been strong for the bonus system. I believe that good discipline on the part of the management, when we want things done, is much more effective. I have seen the bonus system work out in some of the paper mills in the Province of Quebec, and in some of the textile industries, and it works for a while, but it is awfully hard, and you run into difficulties on account of the different ways of working and the different hazards that men have in different departments. That, of course, is dealing with bonuses in different departments, different foremen in the same mill; and my objection has always been that the bonus is not what some people think it is.

E. W. BACK (United States Rubber Co., N. Y. City): I have been very much interested in Mr. Regal's paper and Mr. Smith's remarks. We have two regenerating plants, and I am glad to say that one of them operated during the first six months of 1930 a total of 408,000 hours without an accident. In other words, this plant, a regenerating plant, worked 408,000 hours, with approximately 300 employees, for six months without an accident.

By the same token we have another regenerating plant—we have two—and the other one operated 440,000 hours, with approximately 300 employees, and they had five lost time accidents; which is a total of 848,000 hours with five lost time accidents. The total number of days lost was 117.

We haven't had a very bad experience with mills, and I believe that it can easily be explained by saying that our mills are all fed by hoppers. The hoppers are pretty high. A man has to jump up to reach down into the hopper, in order to get caught in the bite of our rollers. Our rolls are extremely tight, as you know, and even if a man did get caught, why I think that he would have warning enough to get his fingers out soon after he got pinched. But I think it would be extremely difficult for

anyone to get caught in the reclaiming rolls or mills as they are designed at our reclaiming plants, on account of the hopper; and they are all fed by conveyors.

So you see, the man is not feeding the mills. They are fed by conveyors and they are fed through a hopper.

The screw conveyor is a hazard. We had an unfortunate experience with screw conveyors. Last year we had a man pick up a broken grate; his foot went down into the opening, and he practically lost his foot in a screw conveyor.

We have had unfortunate experience on the debanding machine. Our debanding machines are of the usual type, and we have had two serious accidents; and in both cases they should never have happened. They were by boys who went into the department, and seeing this very slick operation of debanding old tires, tried the stunt themselves, and in each case these two young men lost fingers; and in the State we were held liable. It was during the lunch period, too.

We have tried to maintain discipline. We felt sorry for the young men, and we paid the compensation, and charged it up according to the specific scale of time losses for the loss of fingers.

I also agree with our friend Mr. Smith regarding apron accidents. We have had several apron accidents, and they happen as you say. We have installed angle irons on the side of the frame, and then fastened heavy belts so as to keep the stock from getting down into the apron; but in spite of that we find that they will occasionally do some very unusual stunts; and when you do get an apron accident it is usually a serious one.

CHAIRMAN KIDNEY: We'll have to close the discussion, now, in order to keep on schedule. The next speaker is Mr. Leonard, chairman of the Industrial Commission of Ohio. He represents the employer on the board of three; one appointed for labor, one for the public, and one for the employer.

Mr. Leonard is Chairman, and is the first representative of the employer who has been Chairman in Ohio.

How We Can Best Serve the Injured Employee

By W. T. LEONARD

Chairman, Ohio Industrial Commission, Columbus, O.

As the representative of 43,000 employers of Ohio on the Industrial Commission, I try to interpret the modern point of view of industry. I have often said "We try to look at things in terms of humanity and industrial justice", and I know that is the way you men want to look at those big problems in human life.

We, the members of the Commission, personally act on 20,000 cases a year. Every day there are between 600 and 1,000 accidents in the State of Ohio. We have a fund of \$54,000,000, and the greatest trouble we have in the State of Ohio is to try to convince people that it is not a surplus, that money. Most of it is spent; it does not belong to the employers, and it does not belong to the State of Ohio. It belongs to the injured workers.

If our fund should stop today, it would be seventy years before the last dollar, the last claim was settled.

I want to give you men a picture of the situation in Ohio. I have just returned from a meeting in Wilmington, Delaware, of Commissioners from all over the United States and Canada. They all touched the human note; and, after all, gentlemen, people are greater than machinery.

Modern industry today is coming halfway; it is coming more than halfway, and I don't mean by this that they are emphasizing paternalism, because I think that is one of the most dangerous things that you can have. Workingmen do not want

something for nothing; but I think that you can put a lot of human interest into the lives of your workmen when they are injured.

I remember the case of a man who came before the Commission very much disgruntled, injured, and he said "I am pretty sore. I was injured, and my foreman came by my house every day, but never stopped in once to see me."

Now, I think that is one of the very important things, gentlemen, when men are hurt, to take a real personal interest in them, a real personal interest in their families. You can do things which might be considered somewhat paternalistic. I know in Ohio the men of those big rubber companies go to the homes of injured employees. They make a check on the family conditions. They do it tactfully. The employee and the family need a little money, and they advance it to them. They provide those employees with the best medical service that can be secured. They have hospitals; if the case is such as to warrant sending a man to a public hospital, they give him a private room. They don't put him out in the ward. They give him a private room. If the services of a specialist are needed, they get the specialist. And it pays. They are playing the human game of life, and, as I say, it is far better to look after people than it is to look after machinery.

One of the great things in life is not to get hard-boiled. I think one of the greatest tributes that was ever paid to the Industrial Commission of Ohio was when a poor fellow came before us, nervous,—we try to make our sessions very informal; we lay the cards down on the table and make the fellow feel that he is not in the presence of three men who emphasize dignity. He went out into the hall after we had passed on his case and he said to a man, "H—! I thought those fellows were hard-boiled."

Now that is the big thing in industry, to keep from being hard-boiled.

I attended this meeting in Wilmington, Delaware. I met an old friend of mine, who is chairman of the Commission of Georgia. On my way south for a vacation trip this spring, I stopped in at the State capitol. I called on Mr. Stanley; looked around his building. They were making some alterations, and I said to Mr. Stanley "You have a very old State House here. I imagine you have a lot of old records." He looked straight at me and said: "Mr. Leonard, our records date back only to the war with the States. You know, Atlanta was burned." It was very embarrassing for me, but, after all, I hadn't done it.

I had occasion to introduce him during a discussion in Wilmington, Delaware; and I said, "Mr. Stanley, I am going to tell you the answer that is in my mind. The brother of the man who burned Atlanta was a neighbor of mine in Mansfield, Ohio, Senator John Sherman. You have a state rich in history; you have a state rich in resources; and you have a state rich in people. If Sherman hadn't burned down Atlanta, you people today might have been pointing out landmarks and saying 'This was General So-and-so's Headquarters', but you didn't have anything left. You had to start in and rebuild, and for that reason you have a wonderful city in Georgia—Atlanta."

Now that is the same way in the safety movement, the same with our relations to our employees. We can't go on the landmarks of the past. We have got to keep in step with our workers.

And after all, good-will is the greatest thing, to my mind, in the whole set-up, the whole relation with our employees. That good-will is not secured through paternalism; that good-will is not made by anybody but you. You write the record of good-will.

In the matter of the injured worker, another thing comes along, the matter of giving the man a job, and, after all, that is the big thing after a man is injured. A number of the rubber companies have rehabilitation programs. Those men are taught to take up other lines of employment in the rubber industry. To many of those men their injury was a blessing in disguise. They are occupying better jobs than they ever had before, and that, after all, is worth a lot.

From the standpoint of the man, there comes the dread of not being able to get a position. On the Industrial Commission of Ohio, we try to encourage employers to put an injured man back to work; and they cooperate splendidly with us.

Machinery is complicated. We all have accidents, and we are continuing to have accidents; but we are cutting them down. It is discouraging, at times, in the Machine Age, to look at the record that is being written of accidents; but if we didn't have this intensive safety work, we'd have far more than we are having today.

Mr. Kidney spoke about cutting down the number of rubber manufacturers. He spoke about the consolidations. I want to say this, gentlemen: If I were an executive in a company, at the end of the year I would go over the reports of my personnel men, of my compensation men, and I would scan that record very, very carefully. I wouldn't want a man in my organization who tried to get out of paying claims to injured workers. I wouldn't do away with my personnel men or my compensation department, in the time of cutting down overhead, because I think that is the poorest policy that any manufacturer can put into effect today.

There was a time when men were laid off. There'd be a sign "This factory is closed—no trespassing." Your workmen today go up to your personnel office and talk it over with your personnel men. They get the human point of view of industry. You keep their good-will. Nothing is more important than that.

Two weeks ago last Wednesday, I looked across the table at a young woman who came before us. Her husband was a young engineer in a plant in one of our big cities. He had two inventions on the way. He laid great store by those inventions, he went into the power house, a fuse burned out and destroyed both his eyes. They had two little children. A representative of the employer sat on the other side of the table.

He said to me "Mr. Leonard, we want to give this man every opportunity in the world in the way of medical treatment; send him to a neurologist. We want to do everything we can to help that man." The young woman said "I am afraid my husband will commit suicide. He is terribly worried. He sits there in darkness." With tears streaming down her cheeks she handed across the table a paper. I looked at it, and it was an eviction notice which was to be tried the next day. They were ten days behind in their rent.

This employer said "I will get a check to her in the morning, and I will go down with her to the Municipal Court, to have that case dismissed." I saw him again just before I left Columbus. I said "How did you make out?" He said "We went before that judge, and he said 'I hear these hard luck stories every day. You ought to get out of that house.'"

That is a fine type of judge! That isn't the spirit that industry is putting into life today in the treatment of its workers.

I want to say that I am very happy to be here today. There was a selfish interest in this for me, because the fewer accidents there are, the less work we have to do; but I want to say to you that labor and management, in these modern industrial days, are going down the long road together, into the dawn of the New Industrial Era.

O. F. RITTENHOUSE (International Rubber Works, Detroit, Mich.): I was very much interested in the statement made earlier in the day about reduction of compensation rates from \$1 to 40c or 50c, and then, on top of that, Mr. Low's report of the increase in the severity rate. I don't know whether it comes under the Industrial Commission or not, the setting of those rates.

CHAIRMAN KIDNEY: Mr. Low's statistics are to be found in the National Safety Council publication, and cover all of the United States. The Ohio rates, as set by the Industrial Commission, have dropped from very close to \$1 down to around 50c.

MR. RITTENHOUSE: The severity rate must have dropped accordingly.

CHAIRMAN KIDNEY: Of necessity, because the rate is based on the severity.

MR. RITTENHOUSE: That was a surprisingly low rate.

MR. LEONARD: I might say that to the employer our motto has been "Prevent or Pay." Each employer is merit rated. A few years ago the rate in Ohio was \$1.50. Today it is 50 cents. We have a rate for all the industries of one classification. That is the manual rate. One of your competitors, Mr. Kidney, might pay \$1 per \$100 of payroll, because he has had a bad accident in the Spring. We have others who pay less than 50c, because of their good experience.

That is why I say that it is a matter of "Prevent or Pay", and if an employer does not protect his workmen from the humanitarian point of view, he will protect him from the dollars and cents standpoint, or, rather, protect himself. It is a business proposition from both sides.

MR. BECK: As I understand Mr. Leonard, he said that the present reserve fund of the state was some \$50,000,000, and that if you should dissolve as of today, why you would have an obligation for some seventy years. I was just wondering how you figure the seventy years.

MR. LEONARD: We figure the last claim would be paid in 70 years, because some men who have been injured might live to be 85 or 90 years of age. That is the great difficulty we have, men saying "Well, what are you going to do with all that money?", and that money is already spent.

CHAIRMAN KIDNEY: You might find out, there, that a lot of people, in figuring out how much accidents cost, just figure the death award; that is, \$6500. In Ohio, and it is about the same in other States, it is possible for an accident to cost your company \$20,000 or \$30,000. If a man 25 years old loses two eyes, you will pay him \$975 a year until he dies, and if he lives to be 60, you can figure it out for yourself.

Every industry is liable to pay for some accidents as high as \$25,000 or \$30,000. Generally, in industry, the average man thinks that the most an accident can cost is around \$6,500, but we have had lots of accidents that cost more than \$10,000.

J. S. HYBURG (American Tire Products Co., Pittsburgh, Pa.): Although I am a stranger here, I certainly have enjoyed this meeting, as I did, also, your kindness in letting me in here. In attending previous sessions, I have been very much interested in the treatment of burns, both chemical and otherwise; and we had several fine addresses and papers on the subject. Both for the eyes and the body we advocate the use of water first, dousing with water first, before anything is put on it. Mr. Smith made a statement as to not putting anything on the eyes. In our company, our instructions are always to apply plenty of water.

MR. SMITH: Caustic and alkali burns?

MR. HYBURG: Any kind of a chemical burn. I think tests were made by the doctors who presented these papers on both acid and alkali. I was wondering whether we were wrong in that. We have sprayers, and not only make that a spray, but advocate making it a deluge, a whole heap of water.

MR. SMITH: My understanding is that the water does not hurt, but it is not sufficient in itself. It doesn't go far enough in an alkali burn, because the alkali sticks to the tissues, so that it doesn't wash away like an oil or a saponifier would. A dash of water doesn't hurt, but its use is insufficient.

MR. SMITH: Mr. Chairman, just one point that was brought up by Mr. Leonard, a question of the humanitarian attitude of companies. I would just like to bring out a phase of it that we have run into, and that is, take a company, for instance, like our own, which is located in the city of Buffalo and has available every facility in the way of giving an injured employee all of the specialist service or treatment which is possible. We have a man injured, say he breaks his arm; we send him to the hospital, give him the very best treatment we can; after his arm is knit we send him to a physio-therapist, and give him a long series of treatments; then his case comes up before the Commissioners, and after that man has been returned to his former normal work and is apparently doing his work as satisfactorily as ever, we

are required to pay him a lump sum award, which varies in some cases from \$500 to \$1,000.

Now that man has probably lost a certain percentage of the use of his arm, if he were to be required to do some contortion act or some very difficult work; but for the work that he is doing, for instance, a foreman in the mill, that man is perfect, and, in fact, he is as good as 60 per cent of the men we have to hire.

Now I'd say it is rather discouraging to us, and rather a hindrance to our safety efforts, if a man who breaks his arm comes back to the job with a new automobile, and they ask him "Where did you get that car?", and he says "The company paid me \$900. I broke my arm, so I am able to buy a car, now."

MR. LEONARD: I might say that in Ohio we have no lump sum settlements. It is based on earning capacity, although we have a new policy in Ohio, and that is when a man has permanent or partial disability, say 10 per cent loss of the arm function, or 20 per cent, we sometimes make arrangements to ease off the temporary normal period of repair. When that period is over, the man is ready to go back to work, and we say "We'll have you examined by your doctor, and if he passes you, you can go back and make twice as much as you made before."

We think from the standpoint of public policy, that is, when a man's finances are low, that is when he needs the money worst, and we don't allow lump settlements. It is payable every two weeks.

We have had men come up with representatives of finance companies and want to buy automobiles, and we say "No." They say "It is our money", and we say "It is not yours in a lump sum. It runs over a period of weeks."

There is one other thing I forgot to mention. I think it is very important, too. I notice Mr. Jaechel sitting back there, Secretary of the Bricklayers Organization of Ohio. I remember a head injury case we had, a very distressing case. The attorneys for the employer insisted on having an oral hearing on the medical testimony. Now we have found from experience with workmen that whenever you have a man with a head injury and you put him to work, that mental medicine is a great deal better than any medicine a man could take internally for a head injury.

Mr. Jaechel realized that in this case. The man was a high-priced man, a brick mason. He made big money. But that employer's attitude was such as to encourage or discourage this man, and make him a permanent total disability.

Now I say, particularly with a man with a head injury, sympathetic treatment of that man is what is called for. Get him back to work!

Now this whole thing, gentlemen, this whole thing is just a matter of practical commonsense, and we want to look at things in terms of commonsense practical idealism, not from the standpoint of the theoretical idealist, but from the practical commonsense point of view.

CHAIRMAN KIDNEY: In further answer to your question, Mr. Smith, the award is based on the number of weeks, and it is no lump sum at all. If a man loses the function of his arm it is so many weeks, 108 weeks, or whatever it is. If he dies, it is 346 weeks; and they pay the beneficiaries every two weeks. So in order to get a lump sum he has to go before the Commission, and he has to show some emergency in the way of paying off a mortgage or some debt that is going to cause a lot of trouble to that man. That is the only lump sum that is awarded in Ohio. Any other questions?

ADJOURNMENT

**Wednesday Afternoon Session
October 1, 1930**

**J. T. KIDNEY, Chairman
The Goodyear Tire & Rubber Company, Akron, O.**

The second session of the Rubber Section convened with Chairman Kidney presiding.

CHAIRMAN KIDNEY: We have three speakers this meeting, and some discussion. We will start in without any delay. I am going to introduce Mr. M. A. Clark, Industrial Relations Manager, United States Rubber Company, Detroit Plant.

Developing Job Value Consciousness

**By M. A. CLARK
Industrial Relations Manager, Detroit Plant, United States Rubber Company**

This particular conference being devoted to the study of safety and accident prevention, it is my purpose to show the relationship existing between interest in a given job and industrial accidents, and to endeavor to point a way that may lead to some remedy.

Safety men and the National Safety Council, with masses of statistics, endless service and tireless energy, have succeeded in making such tremendous improvements in safe practices, that one is almost led to believe that there is nothing further human ingenuity can devise to safeguard the worker. However, in spite of all this effort, accidents still occur, and I am of the opinion that further safeguarding can only be accomplished by attacking the problem from an entirely different angle.

Today accidents seldom occur from mechanical failure or from ignorance of safe practices, but rather from absent-mindedness, or lack of interest. From observation over nearly two decades in American industry, I have seen (so have many of you) a tremendous mechanization process of industry and the simplification of operations, which are daily taking away the interest and the need for mental efforts from the worker. No longer does the average industrial worker build completely an article for commerce, but only a small specialized part thereof, and this contribution too is, as a rule, the output of an automatic machine. In shoe, tire, automobile industries—yes, even in bakeries, can be recognized hundreds of jobs that call for no thinking powers whatever.

As I see it, there have been no signs during recent years to indicate that there is any lessening of gray matter above the shoulders in the average worker, but rather the contrary. Such being the case, and there being little in the job to interest, of what then is the worker thinking? If he has brains and does not use them, it is perfectly logical to expect mental atrophy, and in such case industry can be charged with developing a race of nit-wits. If, on the other hand, the brain remains active (and I believe this will be the case) should it not be our function to see that the great mass of thinking is devoted to the job rather than to extraneous matters? To fully see the picture, it would be well to place oneself in the other fellow's shoes—let us say putting nuts on body bolts on an automotive assembly line all day long. What would you or I think about—putting the nut on? Not on your life! I would probably be worrying over some domestic trouble, actual or imaginary, or reconstructing the speech I heard on the street corner last night, or (and this is most likely) inwardly cursing the fellow with the clean hands who is bossing my job. I would think nothing of the monotonous, repetitious job, and just here is where old

man accident creeps in—just the place and time when the worker has no longer any interest in the job on hand. If such a picture is anywhere true, I can see no greater opportunity and no greater responsibility for the Safety Engineer than to seek ways and means of renewing interest in the job, or of providing a satisfactory substitute.

This substitute for job interest and pride in craftsmanship I am calling "Job Value Consciousness." By this is meant the development of an understanding and appreciation of the value of the worker's particular, small, uninteresting job to the job as a whole or the finished product. When those responsible in industry for creating this substitute have found a way of renewing the worker's interest in his job, I am sure that many of our safety problems will be solved.

Assuming that the foregoing is correct, that the situation as depicted is accurate and the big job to do is to provide a substitute for pride of craftsmanship, the next step naturally is what to do. There are, in my opinion, three individuals or groups that have a tremendous bearing upon the thing to be done. The first is—the worker himself; the second—the worker's boss; the third—the worker's family.

Let us first discuss methods of interesting the worker himself as an individual. If you or I were making one simple article day after day, and we hoped to get anywhere, we would naturally expect to know what the article is to be used for and where it fits into the finished product. In particular, I believe that I would want to know what has been done to the article before it came into my possession to work on, some of its history, its physical qualities, and what should be the standard of excellence at the point I receive it. In order to have this knowledge, I think we would like to know something of the operation preceding our own, and I am firmly convinced that, by and large, every operator should have the opportunity, whenever practical, to see the operations performed on a given article he is expected to work on, before it came into his hands.

The next logical step would be, I believe, to assist the worker to learn what the next operation should be on the same article after he has done his part. I feel, therefore, that every worker should, by and large, have an opportunity to see the operations following his own, so that he may learn what effect his good work, or his mistakes, would have upon the following operation and the completed article. Whether it is practical for every operator to personally visit the preceding and following operations must be determined by the nature of the industry and the size of the organization. Where personal visits are impossible, the information or education should be supplied by means of photographs, moving pictures or drawings so displayed in the workshop that the most elementary mind can grasp it.

The next step, I believe, should be that of demonstrating to all the workers the finished product, whether in its physical condition or by means of picturization. This, of course, can be done by having all workers visit demonstrations of the product of the company and having explained to them just where that product is used, so that they may recognize it anywhere outside of their own Company's property.

In the plant of the United States Rubber Company at Detroit, we send from department to department display racks showing defective tires and perfect tires so cut and stripped as to demonstrate all the component parts that go towards making a complete tire. By this means, every operator, during his lunch period or before he starts work, can come to the rack, study the exhibits and see exactly where his own particular job had its effect on the finished product. We anticipated, when this was started, a certain amount of interest, but we are amazed at the increasing interest being shown by every worker in this display. In addition to the racks that go from department to department, we maintain one room for the purpose of displaying the company's products, and the workers are constantly invited by poster and other various methods to come into this display room at any time and see and handle the articles the company manufactures. So far for the first party and the necessity for education.

The second party—boss, foreman—is an entirely different matter. It has always appeared to me, and it must have to you, that probably the greatest satisfaction and interest one has in a job is dependent upon whether the man to whom you report realizes and shows you that he realizes the value of the contribution you are making by the work that you are doing. So, I believe the worker is affected tremendously in his interest in his job by the attitude of the supervisory force. If the foreman treats in the most casual way the value of a very elementary job and speaks of it as such—as an unimportant or simple operation—I can believe that it is highly probable that the worker would feel that all he is doing is a certain job for so much per hour and not a valuable piece of construction.

So I visualize as part of this job the necessity for frequent or daily contact with the foreman, to learn his opinion of the various jobs under his control and to create within him a change of attitude towards the job and the worker, if such a change is necessary. I do not believe that the foreman should be expected to walk around the department patting everyone on the back, telling each one just how important his job is, but I do believe that stopping on occasion to look at the work and ask the worker how things are going, discussing some of the very small troubles that may occur with just as much interest as if the small troubles were major troubles, will materially assist in helping the worker to believe that his boss has a realization of the value of the job that the worker is doing. This is no criticism of foremen. Foremanship is one of the most important functions in industry, and this is merely adding a further activity to many who may not have already realized their complete responsibility.

The third party in this arrangement, the family, offers another field for consideration. When the worker has put in eight hours of honest effort in the plant during the day and returns to his home, it appears to me that he would have certain things pertaining to his work on his mind, and unless the family can understand something of the terms used in his job, the nature of the materials that he handles, the condition of the room in which he works, and the general standard of the men with whom he associates, there can be very little in common in their conversation outside of their regular domestic problems. It, therefore, seems reasonable that families of employees should be given every possible opportunity to see exactly what the worker does, how he does it and under what conditions he works. In the U. S. plant in Detroit, we regularly invite families of all employees to visit the plant. Guides are provided, and the wives and children are escorted right through the entire factory. As is natural, they want particularly to see the place where the bread-winner works and what he does, and so we endeavor to escort them by groups indicative of the Department in which the husband, son, or daughter, as the case may be, works, and we allow them reasonable time, possibly half an hour, to watch the operations. We endeavor, as far as possible, to show them our luncheon facilities, rest rooms and toilets, and finally take them to the display room, where they see samples of the company's entire product. Our experiments in this work so far have been decidedly interesting and valuable. Not merely have the families shown a tremendous interest at the time, but they have asked to come back again and spend more time, and we shall, no doubt, accede to their wishes.

There are still further opportunities for interesting the worker in his own particular job, and one we have found very successful is the promotion and development of our suggestion plan. By keeping the plan well advertised by means of posters and in other ways throughout the plant, we are daily receiving suggestions as to changes and improvements in methods, indicative of the fact that the worker must be thinking about his own job, although I must admit many of them indicate that he is thinking about the other fellow's job. These suggestions receive careful consideration and every worker is thanked for his efforts, and the majority of them receive liberal rewards, rewards based not merely on the savings on the particular job, but also based upon the sympathetic understanding of the effort the individual

has made and the interest he has shown in at least giving of his own time to present what he believes to be something of value to the industry. To further stimulate this interest, it probably would be well to prepare and keep before the eye of the employee a Roll of Honor showing the names of all the individuals who have been rewarded for suggestions. The theory in this is naturally that others will attempt to emulate the example set and will concentrate upon their own particular jobs in the hope of suggesting better methods and being rewarded thereby.

Further valuable assistance in creating job value consciousness can come from the greater use of any sound plan of employee representation. I am of the opinion that no plan can be successful unless there is opportunity for discussion at every meeting of some particular phase of the manufacturing processes, and through this discussion the representatives are given to understand that the Management realizes the value of each job and appreciates to the full what each worker is doing. The representatives would naturally relay, or should relay, this understanding and appreciation to all those whom they represent. Extracts from all minutes of this type should be displayed throughout the plant.

The foregoing are, I believe, the most direct methods of approaching the problem of creating job value consciousness as applied particularly to a large plant in a large city, but the same principle might well apply in any industry anywhere. No attempt has been made to enlarge upon the subject of developing the interest of the worker in the Company or creating loyalty or esprit de corps. This is being accomplished in most industries by means of clubs, athletics and general social efforts and all these, undoubtedly, have a contributing effect, but are not so directly related to the creation of job value consciousness in the individual worker as those previously outlined.

Of course, at a conference of this sort, the safety division of the plant naturally expects consideration. In this respect I believe most sincerely that the safety committees in any plant have a tremendous effect upon the development of this value of the job by their own particular interest in each operation and each operator, and by the demonstration of this interest they can secure greater interest of the worker in his own particular job.

As I see it, the safety supervisor and the safety committee within the plant are a part and parcel of the whole plan of industrial relations, and no safety supervisor can do a successful job if he attempts to work alone. In other words, the work has to be a matter of cooperative assistance rather than a spectacular individual job. It is a service job and the safety engineer, safety committees and the National Safety Council are performing a purely service job and, probably, one of the most noble to which man can turn his hand.

CHAIRMAN KIDNEY: This is the first time, I believe, we have had an Industrial Relations man at our meetings, in the last few years at least, and though we have no discussion on our program, if there is anyone who would like to ask Mr. Clark about some phase of this work, I am sure he would be glad to answer.

R. D. TRAINER (General Accident Insurance Co., Philadelphia, Pa.): I would like to ask whether the work you are doing along that line is destined to affect labor turnover or accident prevention?

MR. CLARK: We are not interested in turnover today; I wish we were. This is entirely educational, a process developed in the last few months, primarily a safety proposition, to which we may attach such things as clean-up campaigns. I would say just one word more. I want you to take very seriously if you can, or tell me I am all wet, the thought I have in mind that the worker of today, by this repetitive job, is going to think of something, and if we cannot get him to focus on the simple job he is doing, he is going to think of something more dangerous, and I think it is a purely supervisory job.

CHAIRMAN KIDNEY: If there are no other questions, we will step along. I will introduce Dr. P. A. Davis, of The Goodyear Tire and Rubber Company!

Safeguarding the Health of the Rubber Worker

By PAUL A. DAVIS, A. B., M. A., M. D.

Assistant Medical Director, Goodyear Tire and Rubber Company, Akron, O.

Industry today must take cognizance of the health of its employees. It is vital, in this age of keen competition, if industry is to live and prosper, build up and maintain the health and efficiency of its personnel and thereby increasing the efficiency of the organization as a whole. The personnel of an industrial organization should act in unison, there should be no broken cogs or units in the system and to keep such a system in perfect operation safeguards must be present. Their function is many fold:

1. Preventive.
2. Instructive.
3. Constructive.
4. Curative.

You may ask "where does the medical man enter into this scheme?" The position of the safety engineer is well established and industry must recognize his value in the prevention of accidents, but accidents from mechanical means do not constitute all the accidents. There are physical and toxic accidents which harm the efficiency of an organization. The physiological and human element must be delegated to the medical man and as such he is a safeguard for the individual.

His first task is to present a healthy individual for the job. A physically healthy individual is efficient, intelligent, happy, and less susceptible to industrial hazards.

A physical being in poor health and with a defective structure is not efficient, is susceptible to many industrial hazards and the competitive pace today shortens his life.

Because an individual is in normal physical condition it does not follow that he can do any kind of work. A tall lengthy individual should not be put to work on a job where he has to do heavy lifting from the level of his feet, as many back strains result. Light skin and blonde hair individuals should not be placed where there are any irritating substances as they are susceptible to dermatosis. Light weight individuals should not be placed on heavy lifting jobs especially where the weight to be lifted is three-quarters or more of the body weight.

Experience has shown that certain types are best on certain jobs and this should be adhered to if possible. Many injuries are due to misplacements of individuals and in their endeavor to fill the job successfully they put in many awkward and unnecessary movements. Safeguarding an individual after he is at work means creating an environment that is free from physical and mechanical hazards. The safety department should attend to the mechanical hazards, the medical man the physical or health hazards.

Health hazards which may be present in the rubber industry are:

1. Illumination.
2. Ventilative.
3. Toxic.
4. Mechanical.

Realizing the importance of proper illumination, the safety, engineering and medical departments made a survey of this problem and in 1928, I read a paper before the Ohio State Medical Association on the result of our investigation. The conclusions were as follows:

1. Near vision as well as distant vision can be greatly improved by proper illumination.
2. That ten to twelve foot candles are thought to be the best illumination for close work.
3. That correctly applied illumination and properly corrected near vision increases

the individual's efficiency 12.6 to 30 per cent, according to the degree of refractive error.

4. Corrected near vision and proper illumination decrease eye strain and fatigue, increase the efficiency of the employee, and are a financial improvement to both man and management.

5. Corrected near vision and proper illumination decrease accidents.

6. Industrial lighting should have the following properties:

- a. Freedom from glare.
- b. Intensity to produce the greatest visual acuity.
- c. Freedom from the irritative rays of the spectrum thus producing less eye strain.
- d. Absence of interfering shadows.
- e. Heat factor reduced to a minimum.
- f. Economy in operation.

7. Short rest periods increase the individual's efficiency in the majority of cases.

The problem of ventilation is no longer one of open windows. It must be installed on scientific principles; for example, benzol fumes are heavier than air and seek the lowest levels, as does water, and it collects in pockets. Open windows do not remove it. Many other volatile substances which are heavier than air do the same thing, hence it is necessary to resort to the suction ventilation.

How must these problems be solved so that the individual will not suffer any damage. It can only be done by making a proper study of substance used and the possible by-products of the process. For example, benzol and high test gasoline are the chief solvents in the rubber industry and they are both toxic. They are liquids at ordinary temperatures and volatilize readily. They are very explosive and their vapors are heavier than air.

Here are two factors that must be considered, toxicity and explosive ability. The toxicity of benzol is reduced by having as few parts to 100 parts of air as possible and this is only possible by having proper ventilation.

The fire hazard from benzol in the rubber industry is great because of the large quantity used, to its ready volatility and the presence of much fabric which generates static electricity.

The concentration of benzol can only be kept at a low point by proper ventilation, both suction and forced and by keeping the processes under ventilated hoods as far as possible. In our experience 150 parts per million have not produced any toxic symptoms.

Poison Hazards in the Rubber Industry

There are approximately 75 substances used in the rubber industry that are more or less toxic, but their manifestation is not present because of the small quantities used and their lost and changed identity in the process of compounding.

L. J. D. Healy in the National Safety Council Proceedings, 1928, 1929, Rubber Section, has listed most of the substances used by the Rubber Industry as a whole and I shall mention only those used in large quantities and which are very toxic. Before entering into a discussion of these toxic substances it is necessary to state our procedure in determining the toxicity of the substance, not only those in use but any new substance that is to be used.

New Substances that are to be Used

The chemistry department consults with the medical research department regarding the substance used.

A thorough study of the chemical nature of the substance is made also as to its stability while undergoing compounding processes.

Laboratory tests are made and the by-products of the reaction studied as to their toxicity.

Test batches are made, milled and vulcanized and the chemical by-products are studied.

The substance in question is subjected to various tests with guinea pigs and rabbits. Hypodermic injections are made, ointments are used and food is contaminated with it. If the substance is volatile a gas chamber is used and the animal subjected to the vapors.

After this is accomplished the animals are studied and the results are noted. If the results show that the substance is not toxic or is only slightly toxic, approval is given for its use, providing however, that proper ventilation and precautions are used that will overcome the slight toxicity that may be present. After the substance is put in use then all men who come in contact with it are observed and examined. The frequency of the examination depends on the apparent toxicity of the substance used, the amount used and the nature of its use.

The chief points of the examination are as follows:

1. Blood examinations.
 - a. Morphological
 - b. Chemical
 - c. Physical

Peculiar cellular changes can be ascribed to substances like lead, arsenic, antimony, benzol, carbon tetrachloride, carbon bisulphide and similar substances.

Chemical detection of poisons in the blood-serum by micro-chemical methods are very accurate in the cases of the heavy metals.

The physical properties of the blood are changed by many toxic substances. The hemoglobin is reduced, the coagulability is decreased, the cessation of agglutinins formation and decrease in calcium retention.

2. Urine examinations. Most toxic substances are eliminated through the kidneys, as such or as one of their broken down components.

3. Stools. This is similar to the urine but often the toxic substance is detected in the stools before it is in the urine.

4. Blood pressure. Various substances affect this differently.

5. Exhaled air. Most volatile substances can be detected by this method.

6. Skin. Many substances produce a dermatitis.

7. Chest and X Ray examinations. Many dusts are not only toxic but produce a mechanical pathological condition in the lungs, such as siderosis, anthracosis and silicosis.

8. Abdomen gastro-intestinal system. Many toxic substances produce pronounced symptoms, carbon tetrachloride and arsenic produce severe vomiting and lead produces severe cramps often simulating appendicitis.

9. Extremities. Poisons like lead, arsenic, antimony and chromium produce decreased muscle tone, often nerve paralysis and loss of function. Chromium often produces chrome ulcers on the hands. Hexamethylene tetramine produces a dermatitis of the arms and exposed parts.

10. Heart. Many substances increase the heart action to a palpitation and others depress it.

In other words the individual is given a careful examination and stress is laid on certain particular clinical examinations for the detection of the substance in question. The results of these examinations tell us whether or not the individual must be removed and placed on some other job or continued on the same job.

Common Toxic Substances

1. Benzol; 2. Carbon bisulphide; 3. Carbon tetrachloride; 4. Hexamethylene tetramine; 5. Lead and its compounds; 6. Chromium and its compounds; 7. Aniline and its compounds; 8. Amyl acetate and nitrite; 9. Ethyl acetate; 10. Denatured and

methyl alcohol; 11. Arsenic and its compounds; 12. Various organic accelerators; 13. Organic anti-oxidants; 14. Amino and guanidine compounds.

Some of these substances produce both acute and chronic poisoning. Some are cumulative in their effects and some are eliminated as fast as they are absorbed.

Each substance has certain alarm signals as to toxic absorption; for example, in lead workers when basophilic cells reach a certain point it is advisable to remove the individual from exposure to lead.

In benzol workers when there is a reduction in white cells, 1500 below normal, a reduction in red cells 10 per cent to 15 per cent below normal and when the hemoglobin falls below normal, it is advisable to remove them from contact with benzol vapors.

In aniline workers a cyanosis develops with a hemoglobin reduction. Blood coagulability is decreased and the viscosity is changed. Hematin is present in the urine in large quantities and an increase in phenol and amino-bodies.

In carbon bisulphide the neuro-muscular system becomes involved and there is an increase in the sulpho-proteids of the body, increase of blood platelets and transitional cells.

In carbon tetrachloride there is a definite nausea with vomiting persistent dizziness, decreased blood pressure, reduction of hemoglobin, acidosis and a marked poikilocytosis and anisocytosis.

Hexamethylene tetramine has a predilection for the skin producing an irritative dermatitis and in severe cases may produce a hematuria.

One could take much time and use much space by discussing in detail each substance used in the rubber industry. A series of articles on toxic substances in the rubber industry by the writer has been published in the *Rubber Age* magazine, starting in July, 1929, in which much detail is given.

All departments where any toxic substances are being used are inspected at regular intervals and all individuals who are exposed to the substance in question are examined at regular intervals and a comparative test made. Should anything develop of a toxic nature the individual is removed from contact with the substance, placed on work which is suitable for him and treated for that particular condition. Should he need hospitalization we maintain a 25 bed hospital fully equipped where he is placed for treatment, observation and clinical study. Prevention is the keynote in medicine and industry. It should be the purpose of the medical and safety departments to prevent accidents as far as possible and this can only be done by the close cooperation of the workmen and the supervision.

Education and instruction as to the particular kind of work is the first prerequisite. Proper environment and freedom from mechanical, physical and toxic hazards produce happy carefree workers.

However, in spite of all our precaution there are some accidents but the percentage is greatly reduced by consistent and constant supervision.

Statistics Covering Many Years

The following statistics are obtained from the records of a large rubber industry and cover a period of many years:

Total number of cases treated during the last nine years.....	1,862,732
New injured cases (lost time).....	23,968
New sick cases (lost time).....	24,834
Injured cases (no lost time).....	325,373
Sick cases (no lost time).....	565,532
Patient days in hospital.....	11,393
X-rays, examinations and dental visits.....	911,920

The following statistics on injured cases with lost time include both the number of cases and treatments and are classified as individual visits to the hospital:

Year	1922	1923	1924	1925	1926	1927	1928	1929	Total
Fractures treated	373	672	722	796	979	1090	984	829	6445
Strained backs	300	327	311	591	475	601	664	352	3621
Strains	560	647	585	673	697	862	950	342	5316
Tenosynovitis	131	233	121	39	30	24	20	17	615
Infections	152	282	140	280	249	310	386	142	1941
Dislocations	20	14	4	15	12	21	22	9	117
Traumatic amputation	24	91	111	103	113	139	20	33	634
Hernias	53	129	77	96	123	132	153	218	981
Bursitis	17	47	21	10	11	13	4	6	129
Occupational dermatitis	0	0	26	21	22	3	5	5	72
Arthritis	11	33	16	8	6	12	6	20	112
Periostitis	8	6	2	2	2	3	4	2	29
Varicocele	0	11	3	0	9	3	3	2	31
Hydrocele	0	3	0	1	4	2	4	1	15
Eye cases	225	200	209	300	268	319	237	282	2040
Punctured Wounds	50	80	70	80	81	75	42	22	500
Neuritis	2	2	3	1	1	1	0	1	11
Myositis	4	6	9	13	12	2	2	1	49
Contusions, lac abrasions	1200	1300	1602	2279	2407	2330	2338	1581	15037
Burns	105	100	109	177	132	244	115	102	1084
Synovitis	10	11	21	1	13	12	7	5	80
Total									38,854

	Total Patient Days	No. of Cases	Average Patient Days
Fractures	3014	150	20.9
Hernias	2520	180	14.
Burns	673	56	12.
Miscellaneous Operations	1335	108	12.3

Contusions and Lacerations	1075	88	12.2
Infections	1190	74	16.
Sprains	407	27	15.
Lead Poisoning	31	3	10.3
Aniline Poisoning	2	1	2.
Total patient days for 8 years			11,393
Total ward cases for 8 years			804
Average patient days			14.15

The analysis in our industry for the last 27 months is given below in percentages:

Bias machine	0.02%
Stairs	0.04%
Window	0.96%
Press	0.96%
Mills	1.91%
Infections	1.91%
Material on floor	1.91%
Stripping tires	1.91%
Burns	2.9 %
Tire machines	2.9 %
Molds	2.9 %
Eye accidents	5.75%
Trucks	5.75%
Bump V S material	5.75%
Falls	6.71%
Misc. machinery	7.67%
Lifting	7.67%
Tools	10.55%
Handling material	13.53%
Falling material	18.3 %

The percentage of accidents that need hospitalization is small and during the last 8 years the following are the chief causes:

1. Fractures
2. Hernias
3. Burns
4. Eye injuries
5. Strained backs
6. Infections
7. Major traumatic injuries to soft parts

Excluding hernias, which we operate on, fractures are the largest factor for lost time.

	Number	Days Lost	Average per Case, Days
Skull	11	215 (8 died)	19.5
Mandible	5	132 (1 died)	26.4
Nasal	9	100	11.3
Malar	4	52	13
Zygoma	3	33	11
Ribs	90	1,516	14.9
1 multiple fracture of chest and arms; died 3 hours			
1 fracture of 5 ribs, mandible and seventh dorsal vertebra; died			
Vertebrae	7	518 (2 died)	83
Pelvis	..	..	..

Coccyx	4	287 (1 died)	71.6	
Pubes	1	259	259	
Pubes and ischium	1	173	173	
Ilium	1	105	105	
Clavicle	7	288	41.1	38.9
right	8	294	36.7	
left	3	177	59.0	
Scapula	3	135	45.0	52
right	7	524	74.8	
left	14	1,315	93.9	84.5
Humerus	41	1,823	44.5	41.3
right	48	1,832	38.2	
left	17	1,139	61.0	73.1
Ulna	19	1,620	85.2	
right	6	284	47.3	40.9
left	6	207	34.5	
Radius	16	1,508	94.2	87.9
right	18	1,472	81.7	
left	1	93	93.0	
Radius, ulna, humerus	1	140 (died)	140.0	
Multiple fracture of right arm	8	1,916	239.5	208.1
Femur	5	883	76.6	
right	10	717	71.7	80.8
left	9	810	90.0	
Fibula	17	762	44.8	55.7
right	4	267	66.7	
left	12	1,602	133.5	118.5
Tibia and Fibula	3	311	103.6	
left	2	74	37.0	46.6
Malleoli	3	169	56.3	
exterior	6	1,027	171.1	118.2
interior	3	197	65.6	
Os calcis	3	197	65.6	
right	5	266	63.2	64.7
left	6	458	76.3	
Pott's				
right	1	1,000	1,000.0	
left	11	995	90.4	
Pott's and multiple tibia left, comp. and infected	27	987	32.8	
Patella	126	4,110	32.6	
Tarsals	221	7,307	33.0	
Metatarsals	33	896	27.1	
Metatarsals				
Carpals	1. 593			
Phalanges of feet	2. 204			
	3. 128			
		925	21,228	22.9
Phalanges of hand	1. 691			
	2. 196			
	3. 158			
		1,045	28,129	27.7
Total of all fractures with time lost	2,826	90,115	Av. 31.82	

From 1922 to 1928, 100 patients with fractures were hospitalized for 1,809 days, averaging 18.1 days.

Chip fractures and fissured fractures in which no time was lost..... 428

Total 3,254 Av. 27.3

Since 1928 there have been 50 more fractures which required hospitalization changing the average hospital days from 18.1 days to 20.9 days.

Cost of Industrial Accidents

It is a very difficult matter to arrive at the actual cost of a treatment in an industrial hospital, but the average cost can be obtained by knowing the yearly hospital expense and the number of patients treated. This average over a period of years has fluctuated between 33 and 35 cents a treatment. However, this is not the total cost to the industry for an accident even tho the man returns to work, for a certain expense must be added by the safety department for the cost of investigation of the accident. This expense is charged to the labor department.

The average cost to industry for cases confined in their own hospital is certainly a variable quantity. However some sort of an average can be arrived at if the following factors are taken into consideration.

Elimination of the original cost of the space occupied by the hospital.
Average cost per meal at \$.50.....per day \$1.50
Compensation per week at \$18.75.....per day 2.68
Average medical and nursing care per day (average for 18 years).....per day .99

Average cost per day with compensation..... \$ 5.17
Average cost per day without compensation..... \$ 2.49

Cases not confined to the hospital if treated every day are averaged over 8 years as follows:

Compensation..... @ \$2.68 per day
Treatment Daily..... @ .33 or .35 per treatment

Total of..... \$3.01 or \$3.03 per day.

If transportation is furnished this adds further expense. You can readily see that trying to arrive at the exact cost per patient in an industrial hospital on an individual or piece-work basis is very complicated. The budget system is the most desirable method, for example the statistics for 1929 are as follows:

Total number of treatments and examinations..... 238,904
Total operating expense of hospital and dispensary..... 93,254

Average cost per individual..... \$.39

The cost to the individual is his loss of the difference between his wages and compensation plus his insurance. The average workman makes about \$6.00 per day.

With statistics available one has some foundation for prevention work, and prevention work safeguards the employees' health. This type of work requires the co-operation of the following departments:

1. Medical Dept.
2. Safety Dept.
3. Supervisional Dept.
4. Personnel and Labor Depts.
5. Engineering and Construction Depts.

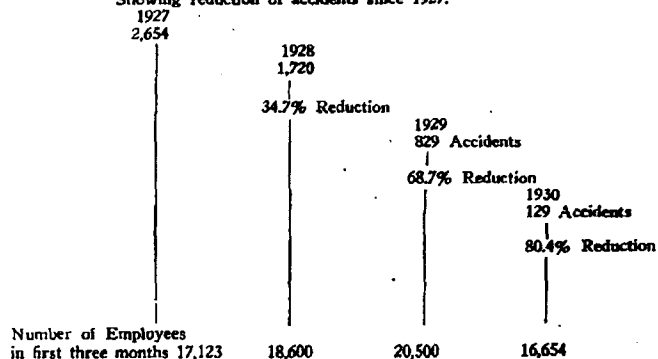
A close co-operation between these departments has produced remarkable results since 1927 as is shown by the following statistics.

Number of days lost by employees since the year 1927.

Caused by accidents.

Year	Days Lost	Average Number of Employees
1927	34,554	17,669
1928	21,626	18,687
1929	17,954	19,335
Total Number of Days Lost, 74,134		

Showing reduction of accidents since 1927.



Solid lines represent reduction of accidents in the first three months of each year.

It is very evident that safeguarding the health of the individual is a paying proposition to industry, for example in 1927 there were 34,554 lost days and in 1929 almost a 50% reduction to 17,954. This means an increase in production and a decrease in lost wages to the individual. Between 1927 and 1928 there were lost 90,115 days on account of fractures and if the average man makes \$6.00 a day this amounts to \$540,690. In 1927 there were lost in our rubber industry \$207,324 on account of accidents and by safety first campaigns, inspections and preventive measures this was reduced in 1929 to \$107,724. Even this latter figure is entirely too high and a further reduction is possible. Preventive sick and accident measures increase production, save the worker money, decrease insurance rates, increase business and promote contentment in the personnel.

The prevention of industrial hazards is much more important than treating the results after they have manifested themselves and this is only possible by the co-operation of all the individuals concerned.

Safeguarding the health of its employees is one of industry's greatest assets for raw material cannot be changed into useable organized things without the help of the human hands. If the factor is defective or becomes defective then the organized product is deficient and inferior as is shown by experience. The consideration of only one of the factors making up the human element has shown some startling facts, namely vision. More than 50 per cent of our population is suffering from visual defects that can be corrected. We have found that 18.7 per cent of workers between 22 and 60 years of age have defective near vision. Correction of these factors have

in most cases produced 100 per cent efficiency and the manufactured products are so much improved that the final inspection shows that only about 2 per cent must be returned to the individual worker for correction or rejection. In summarizing, the following factors in my opinion and experience have produced a great reduction in accidents, guarded the health of the employee, increased production and saved the employee and employer much money.

1. Individuals in good physical and mental condition.
2. Proper elimination.
3. Proper ventilation with enclosure of all dusts and vapors and extraction by suction ventilation.
4. Adequate safety guards on all machinery.
5. Education of the individual for his particular job.
6. Instruction and supervision where there is any toxic substance used.
7. Frequent examination of the individuals where it is indicated.
8. Maintenance of an adequately equipped hospital and dispensary.
9. Recreation and athletic competition.
10. Co-operation between labor and management.
11. Competitive safety first campaigns.

A. M. DIETZ (Pennsylvania Rubber Co., Jeannette, Pa.): I know Dr. Davis said there was an increased number of employees in 1928, over 1927, and in 1929 over 1928, but did the man-hours increase in proportion?

Dr. DAVIS: Yes, they did.

J. R. HANSON (United States Rubber Co., New York City): We have been anticipating changes in installing periods in the day for rest for the employees. I would like to know how Dr. Davis feels on that, if he has a thought on that subject.

Dr. DAVIS: We took a selected group of individuals on one shift; we have three shifts. We found out several things. On the third shift, between eleven and seven, we ran into difficulties. Besides giving them ten or fifteen minutes to lie down and rest, we had to hire somebody to wake them up. They felt a little better from the rest, but by the time you got them back to work you had lost the advantage.

W. L. SCHNEIDER (The B. F. Goodrich Co., Akron, O.): What is your analysis of the so-called third shift with regard to accidents?

Dr. DAVIS: There are a lot of factors that enter into it, before answering that question. A lot of people go to work on the third shift; a lot of accidents happen on that shift because they are new people. We have found that the number of accidents on all shifts will maintain a constant percentage providing you are dealing with men on the job who have been on it a long time. The minute you get an influx of new labor, accidents jump up, simply new people in the jobs.

Most factories work on the service plan where the man with higher service gets the first shift, the next man gets the second, and all the new employees, except for a certain type of employment where they are hired for the day shift, on the average, hiring people off the street, putting them in to learn a job, the percentage of accident is higher on the shifts where they are than on the others.

Mr. SCHNEIDER: We don't find that to be true.

Dr. DAVIS: If you consider your own employees, your percentage of accidents does not vary much in any shift. It is the influx of new people that sends the accidents up.

M. A. QUIRK (United States Rubber Co., Detroit, Mich.): I am inclined to agree with Dr. Davis. We find the most accidents in the third shift. I wonder if anybody else has made any such study?

C. L. HUNGERFORD (The Firestone Tire & Rubber Company, Akron, O.): We have made a study of it, which indicates the highest frequency of accidents being minor injuries occurred to men there over a year; very few accidents occurred to men in the first six months they were in the factory. Our really serious injuries oc-

curred to men,—our survey covered a great number of men—not one of whom had service of less than five years; this is fractures, major injuries. The first six months there appeared to be very few, and the highest frequency was with men over a year in service.

J. M. KERRIGAN (U. S. Rubber Reclaiming Co., Buffalo, N. Y.): Our survey which we made at our plant agrees with the last speaker; our new employees do not have so much trouble in major accidents as the older employees. That may be true because we are spending time teaching him; we figure the older man should know.

However, speaking about the night shift, where the accidents occur, we rotate our shifts around. Our survey showed our lost time accidents, of which we have had only five so far this year, three occurred between the hours of seven-thirty A. M. and ten; the other two occurred one at quarter past eleven and the other at one A. M. Last year the survey showed the accidents occurred more between seven and ten A. M.

I would like to ask Dr. Davis about this rotating; the men say they get accustomed to eating and sleeping and that the quick changes affect them; also is it better from your standpoint to keep them permanently on each respective shift, or shift every week or two?

DR. DAVIS: We have a rather unique thing; we have selected a bunch of men and call them the Flying Squadron; they are picked as they are physically perfect; if there is anything physically wrong, we reject them. This job means the man is going to start in and go clear through the whole industry; he goes to the industry university; at the end of three years he gets a diploma, master plumber, electrician or whatever he happens to be. They represent, to start with, as nearly perfect physical specimens as we can get.

They are rotated about every month; they work for one month on a certain place, then go to another place, maybe on the second or perhaps the third shift.

We have not had much experience with a lot of digestive difficulties or disturbances with that particular type of man, principally because they are of a high type, mostly athletes, with one or two years of colleges, and they know how to take care of themselves.

We have the trouble you mention with the men who work two weeks on, two weeks off. We find they have gastric disturbances, indigestion. There are lots of factors contributing; if you will investigate you will find they are eating at restaurants, and so on.

Personally I don't think it is advisable to change a man that often, certainly not from a personal standpoint, because you can't get set either way. I think a month, or preferably longer.

I might mention the fact about our accidents. You people are like our own safety records, nothing is an accident unless you lose time; but from a doctor's standpoint there are other accidents, nevertheless. If a man cuts his finger, that is an accident; our statistics are based on those, not like your statistics which are based on lost-time accidents.

Now, so far as we are concerned we don't care whether there is lost time or not so far as the record is concerned, but to the management lost time means lost money, not only to the industry but to the individual as well. Somebody gets up and makes a report of a plant running a year, or a month, without accidents; that is a fallacy, but from lost-time accidents it is all right, but from the industry's standpoint we term an accident anything that breaks the trend of the industry.

MR. QUIRK: We take our figures from the doctor's office; we consider it an accident whether we lose time or not.

MR. KERRIGAN: About first aid stations, where the foreman can administer first aid, I am wondering whether you think it is a better idea to use mercurochrome or iodine. The medical profession seems to differ on which is the best to use.

I am wondering, for the men in the factory, for local cuts, which is the safest to use?

DR. DAVIS: We never encouraged this out-patient treatment in the plant; we have a regular staff of doctors and nurses, except in the zeppelin works because there a man may be on top of the thing and need attention before he can get down or before you could get to him, so for there we make our own little patches and put mercurochrome on them.

I believe from the work that has been done on mercurochrome, from the cultures of bacteria, and so on, it answers the purpose for those things. We request that most things go to the hospital. We have had infections develop from a mere scratch, even though a little iodine had been put on it. With this sort of treatment, if you don't get it down to the bottom of the trouble infection may develop.

Some factories do that, have first aid cabinets; I would say have both iodine and mercurochrome; alcohol is very good as an antiseptic, germicide; 70 per cent alcohol works as well as iodine.

There are certain types of bacteria that mercurochrome gets at that iodine doesn't act upon. You very seldom find a person having a skin rash from mercurochrome as you do from iodine. We use iodine in preparation for major operations.

CHAIRMAN KIDNEY: Before I introduce the next speaker, we will have a few words from Mr. R. A. Bullock of the Corduroy Tire Company about this wonderful record they have made.

R. A. BULLOCK (Corduroy Tire Company, Grand Rapids, Mich.): I am glad to say it is an honest record; there has been some question of records being honest, but ours is honest.

Besides going a full year without a lost-time accident, with an average of 279 employees, I might quote from our medical record. In the first aid room a part time nurse takes care of minor cases, but if there is anything of any consequence or which we think will be, is taken care of by our factory doctor. The past year our medical expense averaged \$15.60 a month, 27 cases requiring on the average \$6.90; in July the expense was \$3, in August \$3, and up to September 27th it was \$7.50. Those are our big production months. I am repeating these figures to show you that besides no loss of time accidents, we are having very few minor cases; several people have asked me how we are able to have a record of that kind; it is just a matter of hard work, as I see it.

We started four years ago; I believe the most important thing is to have the company in back of you; the company has to appreciate the safety movement a hundred per cent; you cannot get anywhere unless it is behind you.

MR. E. ROSS FARRA, Manager of the Grand Rapids Safety Council helped lay the foundations of our work. We have the latest type of guards all through the plant, and the final straw happened last year, after I returned from the Chicago Congress, and heard Mr. Fleming's talk. Every foreman is charged with full responsibility for accidents in his department. Since then, we have had none. I think this had something to do with our record. The foremen were not held responsible by me, but by the management of the factory. They knew if they had accidents, they would lose their jobs. We made a thorough study of first aid cases; whether minor or not we investigated each one, and tried to eliminate the causes before we had a major accident from the same cause; that has helped our record also.

We take satisfaction in having this record, because at the first Congress four years ago the small shops were charged up with a high rate of severity and frequency of accidents in the industry, and it was true; I am glad to say today there is one small shop not having any accidents.

CHAIRMAN KIDNEY: If there is no discussion, I will introduce the next speaker, Mr. M. J. Maryanski, of the Goodrich Company, Akron.

The Relation of Safety and Design

By M. J. MARYANSKI

Design Engineer, The B. F. Goodrich Company, Akron, O.

Using the term in its broadest sense, design has no doubt always been influenced by the elements of safety. But, while the term design is fairly constant, safety is an elusive bird, that changes color, plumage and identity according to the relative value of the factors involved, and which are different in every country, in every age, and in every one of the almost infinite ramifications of the designer's art.

In ancient and medieval times, human life was considered of no particular value. The operators of a tread mill, in the time of "King Tut" were not valued nearly as highly as the mill on which they toiled. The same was true of the oarsmen, chained to the war boats of Greece, Persia and ancient Rome, and the soldiers who operated the catapults and siege rams at the fall of Troy. Designers, in those days, were more concerned with the safety and efficiency of the device than of its operators. As a matter of fact, this is true to considerable extent, in some countries even today, and we might be justified in stating that the degrees of the civilization of any country can be gauged according to the value they place on human life.

As there are many avenues of design necessary to the comfort and progress of man, there are likewise many viewpoints to the elements of safety. In the design of a building, widely different precautions must be taken than are necessary in the design of a machine. The architect studies wind stresses, snow loads and various other factors which seldom affect a mechanical unit, and the machine designer, on the other hand, considers safety from standpoints not involved in a building. The same thing is true in the design of materials, such as the inner construction and walls of a tire, a fire escape, a motor boat, or any other of the many avenues of design. In a machine there is often the safety of the material being handled to consider. This is a factor that becomes more and more important with modern high speeds, dainty fabrics and delicate colorings. In modern newspaper plants, the stock must travel at a great speed through hundreds of feet of machinery and it is of equal importance that there be no injury to the fabric, or loss of time in getting out the paper, for while a rubber product will probably be worth about as much tomorrow as it is today, it is not true of a news sheet.

However, notwithstanding the myriad angles involved in the element of safety, that angle which affects the life, limb and health of the operator is undoubtedly of paramount importance, at least in America, today; and it is this angle only that is safeguarded by the State. Their argument is, that while the operator may lose his job, if he persists in neglecting the safety of the machine or the material handled, he may lose an eye, or an arm, or his life, if his own personal safety is neglected even for the fraction of a second. And so it comes that safety codes are in force to insure a maximum of safety and confidence to the worker, whether he be a miner deep down in the earth, the riveter on a tall building, the fireman on a locomotive, or the tire maker in a rubber factory.

Very little pure freedom of design, these high pressure days, is left in the hands of the designer, and a brief example will show that this is necessary. Perhaps you live in an apartment. If so, you probably can view a fire escape from some of your windows. That unsightly, but highly desirable safeguard, was not designed according to the fancy of the contractor. Everything about it was made according to pre-determined articles of the Building and Safety Code, the size and spacing of the rivets that hold it together, the bolts that fasten it to the building, the size, number and spacing of the structural angles that compose its hand rails, the area of its landings and the relation of the risers to the treads in its stairways. If this were not the case, every firm who bid on that fire escape would present a design according to

his own ideas of safety; the contractor would probably accept the lowest in price, and the fire escape, instead of being a safeguard, might be a misleading death trap.

But if you are designing a watch, for instance, you may still enjoy every freedom from State restrictions, because nothing that you could possibly incorporate into the watch would be able to harm anyone, unless of course you tried to drive the wheels by the use of dynamite, in which case the contrivance would undoubtedly be classified as a bomb, and would thus be prohibited altogether.

Designers today are necessarily, to a considerable extent, inventors; and since, as President Hoover recently pointed out, "In the creation of new inventions, processes and methods lies our present and future greatness," it is therefore reasonable to assume that safety rules and laws are made with the intention to retard design as little as possible, and to commensurate with a proper degree of safety. Theory and practice disagree as widely here perhaps as in most other channels; for the curtailment of freedom in design, for the safety of the masses, may mean the defeat of progress, through laws too broadly applied or too narrowly interpreted. Quite often both of these elements combine in the same instance, with a result that is painful. I have in mind a recent example. One of our departments had a belt splicing press of antiquated design and uncertain lineage, that in due process of time came up for redesign. It was a machine used in a certain field operation requiring that it be transported and used in widely separated regions. Requiring the use of steam, this machine needed a steam generator, the two parts of which would function as a unit. Portability, freight and fire hazard being important items, it was decided to attempt an electric boiler.

Careful design indicated that the new outfit would perform its function in a much superior manner and weigh about one-fifth as much as the one to be replaced. However, being a pressure vessel, the device would appear to come under certain articles of the Safety Code and the local State Representative was called in.

The press, being a comparatively modern innovation, there appeared to be no direct code provisions, but he deeming it necessary to put the device at least somewhere, classified it under a broader heading. Being somewhat confused, the agent interpreted the intension of the law so meticulously that when the necessary changes were incorporated in the design and the device designed, it was rejected by the department on the grounds that it was so awkward and cumbersome that they would prefer to continue the use of the old one. This was so manifestly illogical that it provided an alibi for going higher, which brought in a more liberal interpretation, and the final result was, in this case, a fairly efficient and practical machine.

In the design of machines involving continual repetition of a certain movement, like the feeding of material between rolls, or beneath punches, fatigue, monotony and familiarity breed especial danger. A person may make a certain movement ten thousand times in perfect safety, knowing that a slip on his part, in timing or distance, may mean the loss of his hand. At first, the danger lies in personal awkwardness and unfamiliarity with the timing of the machine, but after ten thousand movements, these elements are reversed and the danger lies in familiarity, monotony and fatigue.

The designer can seldom eliminate monotony, but he can nearly always eliminate fatigue. Frequent and well placed rest periods would help to arrest the danger of a sluggish and tired mind caused by monotony, also interest and cheerfulness on the part of the employee and his work tends to keep the mind clear.

There is considerable written regarding the cause of fatigue by such eminent men as Goldmark in "Fatigue and Efficiency", Sir Michael Foster (British Physiologist), Mosso (the Italian Scientist), Prof. Fredrick S. Lee and many other noted specialists. The works are too voluminous to discuss here so I will give you only a brief account of the scientific viewpoint:

Fatigue is caused by lactic acid accumulations from violent exertion. Muscles burn fuel in the form of sugar known as glycogen. Oxygen supplied through the

lungs is carried by the red blood cells to all parts of the body. Any working muscle needing oxygen takes it from these red cells automatically. The faster the muscle works, the more fatigue creating lactic acid it generates and when the muscle works especially hard, lactic acid forms more rapidly than it can be removed. Our body is not constructed like a locomotive which consumes the same quantity of coal for every foot pound of work. When the body or mind is fatigued, even a small amount of work produces disastrous effects. The workman that persists in his task when he is already fatigued not only produces less effective work, but receives greater injury to his organism.

The fatiguing effect of the roar of machinery is chiefly due to its influence upon the faculty of attention. There is thus in attention a sensation of effort, and fatigue of attention is in direct proportion to the continuance of the efforts and the difficulty in sustaining them.

The subject of noise in industrial establishments is usually dismissed with the remark that the workers "get used to it", and doubtless, in many occupations, the workers themselves are scarcely, or not-at-all conscious of any increased application on their part, due to the noise. But, in the main, the process of getting used to it involves precisely that increased intensity of nervous effort, that "feeling of being coerced" and which is most favorable for the approach of exhaustion.

And so the rubber industry is keeping abreast with the latest and most modern applications which science discovers to conserve its human power (and incidentally improve its products).

For example: We have conveyors carrying the burdens, such as cooling conveyors on mixing machinery. Formerly a man cut a sheet of rubber off the mill, picked up a bar, placed it into a socket at a convenient height, threw the sheet of rubber over the bar, then lifted the bar with the rubber, placed it into a second socket to hang and cool. With a more improved method, a chain conveyor with hooks attached passes each mill, the man cuts the sheet off the mill and hangs it on the passing hook. Here, energy is saved which formerly was expended by handling of the bars.

Treads formerly were hand cut to length on a conveyor, picked up and placed in a book; the books were placed on a truck and when the truck was filled, the men would push the truck to one side and pull an empty truck into place for further loading. Under the improved method, the treads are cut automatically, the men pick the treads up, place them into hooks, the hooks when full are placed on a conveyor and delivered to the floor on which they are used.

Formerly, tube machines were purchased with spur gear drives causing considerable noise. In the new design, a texrope belt drive is used, eliminating all noise, but the hum of the motor. We further eliminate fatigue by rotating jobs so that the worker uses different groups of muscles.

Light is possibly the most important tool used in any factory. Natural daylight, I believe everybody will agree, is the most desirable of two sources of light—natural and artificial—however, many illuminating engineers feel that artificial illumination will eventually reach the plane of natural illumination. In fact, many industries are working the major portion of the time under artificial illumination.

The B. F. Goodrich Company has long recognized the fact that proper and adequate lighting is an essential factor in the efficiency and safety of its employees as well as in the quality and quantity of their products.

A vast amount of experimental work has been done in our laboratories and factory by Goodrich engineers to determine the proper intensity and character of light as related to the various operations conducted in the manufacture of our products and the carrying on of office work. They have also given careful consideration to the selection of lighting fixtures best adapted to types of buildings and operations carried on therein.

In addition, the design department has given special consideration to lighting in

connection with each engineering project with satisfactory results. Each machine or hand operation is given careful study by our engineers with the object in mind of proper design for placement of lighting fixtures and lights as well as natural daylight to supply the most efficient light best adapted to the work. Considerable thought is given to protect the worker from direct or reflected glare. Sufficient general illumination is provided for safety.

Naturally, light intensity varies greatly in opinion according to location, class or nature of work, and the engineer under whose control the project may be.

A few samples of lighting intensities used at Goodrich are as follows:

Storage & Warehouse	2 to 4 ft. candles
Tire Building	10 to 15 ft. candles
Tire Inspections	25 to 30 ft. candles
Mold Engraving	30 to 40 ft. candles
Drafting	25 ft. candles.

Operations where dark material or objects are used generally require higher intensities than white or light. This is true of black or dark rubber stocks.

The design of buildings and structures as related to safety and illumination is of paramount importance. Low, squat, dark buildings are being replaced with more modern ones of generous areas with high ceilings, large, generous windows and painted with some bright reflecting paint. This not only adds to the desired natural illumination, but to the facilities for providing better and more efficiently designed units for artificial illumination.

From a lighting standpoint, therefore, the decreased production of the early morning and late afternoon hours of the winter months and common to some industries inadequately lighted would be an unknown thing if given the proper perspective and attention.

The use of solvents and other flammable elements also require special lighting and accessories to guard against the fire and explosive hazard. Special lighting installations are required in instances where the inspection of finished materials of indelicate shades of color are carried on and light as nearly like daylight as possible is required.

Generally the foresighted illuminating engineer realizes when incorporating proper design in lighting that this is a wise investment rather than an expense.

Even with the very best of design and subsequent precaution, operators do get hurt and especially is this true on jobs involving the elements of endless repetition and monotony, for the human brain can not always be alert; and even when the person is aware of the danger, his mind will stray from his work, a muscle will lag and his hand may not always get back to safety.

So, most states require safety devices on such machines. These generally provide that both hands must recede from the danger zone in order to touch two widely separated levers or controls which jointly interlock each periodic movement of the machine. However, notwithstanding the precautionary measures taken, the most careful individual may occasionally be injured.

We have in mind the case of an experienced female operator, whose job was to feed roller chain side-bars under a double punch. After placing a side-bar in its receptacle in the jig, the girl was compelled to withdraw both her hands in order to touch two widely separated levers before the punch would descend. This machine was safe-guarded adequately, functioned satisfactorily and met with general safety approval. The agent who represented the company that built the press took pictures of the girl, sitting at the machine, which were published in their advertising as a shining example of a dangerous operation that had been rendered perfectly safe.

The girl was unusually alert and attractive and the agent fell in love with her. On the last day of her job, being on piece-work, with a counter that recorded each side-bar as it fell from the jig, she determined to set a record that would last. So

she humped herself into an unnatural position until she was able to reach the control levers with her elbows, and by a continuous pressure, operated the punch at its full speed. Expertness and alertness almost won the day—but not quite. At about fifteen minutes before quitting time, she failed to withdraw her hands in time and the result was a five-sixteenth inch diameter hole through the end of *both* index fingers. This incident would not be complete without allaying the listeners' pardonable curiosity. The girl *was* married and on *schedule*, and made no attempt to collect any damages from the company. Her consolation, to whatever extent it applied as such, was necessarily from other sources.

Steel is tougher than flesh and bone, and any machine that accomplishes a movement more powerful than is possible to resist with human tissue, will destroy that tissue if it gets in the way.

Any expansive force that is imprisoned in a vessel is especially dangerous, because the danger is invisible and the strength of the container problematical.

Materials transported, or heavy materials suspended above lines of traffic, are dangerous and require more careful supervision than is sometimes available to the erector of such menaces. Therefore, the State formulates codes and guides for the operation of such devices.

It used to be that labor saving machines were few and far between; they were simple in design, slow in action, lacking in power and usually operated by the owner. Today, machines are crowded into minimum floor space, complicated by multiple operation, high in speed and power and operated by male or female labor that may be changed almost daily.

Today, we hear a great deal concerning safety and accident prevention, safety drives, safety contests, safety medals and safety trophies. There is also a mass of literature available on safety campaigns, commissions, councils and investigations. But, as the old saying goes, are we not getting the cart before the horse? The way to purify water is to go back to the fountain. The way to prevent accidents is to incorporate safety into our machines, our highways and our buildings.

When I started to write this article, it was attacked with enthusiasm—under the impression that the idea was logical—that safety and design belonged together and I viewed the many pages devoted to safety articles in the "Industrial Arts Index" with delight, anticipating a rich repast of learned discussion on this subject. But, there were none! Several volumes of purely index matter were perused vainly. Of course, the idea is approached, from one angle or another, in almost everything written on the subject of Safety, but so far as I can find from the limited sources available, this is the first article on the subject of "The Relation of Safety and Design".

As a matter of fact, it is probably true that the reason for the existing high percentage of accidents in every walk of life today is largely a matter of design. If the engineers who laid out our streets could have foreseen the present conditions, they could have avoided them, had they been vested with full authority to do so. What I am getting at, is that design is not merely a simple matter of intelligent planning, even when the factors are known, but the result of a constant conflict over possibilities that may never materialize, resulting in a final compromise.

An accident, until it happens, is problematical; after it happens is very real. The very persons who might blame the designer for the accident quite possibly are the ones who refused to allow him the necessary lee-way to insure its prevention.

A person may commit suicide, but he rarely will invite mangling. We may assume, therefore, that major injuries are not intentional. A man may be careless, but he's for safety, he believes in it, he is on your side,—at least after the accident.

The highly flammable film room of the Cleveland Clinic was located in the basement of the building, between the heating and ventilating room. What an ideal design for the terrible catastrophe that later occurred! The film caught fire—there were explosions, and the hot air ducts distributed the gases throughout the length,

breadth and height of the great building. Here, indeed, was relation of safety and design—but with the high ideas completely reversed.

The price of safety for the machine from the design to the scrap heap, and for the operator from the cradle to the grave is eternal vigilance. There must be a co-operation of all departments, for safety is largely a matter of *accident prevention*, and the matter of design can be made to play a more vital and important part than it now does—along with the education of the worker and the public.

Safety affects everybody, in every walk of life. The man who goes down into the shafts of the mine, the man who dangles perilously on suspended planks while painting the cornices of a building, the man who stokes the boilers in an ocean freighter, the man or woman who feeds a punch press; in fact, the man who *works*—is confronted every moment with the possibility of accident, either through his own carelessness, faulty design of his equipment, or some combination of these elements with the high pressure of modern competition and production requirements.

My message is first of all to the designer. Keep the ideas of safety in mind at every stroke of the pencil. Human lives are valuable. Arms, hands and eyes are priceless to the man or woman who works. Put such menaces as gears and chains, cranks and cams, not only under guard, but actually inside of the framework wherever possible. Remember that in nature, where the only code is the survival of the fittest, those animals live longest whose framework is on the outside or whose hide is the toughest; such as the turtle, the alligator, and the rhinoceros.

The relation of safety and design does not stop however with the designer and his machine. Our message is also to the worker.

Keep safety in mind—all the time! It takes less than one second to have an accident. Don't be ashamed to think about safety or to talk about it to your fellow workers, and have courage to wear the safety protection provided, even though ridiculed for it. It's the biggest thing about your job—*bigger*, even, than your job; for you can get another job, but you can not get another arm!

We are even yet not finished with the relation of safety and design. The foreman knows the machines' latent danger. The superintendent must have an interest in the safety of his workers; knowing that the machine, no matter how carefully designed, can not be made to think, or feel or sympathize, or be humane in its action—it never reaches out its tentacles for anyone.

No firm, no employer, or no man should take that which he can not replace!

Therefore, since the best worker is sometimes lax, or careless, and ever subject to the human element; and since the machine can not be designed to think, reason or take back the fateful stroke, then it is up to the management to supply this link of safety in the relation of the designer to the machine and the relation of the worker to his machine.

R. E. BULLOCK (Grand Rapids, Mich.): I would like to ask if the design is left to the designer entirely, whether it is safe or not safe. I ask this because we purchased a new machine, a bias cutter, a few years ago which was represented to be equipped with all safety designs. We had an accident on it within two weeks; we found that it was not equipped with all safety guards.

MR. MARYANSKI: No, it is not up to the designer. In our design division, every one talks safety, and the idea in every one's mind is safety. The designs are submitted to our safety engineer for inspection and approval and criticism; they are submitted to the department managers, all the way down the line, every one has a crack at it, they all come back with criticisms. In that way we get the machine so that it is thoroughly safe.

MR. BULLOCK: Could you speak for a company putting machines on the market, how they operate this designing for safety?

MR. MARYANSKI: It all depends on how strict the rubber company is, what safety devices they have. I suppose it is just a matter of development, of the machine having all safety devices on it.

Perhaps the other rubber companies have been remedying that, as they have been receiving the machines you speak of, and eventually the machine company making the machine will find out about them, and eventually make these changes in the machine themselves.

ADJOURNMENT

Thursday Afternoon Session October 2, 1930

J. T. KIDNEY, Chairman
The Goodyear Tire & Rubber Company, Akron, O.

The third session of the Rubber Section convened with Chairman Kidney presiding.

CHAIRMAN KIDNEY: This is our last session. We have two speakers, Mr. Hungerford, and Mr. Fleming. We have our Safety Kinks and the election of officers. I am going to call on Mr. C. L. Hungerford, director of safety and hygiene, The Firestone Tire and Rubber Company, Akron, Ohio, to present his paper.

"Carry On"

By C. L. HUNGERFORD
Director of Safety and Hygiene, The Firestone Tire and Rubber Co., Akron, O.

Wonderful safety records have been established in the year of 1930 as compared with the year 1929. Wonderful reductions have been made in the number of lost-time accidents, days lost, and the frequency and severity rates. Departments, factories, plants, have gone through months without a single lost-time accident, and it is wonderful—but, why not? Don't you have to admit we have had some advantages that we haven't had for years? We have not had new men. We have not had the exposure which we have had in previous years, and aside from lay-off, labor turnover has been very low. Is there anyone connected with safety who will not admit that all these conditions have a tendency to eliminate accidents?

This year there have been many disadvantages. It is true that older men have been on the job, but what a handicap we have all been working under. Ever around the corner has been fear of loss of job, resulting in possible loss of home, failure to meet financial obligations. In many places wages have not been sufficient to enable an employee to live up to the standard to which he has been accustomed—this has not brought contentment of mind—all of which brings about that condition where accidents happen.

In cutting down production, we have created what I call "the new job employee." By that I mean that many men spend so many hours on this job and so many hours on that job, because there is not enough work for one man all day. This makes many of these old men just the same as if they were brand new men.

Have you men been able to convince your management to spend the money for all of your safety orders? I have heard from fellow workers in the safety game who told me that it would not be long until their plant would be closed and they were wondering if there was anything open in our plant or any other plant where they might fit in. I think it is admirable to realize that in the face of a lot of discouragement, our safety engineers have carried on and are still carrying on through a period where the going has been mighty tough.

Picture Has Changed

We can all look back on the past, we see in the setting sun of passing years wonderful changes which have made our industries more safety minded. First, is the fact that the attitude of the management has changed tremendously. Years ago the management was like some man with the automobile insured against fire, theft and liability—he drives recklessly down the street, disregarding human life and property,

because back in his mind he has that belief that his machine is insured and that if he nicks somebody's fender, the insurance company will pay for it,—if some fool steps in front of his automobile and gets his neck broke, his company will pay for it. I believe that management was very much that way in the past. They carried insurance and weren't far-sighted enough to know their rates were decided very definitely by their accident experience—just figured they had insurance and let the insurance company pay for their accidents. Thinking insurance cost was the only cost.

Management, through the efforts of safety workers, now recognizes the relationship of efficiency and safety. Safety is used as a measuring stick of ability. Accidents indicate underlying inefficiency, and we know through accident analysis that in most cases there is no doubt as to who or what is responsible for an accident.

Wonderful strides have been made in the design of machines by engineers to provide safety. Factors of safety are figured, which before were not considered necessary—for one purpose, and that is to prevent injuries and suffering to men who use this equipment. Our purchasing department uses intelligence and does not let price be the only determining factor when safety is concerned. I can mention a number of items which have been changed because the items did not meet safety standards as set up by our department, and I am glad to say that our purchasing department is constantly calling my attention to different items which are considered safety features.

Much more attention is paid to occupational disease exposure than in the past. I am referring to work done to eliminate the use of benzol, and accelerators, etc., which caused skin irritations and dermatitis. One of the best examples of that is the work done by Dr. Healy of the Fisk Rubber Company. His work has been of inestimable value to safety engineers who availed themselves of this information.

The Attitude of the Foreman

Someone conceived the idea of placing the responsibility for accidents upon the over-crowded foreman. That was a great idea for the safety man. The foreman was a regular fellow—he assumed that responsibility and has done a wonderful job. I am telling you gentlemen right here, that if it wasn't for the wonderful safety work of our foremen at Firestone, I wouldn't have any more of a job than a jack rabbit, and we would still be having many accidents, regardless of my work. Our foremen are real safety men. We have one general foreman who last month promised every man who went through the month without a lost-time accident a chicken dinner. Last week he spent \$15 buying chicken dinners. I am not going to discuss the foreman's responsibility; but I would take this opportunity to pay a tribute to all foremen. For, as Garrett Burgess says, the foreman plays a very wonderful part in keeping a man's mind in the proper spirit. "He passes down the path of life each day, he does a safety mission that recalls memory into play. It may be just a word, a nod, a movement of the hand, yet a reminder that safety is in the hands of man. For no hand meets hand in fellowship, yet from out the other eye reflects a gleam of memory, for safety will never die."

The Attitude of the Worker

The attitude of our workers has changed. This has not been the result of sleight-of-hand. It used to be considered cowardly for a man to go to the hospital when he received a minor injury. It used to be that when a man was told that he was doing an unsafe practice, he would stand there and argue with you—he had been doing the same thing for years and never had been hurt. It has not been so long in our plant that when a man was injured and when investigating this injury, I would be surrounded with a wave of sympathy for the injured man. It's a different picture now. Instead of the wave of sympathy, it is now a wave of criticism, especially if that man disregarded a safety rule or if he jeopardized the safety of his fellow

workers. Workers have a real interest in their safety records—how jealous they are and pretty much peeved when anyone breaks their record. This affects the workers. They do not want to get injured, because they know it is wrong, and they know carelessness is not popular with their fellow workers.

Has this just happened? No—emphatically no. I believe it is the result of a series of impressions. The first impression that our man gets when he comes into our organization is from our employment manager, who tells him that we have no place in our organization for a man who is careless and will not follow instructions, especially safety rules, and that unless he conducts himself in a safe way, he will not last long on any job. After that man successfully passes the medical examination, and reports back ready for work, I give him a talk emphasizing our safety program and what is expected of him from that standpoint. He is then conducted to his department and introduced to his foreman, who gives him specific safety rules covering that particular department. The foreman gives this man a little talk on safety, tells him about their safety record, and tries to create in that man at once the spirit of pride the department has in its safety record. The man is then turned over to an instructor who teaches him the right way to do the job, which is the safe way. This man is checked later to see how familiar he is with his safety rules, and in making trips through the factory I am continually checking on men to see how familiar they are with conditions, safety rules, instructions, or whatever in my opinion is necessary for them to know. This impresses men that we mean business when we talk safety.

One of our methods of checking our people is to have our foremen, compensation and medical departments keep a very close check of men who are in the habit of being repeaters on small injuries, because our experience has shown that sooner or later the man who has a series of minor injuries will end up with the major injuries. We get hold of these men and tell them that this must stop or we cannot permit them to remain in our employ any longer. In quite a few cases men who have repeated minor injuries have been removed from the payroll. We have also removed supervisors and even foremen for accidents occurring under their supervision, regardless of whether anyone was injured or not. Yes, our workers are becoming more safety minded—largely due to educational methods—taught to the tune of the hickory stick—coupled with a better selection of men by our employment department. One of the best examples of this is the mills and calenders. You will agree with me that the bite of these rolls is still there. We have not done a lot to cover this up—it's just about as easy for a man to get into a calender, a windup or a mill roll now as it was ten or fifteen years ago—we have raised the height of our mill rolls and we have installed safeties which limit travel distance after the machines are stopped—but our experience has been that we are not getting men into these mills and calenders like we used to. Why? Simply a matter of proper supervision and education. Mill accidents are very rare—I can remember but one calender accident since I have been on the job, since the fall of 1926.

Mr. Safety Man, you have sold management, you have sold supervision, you have sold workers. Sure—you have done a wonderful job. Safety has so woven itself into good business methods that it is no longer a fad—it is no longer looked upon with suspicion by our workers and management—it is no longer a flag-waving proposition to be conducted as a carnival with pink lemonade served as an extra bonus for men to work safe. Now, don't get the wrong impression—I am a firm believer in giving credit when due. No one enjoys a slap on the back as much as I do. Charles Schwab says, that no matter how great or how small his position, a man can do better work under the spirit of encouragement than under the lash of criticism. It is this spirit of encouragement that has brought the safety movement in this country to its present high state of efficiency.

Wonderful safety records have been established, and I hope that the actual acci-

dent cost compares favorably with the wonderful safety records that have been established.

It is human nature for us to stop and rest on our laurels. That is dangerous to effective safety work. I firmly believe **THAT OUR BEST EFFORT IS WHAT IS EXPECTED AT ALL TIMES.** Anything other than our best subjects us to criticism. Did you ever think that over?

Safety records show that accidents can be eliminated; we who carry on the work of eliminating accidents have no longer alibis to offer humanity for failure.

Any organization which is not safety minded cannot survive. This is a keen age of competition.

Future Safety

Safety departments in the past, and in many places today, have been highly organized. Safety directors, 1st assistant, 2nd assistant, clerks, statisticians, safety inspectors galore. As Walter Schneider once told me, "why we even sharpened the pencils for the production department."

The more hands you have in your safety department, the less safety work is going to be done by the rest of the organization.

The tendency has been to eliminate these huge safety organizations, and to have one safety engineer, a clerk and a stenographer head up safety. He has had to be, in order, a statistician, an engineer, psychologist, an author, a diplomat, policeman, but, I have seen, with one man, results obtained in our Akron organizations that have never been equaled with a larger safety organization. In addition, I have seen this same safety man finding time to give other personnel work his time, and in some cases I have even seen him help the advertising department, because he has developed a keen sense of publicity necessary to his work.

I predict that in the future we will not see a definite safety department.

Through the work of you men, organizations like the National Safety Council and our Industrial Commission, and definite state laws, safety has become such an integral part of good business that—

Men will come to your plant seeking employment knowing that your door is closed to careless men.

Engineers will know that a machine designed and placed in our plant without safety will never turn a wheel.

Supervision will realize that effective safety work is a very definite measuring stick of their ability, and the cost of accidents will appear on their departmental cost sheets just the same as excessive labor cost, spoiled material, etc. now appear, and for which they have to answer.

The worker will have placed in his hands material and equipment which is right, and he will work in an environment of cleanliness and order, which is the keynote to safety.

Our whole scheme of education will have safety as one of its major themes.

I beseech you, safety workers, to carry on your good work—let every man here highly resolve that no product, bearing your distinguishing mark of quality shall leave the gates of your factory, made at the sacrifice of life and limb.

For to save life is the noblest of all purposes. It embodies the highest ideal of humanity. It conserves the best asset of the nation; provide its best protection; and creates its real glory. It incarnates the spirit of democracy and brotherhood.

R. A. BULLOCK (Corduroy Tire Co., Grand Rapids, Mich.): I should like to ask Mr. Hungerford in regard to checking up these minor accidents that he mentioned and talking to the employee telling him that if they didn't stop he would be taken from the payroll, whether or not you won't run into the trouble of those people having minor accidents and not reporting them?

MR. HUNGERFORD: We had that trouble and we had to fight it. We had cases where men failed to report minor injuries and we had to get after them. Even now we will have someone come to us three or four days later saying he bumped his ankle and went home and then he couldn't walk the next day. We do go right after them. However, a lot depends upon the individual. You cannot treat all individuals alike. We will tell a man the right way to do things and make him realize that he is doing it for himself and his family. We tell him that it is for his own protection that he report to the hospital for if they have no record of his accident in our hospital, he may have a hard time proving that he was injured in our factory. We say, "Get a pass from your foreman and go to the hospital so that if anything develops you can prove it." We tell them that unless they are treated in the hospital that minor injury may develop into a serious one where they will lose time. They certainly hate to lose time.

A. M. DIETZ (Pennsylvania Rubber Co., Jeanette, Pa.): What constitutes proof of a minor injury? Citing a case that you mentioned where a man may bump his ankle and he does feel a little pain but he goes on working and the next day he doesn't get up and go to work, why would he have any trouble proving that he had an injury?

MR. HUNGERFORD: The best way I can answer that is by an example. On April 1, 1928, a man reported to the foreman with a headache. He was sent to the hospital. There he was given balm and told to rub it on his forehead. He did that. The next morning he came in and his little girl was leading him. He thought he had gotten some of the balm into his eye. A week later the man was dead with an abscess in the brain. It developed that a month previous during his work a drop of hot water hit him on his head. He jerked his head and bumped it. It didn't hurt him. He didn't go to the foreman and get a hospital pass, but he did tell his supervisor who remembered very distinctly that that had happened. We paid his claim because we figured that that had come from the injury a month previously. If we had not been able to tie up that previous injury, I don't think the commission would have made us pay that claim because we must establish proof of the injury.

MR. DIETZ: If that fellow had bumped his head outside and said he hurt it in the Pennsylvania Rubber Company, we would have paid the claim.

MR. HUNGERFORD: You have to take them all in with the rest. The percentage of people that put it over on us is not five per cent. The average fellow that comes to you is actually injured in the plant.

CHAIRMAN KIDNEY: There are a lot of peculiar accidents that happen in the rubber industry. We had a flirting accident. A fellow saw a nice-looking girl passing and he waved to her and waved his hand right into a propeller and it came off. That is the first flirting accident on record.

P. C. WOLZ (Eastman Kodak Co., Rochester, N. Y.): I should like to know where Mr. Hungerford draws the line if he can't treat men all alike.

MR. HUNGERFORD: I mean that there are some men to whom you have to lay down the law. You must say, "You do this or get out." Then there are other men to whom you don't have to talk in that way. They have a different attitude and you can make them realize the seriousness of it and do this by telling them in a very nice way. They will go out and appreciate what you have done for them, realizing in a much better way than before that safety is a responsibility and that our company is using it as a measuring stick of their ability as good workers. Some men you have to go after hard; other men you can approach in an entirely different way. It all depends upon the attitude of the worker.

CHAIRMAN KIDNEY: I now take pleasure in introducing Mr. W. H. Fleming. Mr. Fleming talked to us in Chicago at our last convention and he was very hesitant about coming this time feeling that he should not come twice in succession. But we prevailed upon him to come. He is Assistant Production Superintendent of

the Goodyear Tire & Rubber Company. He supervises the building of the small tires. He is also in charge of all our mechanical goods.

A Foreman's Opportunity in Accident Prevention

By W. H. FLEMING

Superintendent of Production, Plant II, Goodyear Tire and Rubber Company, Akron, O.

During the last few years the rubber industry has experienced increased competition which has resulted in decreased profits. This has entailed a careful scrutiny of every item of expense. Campaigns for the elimination of waste and prevention of accidents are in progress. Selecting and training of efficient labor has become necessary. The research and development departments are expanding their activities. Efficiency departments are doing a more extensive work. These activities, along with many more, are helping to keep the different concerns on a competitive basis. In order to accomplish the best results a spirit of cooperation is necessary.

To help develop this cooperation personnel department activities have been enlarged. Employees representation plans have come into use and the employees are being considered as individuals instead of in a mass. Industrial universities are furnishing the opportunity for better education. Employees activities fostered by the companies are helping to provide the necessary recreation and good-fellowship. Whether these activities originate at the top or the bottom of the organization their interpretation and execution rest with the foreman. This places the foreman in a key position and gives him the opportunity in accident prevention. Opportunity is nothing more than acceptance of responsibility.

An analysis shows that approximately 15 percent of the accidents are due to mechanical causes while the other 85 percent are due to causes ordinarily termed "carelessness." From these figures it becomes apparent that the real problem is to teach the employee to think, talk, and act safety-first. Every organization reflects its head and it is no exception for the department to reflect its foreman. It is a proven fact that in order to be a good teacher a foreman must be respected by his employees for his knowledge, discipline, human understanding, fairness, and consideration for others. When a foreman attains this position he becomes a leader and the employees are anxious to follow his directions and discuss them with others. A foreman can only accomplish so much in a day's time, but by enlisting all of his employees as his representatives, you can multiply his accomplishments by the number under his direction and measure the results accordingly. To develop this to the maximum he must be open-minded to and encourage suggestions, thereby keeping the employees thinking about constructive things so they have no time for petty, manufactured grievances. He must also be willing to admit his mistakes and appear human in the eyes of his employees.

The present age is termed the machine age. Inventions of semi and automatic machinery have come so rapidly that the human mind is having difficulty understanding the very machines which it has invented. The foreman who makes a thorough study of the machines in his department finds he is more capable to teach the safe use of these machines to his employees. He can point out to the new men and continually caution the more experienced men, the dangers in operating the various machines. Also explain the various safety devices and their functions. The important thing is to teach these things in time to prevent an accident, not to put it off until the accident has happened.

The foreman from the nature of his work is in close and intimate contact with his men and operations which gives him an opportunity to study them. This enables him

to place the men on the job for which they are best suited. He must know whether they are mentally and physically qualified to efficiently turn out a quality product in a safe manner. In addition to knowing his men he must have experience and knowledge of the various jobs under his jurisdiction as well as the materials and equipment used in the various operations.

As new men are employed or transferred from other departments, the foreman has the opportunity of being the first to meet them and create a good or bad impression on the newcomer. In small departments he introduces them to their new job and looks after their instruction, which should include the danger points in each operation and the practical knowledge of the safety methods applied. In larger departments this function is delegated to someone else, either directly or indirectly responsible to the foreman, but he still has the opportunity to see that the proper instructions are given. The first impression is generally a lasting one and if the foreman can gain the confidence of the newcomer he should have little difficulty in making him appreciate the need for safety.

No foreman can impress upon an individual the importance of safety unless he practices his teachings in his department. It is useless to teach a man safety methods if the department in which he is working is full of unnecessary hazards. A floor in need of repair is as dangerous as an unguarded machine. A well ventilated department is essential to clear thinking and accident prevention. The lighting should be given careful consideration in regard to both location and kind of lighting used. The need for cleanliness becomes apparent when we consider the dangers arising from tools and materials allowed to lay around the department.

Even though a foreman has taught his men and has conscientiously practiced these teachings his opportunity as a leader is by no means ended. He must continually check for unsafe practices such as chance taking, unnecessary haste, and hazardous shortcuts. This applies more to the experienced employee than to the new man because the dangers have become common place to him. When he notices that the men are inclined to be less careful he must arouse their interest and enthusiasm by means of contests, suggestions, and educational meetings.

In order to plan the most effective educational program it is necessary to study the problem as it actually exists. I will mention briefly the causes for accidents and their percentage of the total accidents in the Goodyear Tire & Rubber Co. since Jan. 1, of this year. Taking the items in their order of importance we first have falling material which is 19.9 percent of the total accidents. This consists of material falling from tables, machines, ladders, improper piling, etc. In this class of accidents the careless operator is often hurt, but more frequently it is someone else. While working he carelessly piles his tools or materials on this table, bench, or machine and while reaching for some specific item pushes another off striking some part of his body. An accident of this kind can be easily avoided by an orderly kept bench. While working on a ladder it is very easy to lay down a tool and with a little push cause it to fall on someone passing near the ladder. Storing of materials requires considerable study in order to utilize floor space to the best advantage and pile the material so it will not topple over. Every factory has considerable vibration which has a tendency to shift materials, sometimes causing a whole pile to fall.

The next item in importance is handling material, which is 9.77 percent of the total accidents. This item covers the loading and unloading of materials and machines, and transporting them from place to place. While handling, the employee may drop his load and crush a foot or he may stumble while carrying it and break an arm or cause it to fall on someone else. In putting down his load it happens quite frequently that he fails to remove his fingers before letting the load completely down and the result is an injured finger.

Falls make up 8.08 percent of the accidents. This covers stairs, tripping, overbalance, slippery floors, bumping against machines, etc. Horseplay, unnecessary haste, and awkwardness are responsible for most of the accidents in this group.

The foreman should see that the stairwells and main aisles are well lighted, free from obstruction and clean. Then it becomes a matter of discipline for which the foreman is responsible.

Trucks are responsible for 7.6 percent of the total accidents. Conveyors are replacing them to a considerable extent but a great deal of material is still handled by hand and electric trucks. Employees turn corners without looking and are bumped by them. Electric truck drivers fail to signal dangerous places. Operators pushing trucks occasionally get squeezed between their trucks and other objects, and also pull them so the wheels run over their feet.

Employees often cause injury to themselves by trying to lift loads that are too heavy and by not knowing the proper way to lift. This causes strained backs, hernia, fallen arches, and torn ligaments. The seriousness of these accidents is difficult to determine and they are responsible for 7.11 percent of the total accidents.

Each man should know the condition of the tools with which he works and when he is not conscientious in seeing that they are in proper repair accidents are the result. Hammer heads fly off the handle, rounded hammer heads cause smashed fingers, broken handles on rollers permit the rollers to drop on the men's feet and any tool in need of repair may prove itself a dangerous weapon. Accidents due to this cause make up 7.9 percent of the total accidents.

At frequent times there are accidents that can not be classified. These we will call miscellaneous. They cause 6.9 percent of the total accidents.

Eye accidents cause 6.63 percent of the total accidents. A man gets a foreign body in his eye and is careless about having it removed, and this starts infection. Most of these accidents are caused by negligence in not using goggles which are provided by the company in performing operations which require chipping, grinding, welding and burning.

It is difficult to educate the employees to the importance of giving immediate attention to even the smallest scratch. Some feel it is childish to go to the hospital for the treatment of an injury which is giving them no pain while others do not want to lose the time from their job and apply home remedies. Neglected minor injuries which result in infection cause 5.79 percent of the total accidents.

Employees not looking where they are going or what they are doing bump different parts of their bodies against doors, materials, machines, and building causing bruises, fractures, sprains, and cuts. These accidents generally take place when the employee does not have his mind on what he is doing and is responsible for 4.58 percent of the accidents.

Tire and other miscellaneous machines cause 8.32 percent of the total accidents. Operators get their clothing or some part of their body in contact with the moving parts of the machine often causing very serious injury. Hoping to save time they change from one operation to another without stopping their machine. Mechanics sometime try to repair a machine without interrupting the operation. These dangerous practices should be prohibited by the Foreman.

Rolling and handling molds in the curing process presents a serious hazard at all times. The percentage of accidents, which is 2.77 of the total, does not express its true seriousness as accidents due to this cause are rarely minor ones.

Everyone has experienced the pain of a burn and can fully appreciate why accidents of this type should be reduced to a minimum, and yet they constitute 2.53 percent of the total accidents. The majority of these take place in the mechanical departments where the men are working with electricity, steam, and hot metal.

With the large number of mills and calenders in operation the percentage of 1.68 percent of the total accidents is comparatively small, however the majority of these mean a badly crushed hand or arm. Every precaution possible should be used in their prevention.

And 1.32 percent of the accidents are caused by men stumbling over or bumping

material lying around on the floor. This is one type of accident which is absolutely unnecessary if the foreman maintains an orderly department.

Presses are responsible for .02 of the accidents. Though few in number these also may be very serious accidents such as burnt and crushed arms.

Going over the accidents in detail should make a foreman plainly see that he has a definite opportunity in accident prevention. With 15 per cent of the accidents due to mechanical causes and the other 85 percent due to causes ordinarily termed carelessness the major part of the foreman's responsibility lies in the education of those responsible to him.

Discussion

E. W. BECK (United States Rubber Co., New York): On the chart the subject of infection is mentioned. I know of an organization that does not include infection as a cause and I should like to ask what is really cause of the 5.79 per cent infection cases, what this is attributed to.

CHAIRMAN KIDNEY: I can answer that. They are probably in this whole circle (indicating). They might come any place in that circle. They are not counted twice. He might get a scratch a week before and he comes to the hospital and we take care of it. A lot of times they don't know themselves where they got it.

MR. BECK: We have found that many infections come from steel wool and burns. We should get at the root of the infection and consider it the cause rather than infection the cause.

MR. FLEMING: They consider that a little scratch is babyish and they don't like to mention it. They have no pain to speak of and they go home and apply a home remedy. Then, too, they don't want to leave their machine long enough to go to the hospital for they lose money by it. There is the foreman's chance to break down those ideas. He must get the employee to feel that it is manly to go to the hospital, that it is the right thing to do. He must be taught that the little time he loses is time well spent because later on he may lose more time if anything develops. It is the problem of the foreman to correct these impressions.

MR. BECK: We have infection on our reports. We insist upon it by our departments but it is not tabulated as such.

MR. FLEMING: I tabulated this for my purpose today to show the opportunity of the foreman. It is an educational thing to impress upon the men the importance of spending twenty-five minutes at the time of the thing rather than days afterwards. And secondly, that nobody is going to laugh at him for going to the hospital or consider him a sissy or a baby. That is the reason I illustrated it that way.

MR. DIETZ: I wonder if it is the smallness of the injury that keeps the man from going to the hospital rather than the attitude of the hospital itself. One time our nurse was away and we got a good-looking nurse to substitute for him. We didn't have any trouble sending the men down there. I think it is the personnel of the hospital that keeps the men away.

MR. FLEMING: A good-looking girl attracts men any time, any place. I do think, though, that sometimes they go to the hospital and the nurse doesn't pay any attention to them or maybe makes some remarks. Naturally they don't want to go back there again.

That applies to the foreman in the same way. The foreman must be respected by his employees the same as the nurse in the hospital because you can get them to do things with less persuasion and with better results by leadership rather than driving.

W. L. SCHNEIDER (The B. F. Goodrich Co., Akron, O.): I should like to ask Mr. Fleming in connection with men going to the hospital do they receive any compensation while they are there?

Mr. FLEMING: The only compensation is when they are out on a hospital pass. As far as going to the hospital is concerned, when they are away ten or fifteen minutes, we don't allow compensation.

M. A. QUIRK (U. S. Rubber Co., Detroit, Mich.): After observing the chart and looking over the statistics in the automobile industry it is amazing to note the low percentage of the Goodyear accidents on falling material and handling material. It is quite unusual to me. I want to find out how you divide the line. Some people classify the falling material that it has to be a certain height before it is classified as a falling material accident. I know that falling and handling are two things that cause the most accidents, but in our case the handling is higher than yours and the falling material much less.

CHAIRMAN KIDNEY: On falling material you can take this whole slice here (indicating) about 35 or 36 per cent.

Mr. BECK: I think since this chart will appear in the report of this section that we should not mislead anyone although Mr. Fleming brought it out very nicely, that on this chart the smallest percentage of accidents would probably be the largest on a severity chart. As I look at this chart that same thing holds true in proportion. The largest number of accidents on this frequency chart would probably be the lowest on the severity chart. I say that so that anyone looking at that will not feel that we are having the greatest experience in falling and handling material.

L. W. ISRAEL (Philadelphia Electric Co., Philadelphia, Pa.): Did they have any local first-aid remedy in the plant that they can use immediately to prevent infection, or do they have to walk a long way to the hospital?

A Hospital in the Midst of the Plant

Mr. FLEMING: We don't have any first-aid. We have the hospital which is centrally located in the middle of the plant. It would probably only take five or six minutes to get there.

Mr. ISRAEL: Have you ever contemplated using first-aid kits to eliminate that infection hazard?

Mr. FLEMING: No. There was a time when we considered it, but we find that the hospital is best equipped and they do a far better job than just anyone around the plant can do.

I should like to answer more explicitly Mr. Schneider's question. The thought of not paying a man for going to the hospital with a scratch is this: The Company provides a hospital and the facilities to take care of an employee even if he is not hurt in the factory. In production, there must be a spirit of give and take and since we provide this hospital, we feel that he should give a little, and that is a little of his time.

Mr. BULLOCK: In regard to paying employees for trips to the hospital, the way we get around that is that if an employee has a boil, for instance we are glad to take care of it without charge. In other words, we take care of their injuries outside of the factory and in return for this they are not paid for time spent there.

E. W. BENDIS (American Mutual Liability Insurance Co., Philadelphia, Pa.): In our particular inspection work we divide our causes into three sections, point of operation, handling material and driving mechanism.

Mr. BECK: In that same connection I should like to ask the members present if any of them have analyzed their accidents as regards the basic cause. You are all familiar with the article that was written by Mr. Heinrich of the Travelers Insurance Co. I feel that in order to solve our problem that is what we are going to do. I know if one of our men loses his eye in getting a drink of water by bending over, if we have the basic causes on our charts, I believe we are then in a position to remove the cause.

Mr. FLEMING: As time goes on in industry, we will find that the causes of accidents are going to vary very rapidly. We are going from the human element to where the operation is going to be simply automatic. It is going to be machine attention and keeping the machines operating instead of lifting and doing the work themselves. Ten years from now I will have to change this whole picture in the way that operation in respect to causes is going to be different from today, because of automatic machinery.

Mr. HUNGERFORD: In the last two years, Mr. Beck, we have been classifying all our accidents according to basic causes. I think that is one of the big things that has enabled us to make a lot of progress in our accident prevention work. Every foreman, no matter how trivial the accident is, regardless of whether the man is injured or not, makes out a Firestone accident report. We have written on that report a list of causes such as lack of proper instruction, short cuts, physical condition of the man, defective guards, exposed pipes, and so forth. Then on that report we say, What have you done about it? Each month we send to each department head a report showing the percentage or number according to those causes.

We don't even classify accidents according to falling material and trucks, where a man has his foot crushed by a truck. What causes the truck to crush his foot? Inattention, improper loading, defective truck, or what? We find that that has down a lot of good.

E. R. LAWLER (U. S. Rubber Co., Woonsocket, R. I.): Mr. Hungerford brought up the point of having the foreman make a report of each accident. Is it necessary to have a report of the foreman before the man can visit the first-aid hospital?

Mr. HUNGERFORD: No. The impression that I get from safety is the same as from other problems. In the first place it is always necessary to find out the cause of anything. Then it just takes a little concentrated thinking; everybody thinking about the same thing improves it to a great extent. I think safety is in that same category. By having our organization furnish statistics as to causes we are going to get far better results.

W. C. LINGGALL (U. S. Rubber Co., Passaic, N. J.): I should like to ask some of the men if they have any provision for immediate explosions? Do they have any neutralizer or do they have to depend upon water. In a case of an explosion you have to utilize every minute. You have to have a neutralizer handy. Of course this would be primarily in a laboratory.

Mr. SCHNEIDER: We have showers.

Mr. HUNGERFORD: No, we don't. The man must go to the hospital immediately.

CHAIRMAN KIDNEY: We will have to close the discussion now. I want to thank Mr. Fleming and Mr. Hungerford for their excellent papers.

I am going to take about three minutes to sum up some of the impressions which I have gained in my three years as general chairman of this Section. First of all, I have had a good time out of it myself. I have met some wonderful people and made some excellent friends. I am sorry I am not going to be chairman next year. That is putting it very frankly.

We have been through a tough year in the rubber business, but it is nothing to worry about. Around the first of next year I believe we will be coming around high, wide and handsome.

There is one other point that I want to point out to safety men and that is compensation. I don't think the safety man takes quite enough interest in compensation. All safety men talk about cost and causes, but they do not take a live enough interest in compensation. The law is legislating on our statute books things that will be accidents next year that are not accidents this year. Your occupational diseases in every state are beginning to include a lot of things that are really alarming. I am not proposing that we should put up any fight against any legitimate cause of an accident, but there are a lot of alarming things creeping into the occupation law.

The day is coming when you won't have to hire anyone unless he is a physically perfect person. I think the rubber business should pay some attention to that feature of safety. That is one thought which I should like to leave with this Section.

To the officers that served with me, I want to thank them personally. I certainly enjoyed meeting and working with them. If anyone of you comes to Akron, we are willing to take a day off and show you around. I will now call on Mr. Beck, chairman of our Nominating Committee for his report.

Report of the Nominating Committee

E. W. BECK (U. S. Rubber Co., New York City): The Nominating Committee presents the following list of officers selected for the coming year:

General Chairman—E. R. LAWLER, Woodstock Rubber Co., Woonsocket, R. I.
Vice-Chairman—C. L. HUNGERFORD, The Firestone Tire & Rubber Co., Akron, Ohio.
Secretary—J. R. HANSON, U. S. Rubber Co., Detroit, Mich.

Chairman Poster Committee—ROLAND KASTELL, U. S. Rubber Co., Passaic, N. J.
Chairman Program Committee—M. A. QUIRK, U. S. Rubber Co., Detroit, Mich.

Chairman Membership Committee—W. L. SCHNEIDER, The B. F. Goodrich Co., Akron, Ohio.

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. SHIRLEY, Hood Rubber Co., Watertown, Mass.

Chairman Engineering Committee—C. B. MITCHELL, Republic Rubber Co., Youngstown, Ohio.

Chairman Slides and Safety Kinks Committee—T. G. McKENNA, The Goodyear Tire & Rubber Co., Akron, Ohio.

News-Letter Editor—A. P. REGAL, The Philadelphia Rubber Works Co., 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.

CHAIRMAN KIDNEY: You have all heard the report of the Nominating Committee. Will someone make a motion?

(It was moved, seconded and carried unanimously that the report be accepted and the chairman declared the nominees elected.)

CHAIRMAN KIDNEY: We ought to have a few words from Ed. Lawler.

E. R. LAWLER (Woonsocket Rubber Co., Woonsocket, R. I.): I thought I would get by and have a year to prepare my speech. I started going to these Congresses back in 1920 and with the exception of a few years I have attended every one of them. Without throwing any bouquets, I want to congratulate Mr. Kidney and the committee for giving us the best program in years. All I ask is that when we have our annual meeting next year we can say that we have had as successful a year as in the past.

I also ask that you cooperate in getting new members and anything along that line. I think we should pass up for the time being affiliating ourselves with any other section. We have lost some very good members but we have a good-sized crowd and what we lack in quantity we make up in quality.

I think this is an opportune time for us to bring up the subject of our amalgamation with the Chemical Section. We ought to either kill the idea or advocate it so that it won't come up next year. I think we should put it up to this group right

now whether we should entertain this thought. Let us put it to a vote and get it out of the way. We have considered it now for the past five years.

(The motion to kill any thought of amalgamation with the Chemical Section was moved, seconded and passed unanimously.)

("Safety Kinks" was then presented by Mr. T. G. McKenna—Goodyear Tire & Rubber Co., Akron, O.)

ADJOURNMENT

NINETEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Steam Railroad Section

Officers 1930-31

General Chairman—GEORGE H. WARFEL, Union Pacific System, Omaha, Nebr.
Vice-Chairman—W. A. BOOTH, Canadian National Railways, Montreal, Que., Canada.
Secretary—J. L. WALSH, Missouri-Kansas-Texas Railroad Co., Dallas, Texas.
Chairman Poster Committee—L. G. BENTLEY, The Chesapeake and Ohio Railway Co., Richmond, Va.
Chairman Program Committee—C. E. HILL, New York Central Lines, New York City.
Chairman Committee on Prevention of Highway Crossing Accidents—E. G. EVANS, Louisville & Nashville Railroad, Louisville, Ky.
Chairman Membership Committee—W. H. FALLING, Central Railroad of New Jersey, Jersey City, N. J.
Chairman Publicity Committee—FRANK E. STROUSE, Pennsylvania Railroad, Chicago, Ill.
Chairman Public Relations Committee—M. J. FLANIGAN, Chicago, Milwaukee, St. Paul & Pacific Railroad Co., Chicago, Ill.
W. A. BOOTH, Canadian National Railways, Montreal, Que., Canada.
Chairman Engineering Committee—A. E. WILLAHAN, Kansas City Southern Railway Co., Kansas City, Mo.
Chairman Committee on Present and Future Activities—J. E. LONG, The Delaware & Hudson Corp., Albany, N. Y.
Chairman Committee on Accident Causes and Remedies—T. H. CARROW, The Pennsylvania Railroad, Philadelphia, Pa.
Chairman Safety Contest Committee—A. V. ROUWEDER, Duluth, Missabe and Northern Railway Co., Duluth, Minn.
Chairman Health Committee—DR. J. W. GROMLEY, The Delaware and Hudson Corp., Albany, N. Y.
Executive Committee—THE OFFICERS AND
C. F. LARSON, Missouri Pacific Railroad Co., St. Louis, Mo.
D. C. PHILLIPS, Wabash Railroad, St. Louis, Mo.
F. M. METCALFE, Northern Pacific Railway, St. Paul, Minn.

Retiring Officers

General Chairman—C. F. LARSON, Missouri Pacific Railroad Co., St. Louis, Mo.
Vice-Chairman and Chairman Committee on Safety Contest Methods—GEORGE H. WARFEL, Union Pacific Railroad Co., Omaha, Nebr. *Secretary and News-Letter Editor*—W. A. BOOTH, Canadian National Railways, Montreal, Quebec, Canada.
Chairman Poster Committee—L. G. BENTLEY, The Chesapeake and Ohio Railway

Co., Richmond, Va. *Chairman Program Committee*—E. R. COTT, The Hocking Valley Railway Co., Columbus, Ohio. *Chairman Committee on Prevention of Highway Grade Crossing Accidents*—C. L. LAFONTAINE, Great Northern Railway Co., St. Paul, Minn. *Chairman Membership Committee*—A. V. ROHWEDER, Duluth, Missabe and Northern Railway Co., Duluth, Minn. *Chairman Publicity Committee*—M. T. FULTON, Kansas City Southern Railway, Kansas City, Mo. *Chairman Committee on Accident Causes and Remedies*—T. H. CARROW, The Pennsylvania Railroad, Philadelphia, Pa. *Chairman Engineering Committee*—A. N. REECE, The Kansas City Southern Railway Co., Kansas City, Mo. *Chairman Public Relations Committee*—J. L. WALSHE, Missouri-Kansas-Texas Railroad Co., Dallas, Texas. W. H. JONES, Canadian National Railways, Montreal, Quebec, Canada. *Chairman Committee on Present and Future Activities*—D. G. PHILLIPS, Wabash Railroad, St. Louis, Mo. *Chairman Health Committee*—Dr. J. W. GHORMLEY, The Delaware and Hudson Co., Albany, N. Y. *Executive Committee: THE OFFICERS AND—J. E. LONG, The Delaware and Hudson Co., Albany, N. Y. J. G. FITZBUGH, Gulf, Colorado and Santa Fe Railway Co., Galveston, Texas. H. W. HUDGEN, St. Louis-San Francisco Railway, Springfield, Mo.*

Tuesday Morning Session

September 30, 1930

C. F. LARSON, Chairman

Missouri Pacific Railroad Company, St. Louis, Mo.

The first session of the Steam Railroad Section at the Nineteenth Annual Safety Congress convened with the chairman, C. F. Larson, Missouri Pacific Railroad Company, St. Louis, presiding.

CHAIRMAN LARSON: These annual gatherings are for the purpose of discussing things we have done and the things we want to do, to hear reports and eminent speakers discuss safety. Much happiness has come to us in our work. Therefore, I am going to ask you to stand and reverently bow your heads while Mr. Emerson R. Cott of the Chesapeake & Ohio invokes divine blessings upon our work.

EMERSON R. COTT: Almighty Father, we are here in a spirit of brotherhood to learn how to improve our chosen work of saving the lives of our fellow men, so that women and children may be blessed with an unbroken home. Guide us in our work, bless our efforts, and in the end save us one and all. Amen.

Resume of the Year's Activities

By C. F. LARSON

Missouri Pacific Railroad Company, St. Louis, Chairman

It has been said that "To save human life is the noblest of all purposes. It embodies the highest ideal of humanity. It conserves the best asset of the nation; provides its best protection and creates its real glory. It creates the spirit of democracy and brotherhood."

There are two national organizations, the Safety Section of the American Railway Association, and the National Safety Council, whose purposes are to save human lives, to reduce accidents and save from harm, the employees in industry, the passengers who travel by land or sea, or in the air. The men and the women in these organizations know that humanity is prone to tamper with conscience, excuse wrong, making it a slight thing; arguing with ones-self that the act is not so bad after all. These are

the things that produce moral ignorance, leading to moral tragedy. Under the influence of these organizations, results have been attained that are startling as one studies and analyzes the reports showing the steady decline in fatal and non-fatal accidents to employees on duty on the American railways and other industries. We know, and it has been truthfully said that education is the only practical means of bringing the individual to a realization of what an accident would mean to himself and his family, of his duty and responsibility with reference to the safety of himself and others and to the protection of property. This education must be continuous, constructive and interesting. We all know how well this program has been carried on.

We also know that the foundation for successfully teaching the principles of safety lies in the schools and the homes of the nation. It is from these sources that our children must learn the hazards that face the normal child or grown person, and be taught to safeguard life and limb. Knowing all of these things, the National Safety Council is carrying safety teaching into the schools by specially prepared literature and illustrated posters that carry conviction. In this particular feature your Section has also been diligent and your attention is called to the pamphlet entitled, "WILL YOU HELP STOP THIS SLAUGHTER?", recently off the press for sale at a ridiculously low price, the product of the Chairman of the Publicity Committee. The railroads should buy liberally and distribute in the schools. It is no new suggestion that we should seek opportunity to get into the schools and seek to bring the message to teachers and pupils alike—they all need it. I count it a great happiness that I have been privileged to occupy the pulpit in several churches in large cities, where I have endeavored to interest large congregations in the subject of "Industrial and Spiritual Safety." The field of opportunity is wide and we should cultivate it.

The great public problem is the grade crossing accident and the National Safety Council has done as much to face the motor vehicle accident problem as any other force engaged in effecting an improvement from the devastating state of affairs that exists nation-wide, the appalling death rate as a result of the speed craze; the drunken, the careless, the sleepy-don't-care driver of motor cars. The Council has been ubiquitous, stirring up the waters of complacency into waves of constructive action.

In view of the immensity of the task there is certainly no gainsaying the apparent negligibility of actual accomplishment; but this does not at all detract from the significance of a real beginning—the Council's earnest of determination to face the situation. Nevertheless, actual tackling of the problem has revealed to its undertakers a painful lack of interest on the part of those whom we are trying to save. This reference to the automobile accident problem is to the whole problem, not only that aspect in which the railroads are primarily concerned—the grade crossing problem—but as it relates to the highways of the country and to the streets of the cities and towns. The Steam Railroad Section of the Council, through its activities is supplementing the splendid and tireless efforts of the Safety Section of the American Railway Association, which is so relentlessly fighting a battle of education concerning the ever-present dangers lurking at the railroad-highway crossing. The efforts of the National Safety Council are more directly concerned in bringing about safe and sane driving at all times and at all places, and this will directly have its effect upon bringing to the attention of the driver the necessity for being careful at the railroad crossings.

In the contest awards of the National Safety Council for the best records made by various groups as shown in the "GREEN BOOK", there has been made a change that should be pleasing to all—no railroad shall win the award two years in succession. In the past certain railroads were constant winners and there seemed to be no hope for others. Under the new rule, made effective through the efforts of your present Executive Committee, the successful winners in one year must drop out if they are successful again the succeeding year, but this does not preclude their return again after having dropped out for one year.

In the conduct of our work, and the work of the Safety Section of the American Railway Association, where the results sought are identical and to be derived from identical sources, there seems to be overlapping and duplication of effort and, in some cases, interlocking Committees.

Were it not for the high class personnel of the two organizations there could be conflict that would arouse and engender feelings that might make the results doubtful as to success. We are thankful that never in the past has this been manifest. However, for the purpose of minimizing the duplication of effort, your chairman has appointed a committee consisting of John E. Long, chairman, with Chas. E. Hill and D. H. Beatty serving with him to carefully consider the relations which exist and should exist between the Steam Railroad Section, National Safety Council, and the Safety Section, American Railway Association. The chairman of the latter organization has appointed a similar committee and they will co-labor in developing a plan of procedure that will bring about even closer co-ordination of effort than now exists. The incoming chairman will, no doubt, see the wisdom of this step.

The Engineering Committee has developed a set of rules governing the use and operation of motor cars for use of engineering and maintenance of way forces that is the very best compilation of rules ever made. It was the result of much research, thought and hard work. Mr. A. N. Reece, chief engineer of the Kansas City Southern Railway, as chairman of this committee deserves the praise of this section for his untiring effort and the work is commended to your favorable consideration. A pamphlet on the use of hand tools is also under preparation by this Committee.

The Poster Committee, L. G. Bentley, chairman, has been diligent in the study and preparation of posters and every issue has been a whole safety speech reduced to colors, and we hope the sales to the various railroads have been in proportion to the value of the poster.

The News Letters edited by our good friend and efficient secretary, W. A. Booth, aided by his assistant, W. H. Jones, have been genius of literature and it is no reflection upon the efforts of other secretaries and editors, the speaker included, when we confess and admit that they have been the very best ever. And, as a secretary, Mr. Booth has been diligent, active and, of course, always pleasing in his office and we attest our appreciation for the support given us, and of our affection for him as a friend.

In this way, my friends, I have given you a brief summary of what the section has done in the past year, and we will yield the office of chairman to another when this meeting ends; it is our hope and prayer that the efforts put forth will bear some fruit. Years may elapse before the seed that has been planted comes to maturity, yet the seed planted is kept continually cultivated, and this, after all, is the essential thing if fruit is to be brought forth. We shape the future by our work today. We know that the future of safety does not lie altogether in the hands of the loyal and devoted men and women of this generation. It lies in the hands of the children, the safety men and women of tomorrow. So, going back to what I have said about safety education starting in the homes and in the schools, I would strongly urge that we give more attention to this phase of education, by accepting, and even soliciting invitations to talk to school children and the instructors. Nor, should we overlook the importance of getting into luncheon clubs and churches and make known the message of safety.

For those who did not have the pleasure of attending the American Railway Association meeting in Denver in July, I want to quote just a paragraph from the address of Elmer T. Howson, Western Editor, *Railway Age*.

The Question of Safety

"In meeting this further and still more insistent demand for economy and efficiency in operation, the safety department must be prepared to bear its share

of the burden. You have as an impelling motive your full share of responsibility as railway officers for the conduct of operation with the degree of economy that the future is going to demand of every such officer and the further incentive that any success attending your efforts goes to relieve suffering and sorrow.

"To the extent that an injury disorganizes a gang and interferes with its production that injury constitutes an unnecessary tax on the efficiency of that department and on the cost of its operation and should be eliminated. Entirely aside from the humanitarian consideration, every accident resulting in the death of an employee or other person, likewise creates a drain on the revenues of the road sufficient to cause it to haul a tonnage train on the average railroad a full engine district to pay for this claim."

Finally, I wish to express a debt of gratitude to all those faithful and zealous members of the Steam Railroad Section, who have contributed to our success during the year now about to close. Such success as has attended our efforts was made possible and made actual by their unceasing activities.

In the remaining years allotted me, the memory of your goodness toward me will live, while maybe more important things—names, dates, faces, places—are lost and forgotten. Memory, "the warder of the brain," will hold in her jeweled casket no more precious treasure than my recollection of our association and the honor that you placed upon me one year ago. These are tender reminiscences to me, dear friends, that will come back to me o'er and o'er.

CHAIRMAN LARSON: The first number on the program is by Mr. George H. Warfel, chairman of the Committee on Safety Contest Methods, and Assistant to the General Manager of the Union Pacific Railroad, Omaha, Nebraska.

Report of Committee on Safety Contest Method

By GEORGE H. WARFEL
Railroad Company, Omaha, Neb.

Statistical Data

As a preliminary to proper consideration of the subject, a questionnaire was sent to practically all class 1 railroads reporting accident statistics to the I. C. C., requesting information as to policy and practice. Replies were received from 101 roads. The following is a brief resume of the replies:

Twenty-three roads do not tabulate the casualties occurring among employes and others for purposes of comparison with past performance or stimulation of preventive effort. However, the three larger of this group signified intention to do so at once.

Forty-eight roads do not employ "Contest" methods of any kind, although twenty-five of them circulate their accident statistics to stimulate preventive efforts of supervisors and employes. Of these 48 roads, 2 are large systems, 15 medium size roads, 31 comparatively small.

One large road which formerly conducted a safety competition between groups discontinued the contest, stating as a reason that their preventive work did not seem to be stimulated by the contest sufficiently to justify it. Four other roads state they do not believe contest methods are effective, and for that reason have refrained from using them.

Some 53 roads, including a decided majority of a large and intermediate size, employ contests of various kinds.

Of these, 47 use some basic measure of exposure as an equalizing factor against which an accident ratio is calculated. Two measure results, otherwise, as shown: 40 Use man-hours worked.

- 4 Use Man-hours for Non-Trained Casualties.
- Locomotive miles for Train & Train Service.
- 3 Use number of men employed.
- 1 Use per cent reduction under previous period.
- 1 Use least total time lost from work.

49

- 4 Use simply lowest number of accidents, groups of employees contesting being approximately of same general size.

53 Total employing contest methods.

Of the 47 using some basic measure of exposure, 27 use figures certified by their accounting departments, and 22 use figures arrived at or estimated by supervising officers, but not checked for accuracy.

44 Apply I. C. C. rules as to counting casualties.

7 Include passengers and persons carried, in contests.

42 Do not count passengers and persons carried, in contests.

11 Use a differential weighting as between fatal, other reportable, and lost time casualties.

Of all roads replying to questionnaire, whether using contests or not, 57 require certificate from a surgeon that man can be put to work. Fourteen do not ask for doctor's certificate, 30 did not state their practice.

Prizes awarded are of various kinds, usually banners, plaques, cups or lapel buttons, two roads giving money bonus to foremen and men making best record.

General Comment

There has been definite opposition in some quarters against putting railroad safety work on a competitive basis, particularly as between the various individual roads. Broadly speaking, the fundamental objection was that men obviously do not refrain from being maimed merely to improve a score or tally, and that therefore the result of instituting a contest would be simply concerted effort to avoid reporting and tabulating injuries that did occur.

Those holding these views have been frigidly skeptical or incredulous of any low casualty records, achieved where contest methods were employed. Gradually, however, this attitude has become less marked, in view of the increasing evidence of the validity of results attained.

Perhaps there has been a misconception of the real purpose and legitimate objectives of contests.

The primary purpose of a safety contest is to stimulate interest in and create enthusiasm for, the prevention of accidents and casualties to persons and to suitably recognize the success of efforts directed to that end.

The primary objective in promoting competition between groups is to more quickly and thoroughly train officers, supervisors and employees to develop and use the safest practices, and to insist upon high standards in tools and equipment.

A secondary but very important objective is to develop cooperation and team work between individuals, groups and departments in their efforts toward a common purpose, thus improving general morale.

Two valid criticisms may be offered to the use of contests, although justified in but few cases.

(1) Unless carefully and constantly supervised, a contest may deteriorate into mere efforts to prevent casualties from being entered against the record of the competing group or unit.

(2) Indifference of management or failure of higher officers to take active interest and give full support may result in completely stultifying the interest of foremen and men, and the contest fails to show any gain.

In either case it is almost inevitable that a large portion of the personnel will eventually lose faith in the sincerity of purpose behind the contest, will regard it as a sham or a fraud, and develop a justifiable resentment.

Contests or any other form of safety work will only receive loyal support and active cooperation of the men over a long period, if directed with absolute sincerity of purpose and guided by high standards of ethics.

It is true also that very effective safety work may be done on a railroad without the benefit of contest methods, if the management insistently requires supervisors and foremen to employ safe methods and to teach their men a high regard for personal safety.

Experience on a majority of roads, however, seems to justify their belief that it is most satisfactory to reinforce aggressive supervision with the contest plan, for no matter how definitely men understand that they must get results in preventing accidents, they take a very human pride in having their accomplishments officially recognized and publicly acclaimed. In this era of high pressure on supervision, the opportunities to win sincere and open praise from the executive office of a railroad are rare enough to be highly coveted.

Basis for Equalizing Contesting Groups

Such a preponderant majority of roads use the ratio of casualties to the number of million man-hours worked, there seems to be scant ground for argument favoring other bases. Although admittedly imperfect as an equalizer, it is more reliable than locomotive miles, number of employees, or any other measure of exposure readily available. While assuredly a period of hours in one occupation may involve much milder exposure to hazard than a similar period in another occupation, this apparent inequality may be almost completely rectified by arranging contestants into groups of similar exposure, and instituting contests between these groups.

It is regrettable that a comparatively few railroads do employ other than the million man-hour base, as by so doing their periodical contest records are rendered incomparable with results on most other roads.

Kind of Accident Counted

It is common practice of most roads to count in their contests only injuries occurring to employees on duty reportable to the I. C. C., each one constituting a debit against the record. A few include injuries to passengers, and to persons carried under contract, such as mail, express and Pullman employees, stock caretakers, etc. Argument for including these latter is that any injury to such persons presumably reflects failure of the organization to protect those for whose safety it is properly responsible.

The number of I. C. C. reportable injuries is, however, only a *relative* index of the number of *failures* to prevent accidents. As a matter of fact, many hazards and even serious accidents, fortunately do not result in harm to persons, or inflict merely minor hurts. A minor injury may therefore indicate a safety failure as truly as a reportable or fatal injury. It would seem proper thus to count, in a prevention contest, every little hurt no matter how trivial. But this is impracticable for the same reason we do not count *failures* where no injury results, namely: the men will simply not reveal the occurrence, knowing it will be charged against their record. They would often fail to secure medical or first aid treatment in order to keep the record clear. It is only practicable therefore to count minor casualties resulting in loss of time beyond shift, in order not to penalize for securing medical and first aid treatment.

But there is a widespread and well grounded feeling that, after all, the gravity of an accident or hazard should be measured to *some* extent by the severity

of its effect on the human being, and men regard it as unfair to charge their group record as heavily for a mashed finger nail as for a broken arm or leg. This raises the question of propriety of waiting for severity of injury.

Weighting for Severity

The frequency of accidents per unit measure of exposure is, of course, the most trustworthy index of results. In fact many feel that it is the only real and practical measure.

There is some question whether severity weighting is justified in a safety contest. The fault, carelessness or failure which results in death is often no more heedless or negligent than the one which results in a mere bruise. But the humanitarian points out that safety work is designed to prevent men from being maimed and killed, and that its success or failure is rightfully measured by the degree of severity of injuries which continue to occur.

It seems expedient therefore to consider a differential which will recognize in some measure the *degree of severity*, but still not inflict penalty out of all proportion to degree of hazard involved or preventive effort possible, nor overshadow the relatively more important factor of an *accident frequency*. If two competing divisions average 100 reportable injuries a year, 5 to 10 of them fatal, a weighting of 1 point for a lost time, 10 points for a reportable and 50 points for a fatal injury may not be unreasonable. But if two sub-divisions only run 3 to 5 reportable each, that weighting might result in a single fatality completely overwhelming one contestant, if the other had none, though the *former* had but that one casualty.

While a weighting scale of 1 debit for a lost time, 5 for a "reportable" and 15 for a fatal injury will prove fairly equitable for roads and groups having a casualty rate of 5 or more per MMH, a corresponding weighting of 1-3-6 is preferable where the frequency is less than 5 per MMH, and this scale would impose no disadvantage on the roads with the higher frequency. It is therefore urged for the sake of uniformity of practice.

It is desirable, however, that in every published or generally circulated contest statement of a road, the *unweighted* total casualty rate of the road be used for the period standing on the national basis.

Grouping of Contestants

Many safety contests have fallen short of the results possible, and a few have failed utterly, because of inequalities between individual groups competing against each other. There may be gross inequality as to size of groups, or degree of exposure.

Generally speaking, complete operating divisions of a road are on equal terms provided there is not too tremendous a difference in traffic density. But when contests are instituted between smaller sub-divisions, departmental groups, shops, yards, freight terminals, road-masters, district mechanical foremen, etc., much care is needed. This becomes increasingly evident as injuries become fewer. When injuries are occurring at a rate of 10 or 15 per MMH the supervisors and men do not see the handicap to a shop of 300 men when competing against one of 50 men. But when the rate drops to 5 or to 3 per MMH, they see that the smaller group will *always* win in any period when it goes "clear" if the larger group has *even one* injury. Other conditions being equal, the odds on going "clear" for a year" are 6 to 1 in favor of the 50 man shop! There is less apparent inequality so long as the small shop keeps having some accidents, but when safety gets to a point where the smaller contestants begin going through the contest period "clear," their advantage is inversely proportionate to their total man-hours.

Again generally speaking, employe groups in similar general occupations should be placed in competition with each other, but not pitted against groups similar in size but different in class of service.

Enthusiasm and interest are bound to wane when there is any evidence of serious inequality of opportunity to win. This is also evident when a point is reached where a majority of contesting groups go "clear" and only one or two have any accidents charged against them. Thus on one road with six small yards competing in a contest, all went clear and there was considerable disappointment that but one prize was awarded, the yard with most man-hours receiving it. Obviously there was nothing more to be gained from continuing such an uninteresting contest.

Fundamental Requirement

It would be desirable to measure contest results in *positive* terms by tabulating a list of the accidents and injuries actually prevented, if such a tabulation were possible and practicable. Obviously, however, that cannot be done, and we are forced to keep score by counting the failures rather than the successes, and measure contest results in *negative* terms of accidents or injuries which continue to occur.

This gives rise to the most serious drawback encountered in conducting contests, the one which has drawn the most warranted criticism, namely,—a tendency to avoid reporting an accident or to minimize its severity, in an effort to escape tabulation of it against the record of the contestant group.

Unless such a tendency is rigorously curbed, and the performance kept under impartial surveillance to assure complete reporting, the contest record manifestly will not reflect the actual effectiveness of the safety work of the competing group, department, or railroad.

The safety contest simply employs the age-old expedient of making an interesting and exciting game out of a most serious and difficult undertaking. It is a game which develops resourcefulness, cooperation, skill and efficiency. Best of all, if properly conducted it develops sportsmanship, fair play and a code of ethics which is directly reflected in the morals of the entire railroad personnel. But if improperly conducted and inadequately referred, it may, like any other game, degenerate into a mere cheating contest.

Government Statistics Have Proved Valuable

The tabulation by government agencies of accidents and injuries occurring on railroads was secured largely through the influence of labor organizations for the purpose of establishing accurate statistics on the hazards of their occupations which could be used as a basis for remedial measures. These statistics have proven immensely valuable, not only to the workers but to the managements as well. They are the very foundation of the splendid safety work in which the railroads have led all the industries of the country. So long as the casualty statistics of the I. C. C. as rendered by the individual railroads, reflect with accurate fidelity the actual situation on those roads, our safety contests will continue to receive, as they do now, the whole-hearted and loyal support of the great majority of the men who are the chief beneficiaries. But if ever, through over zealotness or incompetent reporting, the accuracy of these casualty figures is impaired, we may expect to lose the esteem and support of those vitally interested men, and of their labor organizations, and we would *deserve* to lose it. Next to the prevention of accidents, the most important service any safety officer can render to his railroad is to see that every accident is correctly reported as to cause, extent of property damage, and severity of personal injury. He should be scrupulous to eliminate such minor cases

as are rightfully excluded by fair and honest application of the rules, but be equally zealous to see that every one of them contemplated by the I. C. C. rules is impartially recorded. That is a fundamental requirement in any safety contest, local or national.

Mr. CORR: I want to give you the benefit of a discussion that I had with a surgeon of a railroad who called my attention to the injustice, as he saw it, of putting the surgeon up against the problem of combatting the lost time accident. John, an employee, comes to the office with an injured thumb. He has seen blood and is somewhat nervous from the accident. The thing pains him. What do I have to do? Clean it up, of course, and as I do it, I talk to John about going back to work. The injury wouldn't prevent John from going back to work, but this man begins to think of me as some kind of a driver working for the company who insists that he immediately get back on the job when he has a hurt, after being privileged for years to expose that thumb to the world and say, "I have been hurt and I can stay off." The result is I have a problem in psychology and painology and a few other things to make John see the necessity, for the sake of a record, of going back to work. It puts a tremendous problem on the doctor, causes a lack of opportunity for him to make a contact with the man to secure his confidence, and from the doctor's angle at least it does not work out as successfully as when he can permit a man to take his time about returning to work.

The doctor believes that he can assist in reducing reportable accidents more effectively if he is not expected to get a man on the job in a hurry.

L. G. BENTLEY (Chesapeake & Ohio): The reason we count a lost time injury is because it might have resulted in a reportable accident and because we want to get away from the thought in the minds of some of the supervising officers that just as long as we keep a case off the reportable list, we don't care how many minor injuries we have. We do feel that, by including both the lost-time and the reportable injury, with a proper weighting, we are striking at the real cause of the accident and encouraging the supervising officers and the employees to correct causes.

CHARLES E. HILL (New York Central Lines, New York, N. Y.): What do you call a lost-time injury?

Mr. BENTLEY: One that results in lost time beyond the shift. In Mr. Warfel's report it involves more than one day's lost time.

ROBERT SCOTT (Atlantic Coast Line): Those who are just starting out in the contest may find it advisable to use the I. C. C. reportable accident as a yardstick for measurement, and later adopt the one-day or one shift lost-time accident as a measure of loss.

Contests Help to Hold Safety Interest

DOUGLAS PHILLIPS (Wabash): The object of safety contests is to get the men so interested in the record they are making that they will not have to be driven back to work. You can work your contests up to such a pitch that the men will be so interested that your doctor, instead of trying to get men back to work, will have to be telling them to stay off the job.

Mr. WARFEL: A man may be incapacitated from performing part of his duties, and yet try to and want to work. Out of fairness to the man, we let him continue to work, performing part of his duties, paying him for that work so as not to impose a penalty on himself or his family, but reporting the accident to the Interstate Commerce Commission. We have done the same thing with seven other cases in the past fourteen months.

CHAIRMAN LARSON: The next number on the program is "Work of the Bureau in Preventing Accidents Due to Handling of Explosives, Flammables, etc.," by Mr. W. S. Topping, Assistant Chief Inspector of the Bureau of Explosives.

Work of the Bureau of Explosives in Preventing Accidents Due to Explosives, Flammables, Etc.

By W. S. TOPPING

Assistant Chief Inspector, Bureau of Explosives, Washington, D. C.

Twenty-five years ago James McCrea, then vice-president of the Pennsylvania Railroad, started the movement which resulted in the formation of the Bureau of Explosives. He advocated, before the American Railway Association, the appointment of a special committee to prepare regulations for the purpose of promoting the safe transportation of explosives. For many years the railroads had endeavored by individual efforts to decrease the possibilities of fire and explosions on railroad property, but these efforts had not prevented many serious disasters.

Mr. McCrea had vivid recollections of disastrous explosions at Kings Mills, Forrest, Crestline, Red Stone Junction, Ohio, and at Greenwood, Delaware. These had caused the death of many people, injury to many others, and had cost the Pennsylvania Railroad many thousands of dollars.

It was appreciated by Mr. McCrea that dangerous explosives were necessarily interchanged between roads, and that little good could come from the efforts of individual railroads acting alone. It was his thought, therefore, that uniform or standard regulations should be prepared, presented to the American Railway Association for approval, and after such approval submitted to the members of the Association as recommended practice for individual adoption and enforcement.

In response to Mr. McCrea's plea a committee was appointed with instructions to present its report at the October, 1905 meeting. While the committee was engaged in its work, one of the most disastrous explosions in the transportation of explosives that had ever occurred in the United States happened at Harrisburg on May 11, 1905; 20 lives were sacrificed and the financial loss exceeded \$600,000. This explosion may have furnished a further incentive to the committee, but the committee worked diligently during the summer of 1905, having the assistance of civilian experts and also representatives from the Army and Navy Bureaus of Ordnance. In October, 1905 the committee presented its proposed regulations covering the safe transportation of explosives to the American Railway Association, and they were approved. These same regulations were adopted promptly thereafter by practically all members of the American Railway Association.

At that time it was thought that this uniform adoption and publication of the regulations would produce the desired results in connection with the handling by the railroads of dangerous explosives, but it was early appreciated that adoption and publication of the regulations would not go far enough, and, therefore, in October, 1906, a year after their approval by the American Railway Association, it was decided that some central agency of all the railroads should be formed for the uniform enforcement of the rules.

A Constitution and By-Laws for the "Bureau for the Safe Transportation of Explosives and Other Dangerous Articles" were, therefore, approved. Membership in this Bureau was optional, but about 75 roads immediately joined. The active work of enforcing the regulations was not started until seven months later when the office of the Chief Inspector was opened in New York City in June, 1907.

Immediately after the Harrisburg accident the Pennsylvania Railroad had taken the important step of putting a competent man on duty as an Inspector to travel over its line and educate shippers and employees and check their compliance with the rules for the transportation of explosives, which were then in effect on the Pennsylvania lines.

The formation of the Bureau of Explosives was the natural outcome of this work on the Pennsylvania Railroad. Other lines familiar with this activity saw the necessity

of inspection and educational work on their own lines, and they realized that without such effort to enforce the regulations the simple adoption of rules would prove futile.

The Constitution and By-Laws of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, as originally formed, provided for the employment of a chief inspector and a number of local inspectors. Certain powers were delegated to local inspectors with respect to the condemnation and stoppage in transit of explosives which were found to be unsafe for transportation. Embargoes were authorized; the powers of the local inspector were quite comprehensive.

Part of our first work was an attempt to convince the manufacturers of explosives that the efforts of the Bureau of Explosives for greater safety were in line with the manufacturers own interests and that we could be of material assistance to them. We were met at the beginning with a frank statement of suspicion that we could not apply our instructions impartially and uniformly. The small manufacturers of explosives could not conceive that a Bureau of this kind would be operated other than in the interest of the larger plants, but by November, 1907, there was a general acceptance by the manufacturers of explosives of a proposal to meet representatives of the Bureau for the purpose of discussing the regulations and proposed changes.

The records show that they appreciated the opportunity of explaining freely their objections to the restrictions, and these restrictions were taken up in the spirit of impartial discussion and with a view to indicating clearly the reasons that prompted each regulation.

As a result of this conference a committee representing the manufacturers of explosives was appointed at the request of the Bureau of Explosives. It was understood that this committee was to represent the explosives manufacturers at all future conferences on any matters pertaining to the regulations affecting their industry. The knowledge that this committee, composed as it was of members representing the various explosives interests, would have an opportunity to present in future discussions their side of any controversy, had a very salutary effect.

It was not long before the Bureau of Explosives and the committee representing the manufacturers of explosives were working in complete harmony in their efforts to secure safe transportation of explosives.

Through the assistance and cooperation of this committee a Federal Law was finally passed, effective May 30, 1908, which gave to the regulations for the transportation of explosives a legal backing found by experience to be quite essential.

This Committee of Explosives Manufacturers carried on for some years until finally the Institute of Makers of Explosives was formed and is functioning in much the same way as did the old Committee of manufacturers.

When we go back to 1907, we find that conditions facing us were not conducive to complete success. There were doubts in the minds of many railway officials as to the value of the plan.

In its work to prevent explosions in transit, or while explosives were on carrier's property, the so-called district or local inspectors of the Bureau were distributed throughout the United States and Canada with district headquarters in the offices of some operating official.

The activities of the local inspectors were concentrated first on the inspection of explosive factories, then on storage magazines from which shipments were made by rail, the objective being to prevent the carriers from being offered any dangerous explosives, liable to cause trouble while in transit. The railway employees were also fully instructed during this preliminary inspection work. Samples of explosives were sent to the Chemical Laboratory for examination and report.

In 1908, which was the first complete year of the Bureau's operation, 4,582 boxes of dynamite were condemned as in improper condition for transportation; 531 kegs of black powder were also condemned because of leading condition. In 1909 there were 10,029 boxes of explosives and 1460 kegs of black powder condemned.

It will be appreciated that by the condemnation of these defective explosives because of the leakage of nitroglycerine from the boxes of dynamite or defective kegs of black powder, and the prevention by such condemnation of these explosives reaching the hands of the carrier and getting into the channels of transportation, serious explosions were undoubtedly prevented.

In the selection of inspectors and in their training, men with railroad experience were selected for the reason that a great deal of the inspectors' work was in connection with the duties of railroad employees.

Through laboratory training, inspectors were instructed on manufacture of the various types of explosives, peculiar hazards incidental to their packing, handling, and transportation. Experience of many years has undoubtedly made experts of our inspection force in their particular line of work, and their testimony is freely accepted in legal controversies throughout the land.

The first regulations, which were those prepared by the special committee appointed by the American Railway Association, and thereafter adopted by the Association, were quite simple and few in number, but even with these few regulations, it was found necessary to issue interpretations from time to time, and one of the first duties of the Chief Inspector's office in 1907 was the preparation of a proposed revision of the explosives regulations. Experience even then indicated the necessity of enlarging the regulations, providing greater restrictions in some instances and providing other rules relating to the carriers so as to provide greater precautions in the handling of the more dangerous shipments. It was very early evident that to secure the safe transportation of explosives it would be necessary to regulate the transportation of other dangerous articles, which included flammables, oxidizing materials, acids, and compressed gases. One or two lines had already put into effect certain restrictive requirements with reference to the acceptance and handling of flammable liquids, application of labels, etc. In the development of a comprehensive set of rules to take care of all of the other dangerous articles it was necessary to hold numerous conferences with representatives of both the carriers and the various industries affected.

The attitude of the shippers of dangerous articles was a very important factor when an attempt was made to regulate the practices and customs of such industries. The complete cooperation of the explosives industry was early secured. A more difficult task was presented with respect to the regulations of other dangerous articles.

Prior to the adoption of the Federal Law on May 30, 1908, the attitude of some shippers and carriers of explosives was not conducive to uniform enforcement of the regulations. By the adoption of this law, which provided penalties for violations of the regulations, and by a few prosecutions, good results were accomplished. The original law of May 30, 1908, did not place with the Interstate Commerce Commission the duty and authority of prescribing regulations to cover the transportation of the "other dangerous articles." Under the authority of the Mann-Elkins Act the Commission took the regulations proposed by the Bureau and prescribed them so that in effect we had the authority of the Federal Law behind both the explosive rules and regulations applying to other dangerous articles.

Under the authority of Federal Law, the regulations applicable in the United States are prescribed by the Interstate Commerce Commission and apply to both shipper and carrier. These regulations cover not only freight transportation, but also express transportation and baggage transportation. It will be appreciated that there is considerable difference in the transportation of explosives and other dangerous articles on passenger trains versus express matter in comparison with carriage by freight trains of similar articles. There is, therefore, a greater limitation of the amounts and character of the explosives and other dangerous articles that may be transported by express and a still further limitation by baggage.

The Commission looks to the Bureau of Explosives for the proper preparation and submission to it of the proposed rules. Under a recent plan, dockets are prepared

by the Bureau of Explosives and distributed to the principal industries affected, and a conference date is set, at which time an opportunity is given to all interested parties to appear and present their objections, criticisms, or suggestions. These docket conferences are to be held at reasonably frequent intervals and after these conferences the proposals are submitted to the Commission for final disposition. The Commission may dispose of the matter as follows:

1. Action after circulation of proposed changes among interested parties and hearing.

2. Action following 20 days' notice.

3. Action without such notice when that seems necessary in the public interest.

The foregoing plan contemplates the receipt by the Bureau of Explosives of propositions for amendment, full consideration thereof, opportunity for presentation and consideration of objections, presentation of agreed matters to the Commission, and the issuance by the Commission of the amendments so agreed upon with such changes or modifications as the Commission may see fit to make, all of which is sought to be accomplished without the necessity for a public hearing by the Commission.

Safety in the transportation and handling of explosives and other dangerous articles depends very largely on the method of preparing and packing any dangerous articles, whether it be an explosive, flammable liquid, a compressed gas, or an acid. The dangerous material can be made safe for transportation if sufficient and proper precautions are taken in its packing. If the dangerous article is thus properly prepared, packed, and delivered to the carrier, it should then be safely handled by the carrier's employees up to and including the time it is delivered to the consignee, excepting, of course, any accident in transportation, such as a wreck or derailment. Prompt delivery after arrival at destination should be made so that the dangerous article is removed from the carrier's property and is not subject to exposure to other hazards, such as fire.

Proper handling by railroads includes proper loading, blocking, and bracing of dangerous shipments. Tests were made at Altoona in the early stages of the Bureau work to determine what shocks the packages would ordinarily receive after being loaded in cars and under transportation conditions. As a result of these tests, secure bracing was specified to keep the packages in their relative position in the cars and prevent them from sliding over the car floor and coming in contact with other freight.

As has been stated, the practical work of the Bureau was started in June 1907; office headquarters were established in New York City, and on August 1, 1907, the first group of inspectors was put to work. So far as practicable, these inspectors were trained by a man who had performed inspection work for the Pennsylvania Railroad, and who had entered the services of the Bureau of Explosives.

In 1907 there were found dynamites which, because of improper manufacture were susceptible of leakage of nitroglycerine in storage, and in this leaky condition had been offered to and accepted by the carriers for transportation. Accidents were found to be due to this leakage. It was appreciated that some action must be taken to prevent the acceptance and transportation by the carriers of leaky dynamite or other explosives that would not withstand the shocks incident to reasonably careful handling during such transportation.

One of the first things that the Bureau did was to establish a Chemical Laboratory at South Amboy, N. J. It was determined that such a laboratory was a prime necessity in the development of suitable regulations covering the transportation of explosives. This laboratory was placed in charge of a chief chemist, C. P. Beistle, who is still with us. Mr. Beistle had had wide experience with explosives, having been employed for a considerable time at Government Ordnance Laboratories and Depots.

One of the first important duties assigned to the laboratory was the development of standard tests to determine whether an explosive, such as dynamite, was safe for transportation. This work was of great value to the manufacturers and users of explosives.

In addition to leaky dynamite, the early inspection work of the Bureau showed many other unfavorable conditions. There was indiscriminate loading of explosives together, packages were not stayed in the car to prevent their shifting, nor were packages of other freight blocked or braced to prevent damage to boxes of explosives. Blasting caps were loaded with high explosives. Matches, gasoline, and oil were loaded with black powder and black powder kegs were in many instances found to be in a leaky condition, and accidents were occurring from time to time due to these improper practices. The custom of packing blasting caps was not such as to prevent occasional explosions during handling.

After a manufacturer or shipper once knew what he was expected to do in the preparation of dangerous articles before delivering them to the carrier for transportation, there was but little difficulty in getting him to do that work. This required much educational and inspection work on the part of our inspectors.

The Work of an Inspector

An inspector of the Bureau of Explosives is a busy man. He may have as many as 25,000 miles of railroad in his district. The United States and Canada are divided into districts and each district is directly in charge of an Inspector.

The inspector visits and inspects all factories manufacturing explosives and fire-works to determine the thoroughness of their preparation and to see that the regulations are fully complied with in connection with their packing and offering for shipment. He sends to the laboratory of the Bureau at South Amboy, N. J., periodically, samples of the product of each plant in his district and receives a report from the chief inspector's office, together with a copy of the laboratory report. In this way he is advised whether the explosives are found to be sufficiently safe for transportation. If the laboratory examination shows that they are not safe for transportation, then the manufacturer is immediately notified and instructed not to offer shipments to the carriers.

He instructs the shippers of explosives as to the proper marking, loading, and staying of explosives in cars loaded by them and for L. C. L. shipments loaded by the carrier, similar instructions are given to the railroad forces. Carriers' employees are instructed as to the proper position in trains of cars placarded "Explosives"; also cars bearing other placards, and as to the handling of such cars in trains. He also visits and confers with supervisory officials of the lines in his district, endeavoring to secure their interest in a strict enforcement of the regulations, showing them wherein they are responsible for compliance on the part of their subordinate employees.

He visits many other factories where shipments of other dangerous articles are prepared, and in a general way gives them similar instructions. He makes periodical visits to loading racks where gasoline and highly volatile flammable liquids are handled in tank cars; has made, or makes himself, necessary tests for the purpose of determining the vapor pressures, so that only cars permitted under the regulations may be used.

He makes periodical visits to acid plants in his district; makes or supervises tests on boxed glass carboys, reporting the results to headquarters, from which reports are also rendered to the manufacturer. Instructions as to the proper loading and bracing of carboys in cars are given to shippers' and carriers' employees.

He periodically visits all magazines from which shipments of explosives are offered for transportation by rail, and by inspection determines whether the explosives in such magazines are in proper and fit condition for transportation. If he finds that any explosives are not in proper condition, he takes samples, sends them to the laboratory for check examination, and in the meantime secures the written assurance of the magazine owner or proprietor that the explosives so indicated by his condemnation report will not be offered for transportation. In many instances, after the

laboratory examination, it is found that condemned explosives may be repacked. In these cases the Inspector supervises the repacking in proper containers and lifts the condemnation. In other instances it is found that the explosives are so badly deteriorated that it would be unsafe to repack and ship them, and if they cannot be used locally through wagon delivery, then the next step is to dispose of them. The Inspector supervises and in many instances actually does the work incidental to the destruction of these condemned explosives by burning.

During the past 23 years a total of 6708 samples of explosives, 8649 samples of fireworks, and 6049 samples of other dangerous articles (total 21,406) were examined at our laboratory to determine if they were safe for transportation and what their proper classification would be. The regulations require that the product of any new explosives manufacturer must first be submitted to the Chemical Laboratory and be passed upon as sufficiently safe for transportation before any shipments can be made. Any new explosive manufactured by an old manufacturer must be similarly submitted and passed upon.

An inspector periodically visits every freight station, transfer, yard, or other point in his district where explosives or other dangerous articles are handled. He gives short talks to employees at these points for the purpose of interesting them in the enforcement of the regulations and gives individual instruction to all of the employees as to their particular duties.

From time to time the inspector is called upon to look over locations where it is proposed by an industry to establish unloading plants for flammable liquids, such as gasoline. The American Railway Association has adopted a set of rules to govern such locations and the work of securing compliance with these rules falls, in a very large measure, upon the Bureau Inspector.

When fires, explosions, or other accidents occur, usually the first call is for an Inspector of the Bureau of Explosives to visit the scene and supervise the handling of the situation. It may be a wreck or derailment, and through their training the inspectors are competent to supervise such work insofar as safeguarding the carrier's property from additional explosion or fire is concerned.

In his visits to railroad stations, if he finds defective packages, leaking containers, or other violations of the regulations, it is his duty to see that these violations are immediately corrected, and in this work he is compelled to make many visits to shippers' plants and shipping departments.

In general, the Inspector of the Bureau of Explosives is welcome wherever he goes as a man whose object in life is to assist others to avoid trouble.

In the division of the United States into districts, two separate inspectors are assigned solely to express work. Their work is devoted principally to the larger express offices, platforms, warehouses, etc., and they devote a great deal of time to the proper instruction of shippers in regard to the express rules. These express inspectors, of course, have no explosives or fireworks factories to visit, such factories being taken care of by the regular district inspectors.

The Bureau has three inspectors who devote all their time to the question of proper shipping containers. There are many plants in both the United States and Canada making containers used in the transportation of dangerous articles. These plants are visited periodically for the purpose of checking compliance with the specification requirements, and in addition these three particular inspectors, who are specially trained, visit all plants from which compressed gases, either in cylinders or tank cars, are shipped, the object being to prevent delivery to the carrier of cylinders in improper condition for transportation, through age, weakness, overcharging, or otherwise.

Experience has shown that no matter how honest and conscientious any particular shipper of dangerous articles or manufacturer of a container may be, unless these people are subject to regular inspection and their work checked up they do fall down

and are guilty of violations, some of them possibly minor but in other instances of major importance.

How We Accomplish Our Methods of Accident Prevention

We first started off with an acceptable set of rules, which regulated the manufacture and preparation of dangerous articles before delivery to the carrier. By co-operation on the part of manufacturers and shippers we get them to do their part. What they do not know we tell them. Thus, through education we get them to understand what is expected of them in the preparation and offering of their dangerous packages to the carrier for transportation. By periodical inspection their subordinate employees are checked and in this way a continued effort on the part of manufacturers and shippers to comply with the regulations is secured. Of course, uniform application on the part of the railroads is essential. There can be no favorites. There can be no traffic pressure. If a dangerous article is offered in proper condition to the carrier, in the large percentage of instances, that dangerous article will reach its destination without trouble. If, however, the shipper gives to the carrier a package containing a dangerous article in improper condition, then the chances for trouble on the line are many.

Nitric acid is a dangerous article and it is well known that on contact with combustible material it will start a fire. It will also cause serious burns on contact with the human body. As far back as 1907 there were difficulties due to ignorance on the part of shippers of nitric acid on the method of packing to prevent accidents in transit, and even now we find certain shippers taking a chance in shipping nitric acid in glass bottles with combustible packing, stoppers unsecured, with the result that we have occasional fires and personal injuries due to these failures. As with shippers, it is necessary that railroad employees, having anything to do with the handling of explosives and other dangerous articles, be subject to continued inspection service and that they shall have full opportunity of knowing what is required of them under the regulations; that these rules shall be explained to them with the reasons therefor and that the supervising officials, shall be in sympathy with the rules providing for safety and insist upon enforcement and compliance on the part of their subordinates.

Education of railway employees throughout the United States and Canada has been accomplished partially through the medium of illustrated lectures, first, to secure their interest, and second, by less formal talks and addresses given by district or local inspectors familiar with local conditions, and by the issuance of quarterly or bi-monthly bulletins in which are described accidents which have actually occurred and results of violations of the rules. About 30,000 copies of these bulletins are distributed every two months. They do not, of course, reach every employee that has something to do with the handling of dangerous articles, but they are read by many times 80,000 employees for the reasons that they are passed on from one to another and they undoubtedly serve a very useful purpose in continually bringing before the rank and file of railway employees the necessity of exercising care in this safety work.

In the development of proper containers for the transportation of explosives and other dangerous articles, a great deal of constructive work has been performed. It has been the practice to consider the standard types of containers as used by the principal industries affected, and call a conference which will be attended by the manufacturers of the articles to be shipped and the manufacturers of the containers proposed to be used. Suitable specifications will be drawn up and, when finally agreed to, incorporated in the regulations.

During all the past years the Bureau of Explosives has been charged with the duty of recording instances of failure of containers to carry goods to destination and

this information has been utilized in the development of specification containers. There is now available a more complete set of container specifications than ever before. The use of specification containers does not give any trade advantage to one shipper over another for the reason that they are all required to use the same types.

In securing the cooperation of the manufacturers and shippers, the first work was performed by the committee representing the manufacturers of explosives. This has been followed by the formation of many associations and representative committees from all sorts of industries affected by the regulations. As an evidence of their desire to cooperate in this safety work many shippers and associations have become associate members of the Bureau of Explosives and join with the carriers in assisting in a worthy public service. They are also entitled to utilize the facilities of our Chemical Laboratory and the services of our expert chemists. They receive regularly copies of all circulars, regulations, bulletins and annual reports giving details of fires and explosions reported, and the results of investigations relating to our work. They have an opportunity to assist in the drafting of proposed amendments to rules and to shipping container specifications. The associate members take interest in seeing that all their employees are properly instructed and that they comply with the regulations. The associate members and interested employees exercise over their neighbors a helpful influence that promotes a proper appreciation of the object of the Bureau of Explosives. The expert knowledge of the associate members in their respective specialties is placed at the disposal of the Bureau and assists in formulating reasonable and efficient regulations.

What Has Been Accomplished

The records show that during the year 1907, which was the first year the Bureau of Explosives did any work, there were 79 accidents, 52 persons killed, 80 persons injured, and a property loss of \$500,000. Compared with the figures today showing persons killed and injured in automobile accidents, these figures may seem pitiful. Familiarity breeds contempt and undoubtedly the driving public take many chances and pays the penalty.

The potential possibilities incidental to a fire or an explosion involving dangerous explosives are very great. Any serious explosion in a thickly populated district is horrifying to contemplate. The explosion of casinghead gasoline vapors at Ardmore, Okla. in 1915 was devastating. An explosion of war ammunition at Black Tom, N. J. in 1916, while having record of but 5 killed and 99 injured, caused a property loss running up into the millions.

Safety in the transportation of explosives is an acknowledged fact today. During the past three years there have been no accidents in the transportation of explosives by the carriers in either the United States or Canada, with the exception of some minor explosions involving the carriage of fireworks (toy torpedoes). Today wrecks and derailments constitute the prime causes of most of the losses in the transportation of flammable liquids. In the transportation of gasoline alone in 1929 there were 380 accidents, five persons killed and eight persons injured, with a total property loss of \$606,166. In the period from 1910 to 1928, 165 persons were killed, 811 injured, with a total property loss of over \$8,000,000; all of this being chargeable to gasoline. No matter how carefully gasoline is packed for shipment, no matter how thoroughly employees of carriers are instructed as to its hazards, so far the Bureau of Explosives has been unable to do anything that will lessen the hazard incidental to the wrecking of a freight train involving cars containing this inflammable liquid.

The total cost of maintaining and operating the Bureau of Explosives represents an additional item in evidence showing the earnest efforts of carriers to increase

the safety and efficiency of their service. We can never secure perfection in enforcement or complete freedom from accidents for we are dealing with the weaknesses of human nature and with the natural characteristics of dangerous material.

J. T. PRATT (Reading Railroad): I use the bureau pamphlets many times when inspecting points for unloading gasoline. We frequently have a request to locate a siding close to buildings where unloading would be decidedly unsafe.

Some time ago a large corporation wanted gasoline by the carload. They wanted to unload the cars back of our passenger station. I explained to them that the location would be entirely too close to the passengers and that we cannot control smoking around passenger stations. I pointed out that the siding went past their building, if they chose to take the risk. After furnishing them with some of the bulletins from the bureau, they decided they didn't want gasoline near their buildings. Those bulletins helped out wonderfully.

CHAIRMAN LARSON: The next paper on the program is the report of the Committee on Prevention of Highway Crossing Accidents, by Mr. C. L. LaFontaine of the Great Northern.

Report of Committee on Prevention of Highway Crossing Accidents

By C. L. LA FOUNTAINE
Chairman

The Committee on Prevention of Highway Crossing Accidents respectfully submits the following report:

There were 2,485 fatalities at highway grade crossings in 1929, a decrease of 3.2 per cent as compared with the number killed in 1928, and 6,804 injuries, an increase of 2.1 per cent in comparison with the number for 1928. While it is to be regretted that we had a slight increase in the number of injuries at grade crossings as compared with the previous year, everyone who put forth any effort in the cause of prevention of highway crossing accidents should feel highly compensated because there was actually a saving of eighty-three lives as compared to the record for the previous year. This was accomplished in the face of an increase of 7 per cent in the number of automobiles registered, together with a greater density of traffic on the railroads than in any former year. To my mind, however, the record for the first six months of this year as compared with the same period last year is most conclusive evidence that our combined efforts have been effective. The records show a decrease of 338 highway crossing accidents, 158 less fatalities and 356 less injured. Every agency or individual who has influenced these results should be inspired not only to continue this campaign but to put forth greater efforts.

This committee has endeavored to educate the automobile driving public to the need for exercising greater care at railroad grade crossings and to impress them with their responsibility in grade crossing accidents. To that end the National Safety Council has given the grade crossing accident committee's activities frequent editorial mention, not only in their weekly clip sheet service to 3,000 newspapers but in their monthly publications, The Safe Worker and Public Safety Magazine. They have distributed through their membership an average of 200,000 copies per month of the Safe Worker and 9,600 copies per month of the Public Safety Magazine. Leading articles on the grade crossing problem have appeared in the National Safety News, with a circulation of 19,400 copies per month. One of their Universal Safety Series plays was devoted to the grade crossing tragedy; namely, "Not So Dumb," and presented through the National Broadcasting Company service with thirty associated

stations. The railroad crossing safety problem was mentioned also in the radio talks made by Samuel Insull, Jr., L. A. DeBlois, A. W. Whitney and Claude Bowers. It is estimated that three million people were reached through these addresses.

While the committee feels very grateful for the active interest in this problem taken by the Council, we don't feel that we have been entirely able to reach the public as a whole with our message. In the National Safety Council we have an accepted public institution which is in a position to be of valuable service to us, and I would like to suggest to all the members and especially to the chairman and members of the Grade Crossing Committee of the American Railway Association, that they take advantage of the large resources available through the Council and furnish them with all available data dealing with the grade crossing accident problem.

This committee feels that we should all be very grateful for the valuable educational work done by the press. Thousands of editorials have appeared throughout the country during the past year and it is reasonable to believe that the active efforts of the newspapers of the country in urging safety have played a material part in reducing automobile fatalities at grade crossings.

It has been our aim through our educational campaign to cut down the toll of all automobile accidents, whether at grade crossings or elsewhere, for it should be remembered that the grade crossing accidents constitute only a small portion of the safety problem which involves the automobile.

Viewing the constantly mounting toll of deaths and injuries in automobiles, street and highway accidents, of approximately 11 per cent annually for the past ten years, this committee believes that more emphasis should be placed upon the idea that the right to operate a motor vehicle on a public highway is a privilege conferred by the people, and should be restricted to such persons as qualify physically, mentally, morally and financially before competent officials, and who are found to have adequate knowledge of traffic rules and regulations, and sufficient skill and responsibility to drive a motor vehicle without unduly endangering the lives of others. To this end we respectfully direct your attention and solicit your support.

CHAIRMAN LARSON: The next number is "Grade Crossing Accidents and Their Elimination," by Mr. J. L. Walsh, Superintendent of Safety, Missouri-Kansas-Texas Railroad.

Grade Crossing Accidents and Their Elimination

By J. L. WALSH

Superintendent of Safety, Missouri-Kansas-Texas Railroad Company, Dallas, Texas

In 1929, 38 per cent of those killed and 9 per cent of those injured on American railroads had accidents at highway grade crossings. This condition has developed during the last twenty years, and is going to stay with us as long as we have railroads.

Our record on highway grade crossing accidents may not be as good as yours, but I am giving our record with the idea that perhaps we have some interesting methods of decreasing this class of accidents.

Comparing 1920 with 1929, ten years, we show a decrease of 39 per cent in contact, 49 per cent in killed, 37 per cent in injured, while the railroads of the United States show an increase of 35 per cent in killed. I have no record of the contact.

In 1920 we found that of 298 contacts on our railroad, the car that was struck approached from the fireman's side of the engine in 200 cases, and 98 contacts occurred from the engineer's side. That gave us an idea that a whistle was necessary for the fireman as well as the engineer, and we therefore had the whistle extended to the fireman's side of the engine.

We also changed, in 1921, our standard rule, which required two long and two short blasts of the whistle to two long, one short and one long blast and required the whistle to be sounded until the crossing had been passed. We believe that the whistle has done more to prevent crossing accidents than any other one thing.

A rule was incorporated in our book of rules requiring the fireman to handle the whistle in an emergency. On our modern locomotives the engineer can't see an automobile less than three or four hundred feet ahead, and from the record that we had of cars approaching from the fireman's side of the engine, it was necessary to hold the fireman responsible, with the engineer, for cars approaching from his side of the engine.

We keep a card index of the enginemen who are involved in crossing accidents. You may think it a hard job, but it isn't. We don't start a card index until an engineer has hit an automobile. If such a record were kept by all the railroads, you would find that some engineers hit more cars than others. The record of the fireman is kept in the same way when the car approaches from his side.

We also conduct an efficiency test in safety. We try to carry out thirty or forty tests a month. They are carried out with an automobile under the condition of our rules, and a record of the test is kept on the engineer's card. We are, therefore, able to find out which engineers are failing to whistle at their highway grade crossings and whether the whistle has been held open until the crossing has been passed.

You all have had complaints from people living adjacent to railroads about whistling. In order to overcome them we have been trying out a new whistle ahead of the smokestack which concentrates the sound directly ahead of the engine where it is needed and very largely does away with the noise annoyance. We have had this whistle for seven months. We have had comments from people living along the line, and from passengers on our trains. We have done away with the annoyance our enginemen have been subject to with the whistle back on the dome. They now take pleasure in blowing a whistle because the noise is largely removed and there is no danger of harming their ears.

We also make a periodical inspection on a motor car of our 3000 miles of railroad every two years to examine crossings. We have a well maintained railroad. It would shock you to know that perhaps at a good many crossings you haven't even a highway sign, numerous whistling posts that are absent, and obstructions of all kinds surround the crossings that should be removed. We feel responsible for the highway grade crossing condition, and therefore, make this inspection every other year, and follow them through by constantly keeping after those who are supposed to remove obstacles. Trees, sign boards, tool houses, depots, everything imaginable obstruct the view at crossings. I believe that, when the safety men on railroads feel their responsibility for highway grade crossing accidents, they will take a more active part in supervising and insisting upon better conditions at crossings. I don't believe there is a thing in safety work that is as important to us as the highway grade crossing accident.

CHAIRMAN LARSON: Before inviting discussion on that paper, I would like to emphasize what Mr. Walsh has said about whistling at the crossings. Two ladies with five children in an automobile reached our track at a crossing in a ravine where it was utterly impossible for them to see the track more than a few hundred feet in either direction, and it was just as impossible for the locomotive engineer and the fireman to see on the crossing.

This passenger train was running at a speed of sixty miles an hour. It struck this automobile and knocked it through the woods, but it did not injure anyone because there was no one in it. The train came to a stop. The crew went back to see what damage they had done. One of the women grasped the engineer by the hand, and with tears streaming down her face, said, "Sir, if you hadn't been whistling back there in the woods there would have been seven funerals in our home town tomorrow."

row, and I want to thank you from the bottom of my heart because you whistled." I have had this story printed and mailed to every train service employee on the Missouri Pacific Railroad because it very vividly tells the value of effective whistling at the crossing.

C. R. WOODWARD (New York, New Haven & Hartford): I would like to ask Mr. Walsh what effect the whistle has on calling in the flagman from the rear of the train.

MR. WALSH: By actual test we called the flagman 3,000 feet with the engine standing. We don't intend to put it on our freight engines; we are putting it only on the passenger trains.

MR. SCHAFF (New York Central Lines): If a man fails to blow the whistle is there any discipline?

MR. WALSH: Yes, we make reports to the superintendent and a copy to the general manager. The superintendent calls the man in and interviews him on his failure.

MR. SCHAFF: How does this whistle operate, by air?

MR. WALSH: We are putting it on air and steam.

L. G. BENTLEY (Chesapeake & Ohio): Do you have any trouble with condensation on the whistle?

MR. WALSH: No. The method of getting the steam to it is rather crude. We take it from the steam line leading from the fountainhead to the pump; the whistle is about twenty-five inches higher than the return pipe and the drainage goes to the pump and is pumped up. We have had objections from the air brake inspector about this, but we have had absolutely no condensation.

On the modern locomotive where the throttle valve is out on the front end, it is a very easy matter to get the whistle in the proper location and get superheated steam to it.

E. G. EVANS (Louisville & Nashville): On March 1 the crossing accident prevention work was turned over to the safety department on the Louisville & Nashville Railroad.

It had been my opinion from experience in the transportation department that the whistle signal was the greatest factor in the prevention of accidents if sounded at the proper point. We got our management to change the rule to two long, one short and one long, the last blast to be continued up to the crossing.

Since that time, our record shows a reduction, from March 1 to and including August 31, of forty-seven and a half per cent in accidents; 85.7 decrease in fatal injuries; 52.7 decrease in minor injuries. In other words there has been twenty-four lives saved and seventy-seven injuries prevented on our railroad, which is more than twice as good a record as for the railroads of the United States as a whole.

In addition to the change in the whistle signal, the division superintendents and their entire staffs were charged personally with the responsibility of seeing that this signal was properly sounded. There was a great deal of misunderstanding when we first started.

Now, the instructions to the engineer are that the whistle signal shall be approximately ten seconds; the point at which he commences to blow is governed entirely by the speed of the train. We prepared a chart showing a train running at different rates of speed, and indicated the point at which the engineer should start to sound the whistle. For a train running sixty miles an hour, it should start at the whistling post, for a train running thirty miles an hour, it should start half way between the post and the crossing; fifteen miles three-quarters of the way, and so forth.

After an intensive campaign of eight months we have almost a perfect signal and perfect compliance with the signal. If the engineers don't blow the signal, we warn them one time. If they fail to blow it the second time, we suspend them for failure to comply with the rules.

There has been an unusual number of complaints on account of blowing whistle signals in towns. In Gulfport there are forty-three street crossings within the city limits, some of them not over 200 feet apart. We make an exception there by having the engineer blow one complete signal for two and sometimes three crossings. It doesn't make any difference what kind of a signal is blown just so there is a blast of the whistle. In addition, we have changed more than 500 of our whistles, putting in a reducing valve, so that only a certain amount of steam pressure will go through to do away with the shrieking sound of the whistle.

Annual Membership Report

By A. V. ROHWEDER
Chairman

The membership records of our Steam Railroad Section since the Congress a year ago show a slight decrease. At that time we had enrolled 103 members. In the period between October 1, 1929, and September 1, 1930, we enrolled 7 new industrial members and lost 8 through cancellations.

New members were obtained by direct solicitation on the part of our members and by mail approach. Our selected list of 170 Steam Railroad Section prospective members received the following solicitation during the year:

- (1) General letter enclosing folder giving interesting statistics, mailed in October.
- (2) General letter on Council's Industrial Health Service enclosing health folder, mailed in November.
- (3) General letter on safety with descriptive folder outlining service, mailed in December.
- (4) Letter to canceled members of past five years enclosing service folder, also mailed in December.
- (5) General letter enclosing booklet "Protecting Life" describing service, mailed in January.
- (6) General letter following up January letter, mailed in February.
- (7) Letter to members by President Pettibone, announcing Spring Membership Campaign, sent in March, followed by letter from Mr. C. F. Larson, General Chairman, enclosing several prospective members' names on cards and urging their solicitation by members.
- (8) General letter enclosing testimonial folder mailed in April.
- (9) Specific letter by Mr. Larson enclosing poster, mailed in May.
- (10) Testimonial letter (general) by Mr. Temple Williams, Secretary of the Dodge Manufacturing Corporation, also mailed in May.
- (11) Letter by Mr. Rohweder enclosing new booklet "Gazing into the Future" describing the specific steam railroad and transportation service, mailed in June.

A summary shows that each prospect received eight general appeals to affiliate and two specific steam railroad appeals during the year. This mail campaign brought us a \$25 membership.

Many of our members have helped by writing to prospects, usually at the suggestion of Headquarters, and their endorsements were of vital assistance in the obtaining of some of the total memberships of 7 new industrial members, with dues aggregating \$450. (A list of new members, and by whom they were obtained, is attached, in the event you care to name those who helped.) A list of Steam Railroad Section members who helped in the solicitation of members is also attached.

In conclusion, I believe that our cause, its aims and purposes, and our Council service have been presented to the industry. Future solicitation at our present rate of growth will become more and more specialized and result in individual approaches

to companies rather than general mail appeals. We will advance, too, proportionate to the help given by members of our Section in soliciting those companies in our industry not yet members of our National Safety Council.

Report of Publicity Committee

By M. T. FULTON
Chairman

1. Your Committee on Publicity has maintained throughout the year a contact with the Council Headquarters' Staff in Chicago, with the General Chairman of our Section and with officers and members.
2. With the view of avoiding any conflict or duplication of effort on the part of this Section as related to the American Railway Association Safety Section, and other established sources of railway safety publicity, we have not made direct approaches to newspapers or commercial magazines.
3. The Publicity Division of the National Safety Council staff early in the year revised its mailing list for news releases to newspapers and periodicals making a new addition of about one-thousand publications. This Committee, and other members, accepted the Council's kind invitation to furnish them the names of publications in which we would be especially interested to have safety articles appear. Our observation indicates that ground, in the way of publicity, has been gained with country newspapers and magazines published by railway employees' organizations.
4. The Committee offered a recommendation to railway safety officers that they endeavor to have published in their respective railway magazines more material relating to safety including current information regarding activities of the Council and the Steam Railroad Section.
5. Arrangements were worked out by courtesy of the Council for publication in the National Safety News of a number of articles pertaining to safety on steam railroads. A part of this program has been carried out, with more to follow, and co-operation of the members who constitute the only source of this material, is again solicited.
6. At the suggestion and under the supervision of this committee a four-page leaflet on trespassing entitled "Will You Help Stop This Slaughter?" was prepared and printed by the Council, and more than 40,000 copies of this leaflet have already been used by members of the Steam Railroad Section.
7. Favorable publicity among the members of other Sections of the Council was very kindly incorporated in the Managing Director's 59th News Letter, being the issue for May, 1930.
8. Cooperation of the parent body and through its headquarters' staff, particularly Managing Director W. H. Cameron, Editor C. T. Fish and Director of Publicity T. A. Burke, also the helpfulness of our own General Chairman, our Secretary and other officers, is grateful acknowledged.

Report of the Public Relations Committee

By J. L. WALSH
Chairman

Since the first of the year I have written to the Chairmen and National Secretaries of the—

Kiwanis International
Rotary International

American Automobile Association, Dallas, Texas
American Automobile Association, Washington, D. C.
Texas Ginner's Association

—and to the Chairmen of fourteen of the various A. R. A. sections, offering to provide a competent speaker for a short talk on Safety at their annual meetings. Because of various reasons set forth by these gentlemen, I have been successful in placing but one speaker, this being Mr. F. P. Foisie of the Waterfront Employers of Seattle, who addressed the Freight Claim Division of the A. R. A. at their annual meeting in Seattle June 10th to 13th. I have now secured permission from Secretary Hawthorne of the Equipment Painting Section, A. R. A. for someone from the N. S. C. to address their Convention at Chicago, September 9th, 1930. On handling with Mr. Larsoo he suggested Mr. F. M. Metcalf of the Northern Pacific, but because of sickness in Mr. Metcalf's family he is indefinitely detained in Spokane and could not accept, and as the time was getting short I took the liberty of calling on Mr. Shedd of the Rock Island at Chicago to make this talk, but have not yet received advice of his acceptance.

All of those addressed furnished replies to my offers, and expressed approval and gratification of the Safety Work as carried on by the Railroads and the N. S. C., however, the results obtained were rather disappointing.

Representatives of the M. K. T. Safety Department made talks on Public Safety before the following schools and organizations since the first of the year:

Parent-Teachers Association, Denison, Texas.
Parent-Teachers Association, Sedalia, Mo.
Parent-Teachers Association, Smithville, Tex.
Rotary Club Luncheon, Denison, Texas.
Dallas Technical Club Luncheon, Dallas, Texas,

—and on April 23rd, 1930 addressed the entire student body of each school at Denison, Texas, consisting of some 2,000 boys and girls, on the subject of Public Safety.

Report of Public Relations Committee for Canada Council

By W. H. JONES
Chairman, Montreal, Quebec

Unfortunately, after considerable search, I have failed to procure any specific and comprehensive information relative to the duties of this Committee. It seems that most of its work is left to the personal initiative of the Chairman. Therefore, I regret that nothing out of the ordinary, that is, in the form of anything unique, has been accomplished during the tenure of my office. In fact my report consists of the same things done in Canada as have been assured by the Committee in the United States and that during the past years these activities have comprised the following:—Cooperation of the Railways' Safety Departments to outside organizations such as Boy Scouts, Literary and Educational Clubs, Church Organizations, Schools and Fraternities.

In Canada we have not missed any opportunity during the past year in propagating to the people of this Country the old Gospel of Safety. In order to do that we have scattered its appealing truths into the air by radio; into the ears of people by lectures and to the eyes of all men by prepared articles and posters. There is indeed so much of the element of public relations in the activities of other committees that one is tempted to infringe upon their rights; e. g., the Publicity Committee; the Committee on Prevention of Highway Grade Crossing Accidents and the Poster Committee. All of these are public appeals. However, allow me to say in conclusion that no stone was left unturned in performing the unlimited duties of your Committee on Public Relations in Canada during 1930. If a suggestion is intended in this brief

report then it would be this,—that in view of the tendency of this committee to overlap other committees that those responsible in the preparation of the next slate of committees for the Steam Railroad Section should consider the advisability of discontinuing the Committee on Public Relations.

Report of the Secretary and News Letter Editor

By W. A. BOOTH

Director of Safety, Canadian National Railways, Montreal, Que., Canada.

The 18th Annual Congress of the Steam Railroad Section, National Safety Council, was held in the Stevens Hotel, Chicago, Illinois, from October first to October third, 1929. Mr. J. E. Long, Delaware and Hudson Railroad, presiding, with Vice-Chairman C. F. Larson and Secretary G. H. Warfel assisting.

The proceedings included presentation of twenty prepared papers and addresses on very important assigned subjects, together with a roundtable discussion and also reports from each Committee Chairman, the whole proceedings being voted as constituting a most outstanding convention with a very large attendance of not only those especially engaged in the field of accident prevention but also a great many high officials of many of the largest railroads on the Continent. In fact it was one of the most inspirational safety gatherings held under the auspices of the Steam Railroad Section, National Safety Council.

Our chairman, Mr. Long, was the recipient of much laudatory comment in recognition of the dignified manner in which he conducted the various sessions.

There were three special committee meetings called by the chairman during the term and each was well attended. The first was held at Chicago on November 27th and this meeting covered organization and for the purpose of receiving reports of the various committees. At this meeting it was decided that insofar as the present contest plan was concerned, a revision should be made and this was done as follows:—

"That no competing class 1 railroad (or System) be eligible for a group award two years in succession".

The second meeting convened at the National Safety Council headquarters on April eleventh, at which time routine business was carried on; the chairman also received reports from the chairmen of committees.

The third and last meeting took place in the new headquarters of the National Safety Council, Civic Opera Building, Chicago, Ill., and in a few introductory remarks, Mr. Larson congratulated his committee chairmen for the splendid support and cooperation extended him. A tentative program, supplied by Mr. E. R. Cott, chairman of Program Committee, was then considered and any proposed changes were to be referred to him for final action.

I might here inject a word of thanks to Messrs. Cameron and Keefer of the National Safety Council who were invited by your chairman to attend these meetings and who were helpful in their suggestions pertaining more especially to the convention you are now attending. It might not be amiss to mention here the consideration that our chairman gave to many of our members whilst en route to the recent convention held in Denver. He was most untiring in his efforts as representative of the Missouri Pacific Railway to make the trip over his road as pleasant as possible and am sure we all appreciated the way in which everything was handled, including the engine whistle for railroad crossings, and of course the dining car with special menus. Then on arriving at Denver our good friend Geo. Warfel was at his best and perhaps excelled in that wonderful treat at the hands of the Union Pacific Company, when invitations were issued to visit Troutdale when on the way we viewed the graves of our esteemed friend "Buffalo Bill" and his good wife.

Trusting that the monthly news-letters sent to all of you have been helpful and interesting as it has been the aim to give you in a condensed form information received from our railroad safety friends.

Report of the Poster Committee

By L. G. BENTLEY

Chairman

With the hearty cooperation of the officers of the National Safety Council, particularly the Director of the Poster Division, Mr. Kershaw, all posters due for production during the past year have been produced on time.

These posters have been based on the actual needs of the section and have portrayed causes of accidents and suggested remedies which, from experience, are most effective.

The sales of the posters produced have been far from satisfactory in view of the nature of the posters and the needs of the members.

These sales have been as follows:

Number of Posters	Class of Employees Covered	Circulation
2512-B	Firemen	3,700
2555-B	Employees Off Duty	6,200
2596-B	Trainmen	2,500
2638-B	Firemen	3,000
2681-B	Station Employees	9,500
2727-B	Trainmen	8,000
2774-B	Enginemen	2,000
2823-B	Switchmen	2,750
2871-B	Station Employees	3,000
2919-B	Trainmen	1,000 (1 Mo. circulation)
2963-B)		
3021-B)		

Circulation figures not yet available.

The average circulation per poster in 1930 was 4,517 compared with 7,625 during previous year, a startling reduction and not justified by any deterioration in the nature of the material produced.

The chairman of the section, and the managing director of the National Safety Council have co-ordinated their efforts to increase the circulation of the posters during the past year, but without avail.

Report of Committee on Present and Future Activities of the Railway Section

By D. G. PHILLIPS

Chairman

Past and present activities speak for themselves, so this committee will devote the space of a short report to the discussion of our future. Owing to the existence of the Safety Section of The American Railway Association, composed as it is of the same railroads that make up the Railway Section of the National Safety Council, it is necessary that the work of each Section be planned with reference to the work of the other, otherwise there will be duplication of effort.

A study of the situation seems to warrant the existence of both organizations. The National Safety Council, is a great organization, going into every field where there are accidents, at home, on the street, at work, at play, in the school, in fact everywhere we find the National Safety Council at work. As it is just as serious to an injured man to receive an injury off the railroad as on the railroad and a railroad man is just as much concerned with the safety of his family as a man who follows some other occupation, he is also interested in any plan of safety that seeks to protect him when he is not at work, that seeks to protect his family at all times.

The National Safety Council is such a body. The Safety Section of the A. R. A. is and has, and rightly, devoted most of its attention to the man on the railroad. Its very organization is for that express purpose, while the National Safety Council on the other hand, is organized to look after safety everywhere at all times. It is a public organization and reaches and influences the public as a whole, while the Safety Section of the A. R. A. talks mostly to the railroad man, or with others as they come in contact with railroad movements. It is said that no man can live by himself, and just so no set or class of men can successfully exist and operate unless they are helped directly or indirectly by other sets or classes. Successes in safety among certain occupations, leads to success in others. On the railroad we need the help of all, in order to increase the interest of railroad men in safety. The child comes home at night from school, a safety idea has interested that child, and you hear about it. While that idea is not directly concerned with the work of a railroad man, yet coming as it does from your boy or girl, it adds to your general interest in safety, it affects your attitude toward safety and thus does have its influences on you as you go out to your own work on the railroad. In other words the National Safety Council is building up a great and general interest in Safety that not only protects your home life, but also indirectly affects the work of the man out in the shops, or on the road, or where ever he may be. We cannot afford not to be a part of such a movement. We cannot draw off to one side and say the "Safety Section of the A. R. A. will take care of my needs."

However it is absolutely necessary that the two Sections have definite programs of work so that we can get the most good possible out of both organizations. It is only natural that to the Safety Section of the A. R. A. should fall the especial task of the employee on the job, just as naturally falls to the Railroad Section of the National Safety Council "The employee off the job" and his wife and children all the time. Also there is a certain line or rather lines, that fall to both, such as "the public in contact with the railroad" that is the passenger, the trespasser, the man using the public highway across the track, etc. But even these joint cases should be approached from a different angle, or rather different methods and avenues of appeal should be sought. The Railway Section as a member of the National Council will be able to use means that would not be available to a strictly railroad organization. In fact the Section of the Safety Council should seek to work with and through the Safety movement as a whole as represented by the Council, while the A. R. A. Section should work through railroad channels. By each one following well defined lines, not in conflict with each other and yet not identical, the greatest good can be done.

The railroads cannot afford to get out of touch with the rest of the world in preventing injuries. The Railway Section affords them the means of keeping up contact and getting the full benefit of the general drive for Safety. Being railroad men it would be a dull convention that did not discuss many railway subjects, but as we see it, our chief work between conventions, will be to keep our safety work in touch with that of other industries to help and be helped by them and also we believe that in the future more time at our conventions should be devoted to the safety of the railroad when he is *not* railroading and to the safety of his family.

The phases of safety work are so linked with the work of the National Safety

Council that we will be able to profit much by cooperating with them. We should endeavor to work with all local organizations—we should be an active part of the local Council.

In closing we merely wish to suggest that one is just as much a cripple, is just as hard up, regardless of when and where the injury occurs, and also that the list of railroad men hurt off duty is very large. In order to cut down this outside record of death and injury, let us place ourselves where the influence of the National Safety Council will be most easily available, that is a part of that organization, both at the annual convention and all the year round.

ADJOURNMENT.

**Tuesday Afternoon Session
September 30, 1930**

C. F. LARSON, Chairman
Missouri Pacific Railroad Company, St. Louis, Mo.

The second session of the Steam Railroad Section convened with C. F. Larson presiding.

CHAIRMAN LARSON: The first topic on the program this afternoon is by Mr. P. E. Odell, vice-president, Gulf, Mobile and Northern Railroad, Mobile, Alabama.

Education—A Factor in Accident Prevention

By P. E. ODELL

Vice-president and General Manager, Gulf, Mobile and Northern Railroad Company, Mobile, Ala.

Accident prevention is receiving the attention of the entire world as it never has before. The people are awakening to the fact that great suffering and loss of life and property caused by accidents due to carelessness and thoughtlessness, can be lessened or almost entirely eliminated by means of education. But, in order that maximum results may be obtained, we have found that the activities in this direction cannot be carried on as a side issue. They must be given a place of paramount importance in the operation of a railroad. The best proof of this statement lies in the fact that, while we on the Gulf, Mobile and Northern had been making fair progress in reducing employee injuries from 1923 to 1927, through more or less routine methods and sporadic safety contests, our casualty rate had been reduced only from 30.89 to 12.02. In the early part of 1928, mass meetings were held at the important points on our line, at which the employees were assured that the management was in earnest in its desire that safety be given preferred attention. They have responded nobly, and our casualty rate was reduced to 3.15 in 1928, and to 1.68 in 1929.

In bringing about this reduction during the past two years, let me assure you that we adopted no revolutionary methods, nor did we have any secret formula. It has been primarily a matter of education, along the lines with which practically all of you gentlemen are thoroughly familiar. A great deal of the credit is due to the helpful suggestions received through the Steam Railroad Section of the National Safety Council, and the Safety Section of the American Railway Association. Further incentive was supplied through the National Safety Contest among the various Class 1 railroads. Every employee on our property was advised of our relative standing among other railroads, and these figures brought about forcible realization of the fact that we had a huge task before us if we expected to be a real contender in the contest. Each employee was designated as a safety committeeman. His foreman, supervisor, or trainmaster, was designated as chairman of the committee. Department heads were made vice-chairmen of the system safety organization, and the writer was designated as general chairman. A system of rating each safety chairman was inaugurated, and the standings are published from my office monthly. These standings also included the cumulative figures for the year. Extensive instructions in safe practices became the order of the day. The chairman's safety record was given its proper place in determining his efficiency as a supervisory officer. Other methods have been employed, with which you are all familiar, such as the use of bulletin boards, safety meetings, safety suggestions, etc.

Doubtless you have all heard at one time or another that the subject of safety is being overworked—that the public is getting "fed-up", if you please, with safety talks, literature, meetings, etc. I have never been convinced that this is true. On the contrary, it is my belief that continual and unremitting efforts are essential.

The new man should, of course, be given intensive safety instructions, but as is often the case, the "old-timer" knows as much, or possibly more about the safety requirements of his particular job than does the supervisor. He, therefore, sometimes resents being told how to do this and how to do that. The proper way to educate him is through little reminders. Several railroads, ourselves included, have been placing a transportation rule on their bulletin boards daily. It is called the "Rule of the Day." Most of these rules are so well known to the "old-timer" that he can repeat them verbatim. He knows the necessity for the rule, and probably has religiously lived up to it. Yet, instead of his feeling that his intelligence has been insulted when the trainmaster asks him to repeat the "Rule of the Day", if he has the right stuff in him, he will show a little feeling of pride in being able to come right back with an intelligent answer—as if to say "Why don't you ask me something hard?"

It has been said that "most of us are past the point where we will listen to advice that is presented in text-book fashion. Those who would teach us must assume that we know something. We will listen to the homeliest advice if it is given us in the form of a 'reminder'. We are like children in the sense that we must be 'reminded' all our lives."

Probably the most productive medium of education, from the financial standpoint, is that of advertising. When one has a particular brand to sell day in and day out, what form of advertising is essential? Constant reminders. What brand of cigarette do you smoke? And why do you continue to smoke that brand? Or why did you change? Because you have been constantly reminded that "Lucky Type", "Gold Spun", or some other brand are still on the market, and that that particular brand is better than any other. How quickly would you switch your preference if your pet brand sponsor stopped reminding you about them? And why did you addicts begin smoking in the first place? Because you have been reminded through precept and example that it is the thing to do.

Through the earnest and conscientious efforts of you gentlemen who are in charge of the safety departments of your respective railroads, there has already been created a decided change for the better in the attitude assumed by the "old-head" towards safety. He is not afraid to caution his fellow-worker to avoid chance-taking. Instead of adding to his own importance by relating to the new man how he had kicked drawers all his life, how he has caught fast moving trains, or the front foot board at top speed—in other words, how close he has come to accidents without getting scratched he is telling that man that these tricks are considered foolish in this day and age. I repeat that you gentlemen have had a large part in upsetting the old railroader's code that a stub finger or toe goes along with his job, and is a necessity before he is entitled to be called a real "he-man." Now, that is the result of the right sort of education.

The word "cooperation" has been very much over-worked in the past few years, but in this safety game, close relationship is essential between the safety supervisor and the foreman who is confronted with the actual hazards from day to day. Each can offer suggestions that will prove helpful to the other.

But, after all, it has been truly said that "it is hard to teach an old dog new tricks." It has also been said that, unless a man marries before he is thirty, it is probably too late, as his mean, selfish, cantankerous habits, will have been too well-formed, and his wife finds it almost impossible to adjust herself to them. Habit plays a very important part in our lives. As most habits are formed early in life, we decide that the safety habit, or "safety consciousness", as it has been frequently termed, could best be developed in the minds of our youngsters. About a year ago, we therefore organized the Gulf, Mobile and Northern Junior Safety Committee.

which includes sons of employees between the ages of ten and seventeen. Subsequently, we extended the membership to include boys within these age limits, who are not sons of employees.

In January of this year, a mass safety meeting was held at a large terminal on our line, which was attended by 250 members of the Junior Safety Committees. They brought their school teachers and pastors with them, and were addressed by a Judge of the Supreme Court of that state. It was with a feeling of pride that I looked into the faces of those youngsters as they listened attentively to every word spoken. They all pledged that they would frequently caution their fathers when leaving home for work, with the words "Be Careful, Dad."

These boys have entered into the safety movement with a great deal of enthusiasm. While they have no regularly assigned duties, their services are enlisted at any time and in any manner where they may be used to advantage. Their assistance has been most valuable in the distribution of safety circulars, posters, stickers, etc. They are active in eliminating the practice of hopping trains and trespassing on railroad property by school children. From time to time we have issued flyers to motorists regarding the exercise of care at railroad crossings. Such flyers are distributed by these boys. It was also their job to post the 1930 Careful Crossing posters, and to distribute the 1930 Careful Crossing booklet to motorists. Incidentally, I think that booklet is one of the finest pieces of helpful propaganda that has ever been disseminated.

As an example of their enthusiasm in distributing safety material, I might mention the following: Last April, the state of Tennessee inaugurated a "Save-a-Life" campaign. Arrangements were made by state authorities to make free inspection of motor vehicles in the state, during a thirty-day period. This inspection included brakes, lights, horns, steering mechanism, etc. An official sticker was given the car owner, showing that his car passed the inspection. Through the assistance of our Junior Safety Committee boys, our employees secured this inspection and displayed the official sticker one hundred per cent, within less than five days.

The influence of these boys in the homes of our employees is a fast growing asset in accident prevention, but, aside from this important feature, it is also a part of our plan that safety education shall start with the boy, who, at maturity, should develop into a worker with the idea of safety firmly fixed in his mind. With this objective, we are organizing in the schools, school or class safety committees, with the possibility of the Junior Safety Committeeman acting as chairman of his school or class committee. These committees hold meetings from time to time, and their efforts in spreading the gospel of safety among their classmates are carefully directed.

A short time ago, an automobile accident occurred at one of our grade crossings, which resulted in serious injuries to some of the occupants of the automobile. The car was being driven by a boy only fourteen years of age. This unfortunate accident could have been avoided had the boy exercised a little care in approaching the railroad crossing. It is also safe to assume that had this boy been a member of our Junior Safety Committee, or had he received safety instruction in the school room, the accident would not have occurred.

In talking with one of our Junior Safety Committeemen, who is seventeen years of age, and the son of one of our agents, I told him that I expected to attend the Annual Safety Congress this year, and asked if he would let me have his views, as a school-boy, on the subject of accident prevention. His letter, which I will now read, was written without any assistance from his father, or instructors, and tends to prove that the mind of the boy can be so trained that in his business and social life as a man, he will follow safe practices, not only in the performance of his daily duties, but in conducting his chosen vocation. The letter:—

"We are living in an age of science and invention.

"Distance has been eliminated by modern methods of communication and transportation. Anything that may happen here today could be flashed over the world in a

few minutes, and distance that formerly took months to travel can now be traveled in a few hours.

"With modern inventions and improved methods of transportation has arisen the necessity for greater care and thought in our daily routine, and for this reason a universal campaign for safety is essential.

"Thoughtlessness and carelessness are usually the contributing causes of accidents. To get people to think and act in terms of safety is the first and fundamental rule of safety education. In a certain grade crossing accident which occurred recently, twenty-two persons lost their lives, and seven were injured. If the driver of this bus had been well versed in the rules of safety, these lives might have been saved. Many other accidents similar to this one have occurred because of carelessness or lack of knowledge of the prevention of such accidents.

"To avoid these horrible accidents, the railroads have been putting safety literature before the public in order that the loss of life might be decreased.

"Safety is easily recognized as the most effective weapon man has to combat the grim reaper of death. The problem is to get the public to educate itself to such a degree that it will realize the necessity of using safety. Each railroad, I suppose, has its own methods of doing this. The Gulf, Mobile and Northern employs a method both effective and unique through its Junior Safety Committee. This committee is an organization composed of sons of Gulf, Mobile and Northern employees. It is their duty to see that their community is well supplied with safety literature and that this literature is disposed of in such a manner that everyone's attention will be centered upon it.

"This thought of safety has now become so widespread that it is being taught in schools. There it is instilled into the minds of children who will carry it on through life with them and transmit it to the future generations. This is indeed a practical theory in the development of safety from an educational standpoint.

"Among other methods that are being used are lectures, motion pictures, and prominently displayed posters and signs. Perhaps the best mode of educating the public in safety is to practice it ourselves. To do this one must first realize the value of safety, learn its code, and then practice it. By common observation, other people will soon follow the example.

"In conclusion, let us realize this thing; as soon as illiteracy in safety is wiped away, as soon as people have been taught to think and act along safe and sane lines in every walk of life, then will this loss of life and injury resulting from thoughtlessness and carelessness be eliminated, and safety from an educational standpoint will have become one of mankind's greatest benefactors."

I am strongly of the opinion that no talk or address on the subject of safety should be brought to a close without a suggestion from the speaker; therefore, I offer this one: That Safety be taught in the schools in every state in the Union. I do not offer this as a new idea, because I am aware that some schools throughout the country have already included this subject in their curriculum. In a great many such schools, excellent work is, no doubt, being done; but the methods employed, and the nature of the courses offered, are not at all uniform.

Albert W. Whitney, vice-president in charge of education, of the National Safety Council, recently stated that "the strain upon the curriculum of the modern school is very great, and nothing can permanently find a place in it that does not make a genuine contribution to the development of the mind and character of the child." I believe education in safety is entitled to a very high place in this category. If it is absolutely necessary to choose between safety and some other course, I believe that safety should be given very serious consideration.

When our young people have been thoroughly instructed in safe practices, and have developed a "safety consciousness" early in life, their safety habits will have become so firmly entrenched that they will be practically impossible of dislodgment.

And when these youngsters take over the reins of industry, it is my belief that the results that have been accomplished thus far in the prevention of accidents, will appear almost trivial in comparison.

ROBERT SCOTT (Atlantic Coast Line): On behalf of the Steam Railroad Section of the National Safety Council, I feel that we are much indebted to Mr. Odell for this wonderful common sense address that he has given us this afternoon. I make a motion that we offer a fitting vote of thanks to him for his contribution to the safety movement on the American railroads of the United States of America.

(The motion was seconded and carried.)

CHAIRMAN LARSON: We were advised at the last moment by telegram that the subject to be handled by Mr. J. P. Kavanaugh, "Accident Prevention in the Stores Department," would be without a speaker. He could not be here.

Mr. E. R. Corr, the maker of the program, has kindly consented to lead a discussion on this subject of accident prevention in the stores department.

E. R. CORR (Chesapeake & Ohio, Columbus, Ohio): A number of years ago the safety record in the stores department of the Chesapeake & Ohio was bad. Mr. Bentley was not making the progress in that department that he should have made, principally because Mr. Kavanaugh of our stores department (and I think Mr. Kavanaugh would have told you these things had he been here today) had not been sold on the safety idea, having the old attitude that it is up to the man to look after himself.

The stores department record on the Chesapeake & Ohio now is of the best. They practically have no accidents, indicating that safety is a by-product of a man who is the head of the department. A piece of equipment with hazards now used by the stores department, is the tractor. It is operated by gasoline and gasoline carries a certain hazard.

The safety man and the fire prevention man are interested in the proper storing of the gasoline supply for the use of the tractor and the method of transferring from tank to tractor. There is danger in starting a tractor in a closed building due to carbon monoxide poisoning. There is danger in operating a tractor at varying speeds around buildings and around material.

The problem of unloading, piling and loading are important operations in the stores department. They are making some strides in the use of mechanical devices to avoid unnecessary lifting, always a cause of a number of accidents among the laboring class.

I think there is room for improvement in this, in the routing of material. A great deal of unnecessary re-handling of material might be avoided if someone would give that work the attention it deserves.

The stores department also use trucks, and a number of you have seen trucks with wheels spreading out. The stores department should buy trucks that are adequately built to carry the loads they put on them.

I think we should give the stores department the credit for improvements in the housekeeping of our properties. The stores departments are an example of what can be accomplished when somebody sets out to do a job right.

I emphatically think that there should be a closer contact between the safety man and the purchasing and stores department. Without criticizing, the stores or purchasing department are inclined, in making a purchase, to consider the question of price rather than quality and use. The safety man should be ever-alert to observe whether tools are up to the task they are intended for and whether they endanger the lives of employees, and to bring inadequate equipment to the attention of the purchasing department. Those are merely highlights that come to my mind in connection with the stores department.

C. T. BAILEY (Oregon Short Line): Does the stores department deliver to the other departments in your large shops?

MR. CORR: Yes.

MR. BAILEY: Is it the habit of employees in the stores department to utilize the mechanical service of a shop to which they are delivering heavy material?

We recently had a very serious accident which occurred to one of our stores delivery service employees who, in delivering some heavy engine truck springs, to a machine shop operated an air hoisting device with which he was not familiar and suffered a broken leg. We should insist on the mechanical forces operating machines in making deliveries.

MR. CORR: Some stores departments are not familiar with the rules and regulations of the Bureau of Explosives for handling explosives and inflammables. A number of railroads have had very sad experiences with these materials and all stores departments should know the proper precautions for handling them.

MR. BENTLEY: Portable cranes on our railroad are under supervision of part of the store room equipment.

M. J. FLANIGAN (Chicago, Milwaukee & St. Paul): The stores department delivers the material to the various shops, who have cranes and trucks to pick up the material.

E. E. SEYFARTH (Belt Railway Company of Chicago): Our store employees do operate trucks, tractors and cranes for delivery to shops, but they must be examined and qualified.

MR. CORR: Are any of you having accidents due to material falling off trucks, and what are you doing about it?

MR. BAILEY: We are having a lot of trouble with reclaimed track chisels. Has any other line had trouble with reclaimed tools?

MR. FLANIGAN: We have had quite a lot of trouble with chisels. Some of them would last about two minutes and some of them two years.

I think the trouble with the reconditioning of tools is that different makes of tools have different material in them, and when they go to the shops to be reconditioned, the man who does the job doesn't know how to temper the tools because he doesn't know what kind of steel is in them.

MR. CORR: For a number of years we were confronted with the same situation as that on Mr. Flanagan's road. Our purchasing department was buying the steel and we were making our own chisels. We had some too hard and some too soft.

We finally persuaded our purchasing department to standardize on one particular, high priced brand of rail chisels. We put them in service, three chisels to a section gang, instead of thirty-five or forty.

We appointed a tool inspector. The man at that time was scale inspector. His shop was located adjacent to the shops where all our tools were redressed, and he made a personal test and inspection of every reclaimed tool. The tool had to have his yellow o. k. on it before it went out on the property.

At the same time we bought a number of grinders to put in the hands of our section men in order that they might grind tools. A man was selected at each supervisor's headquarters and trained in redressing tools. Our purchases of chisels were reduced nearly eighty per cent.

A number of roads are returning chisels to the factory for redressing.

F. HARTENSTEIN (Lehigh Valley): We have had very few injuries in our stores department; the few were due to handling scrap iron.

CHAIRMAN LARSON: Dr. Hugh L. Taylor, the leading surgeon of the Rocky Mountain district, is here. I want the Doctor to speak about three minutes.

DR. HUGH L. TAYLOR: It has occurred to me that possibly you gentlemen don't realize what you have accomplished. I have been in this game a long time and I

have seen the entire transition take place. In the old days we had no physical examination for employees and we had no safety devices. I got to be an expert on cutting off fingers and thumbs and legs and arms.

Now we have safety rules, the human element is trained in safety and mechanical appliances and machines are guarded. You gentlemen have reduced mortality, morbidity, and lost time fully 90 per cent during my time of service. I think if you keep up your good work it will only be a few more years until the company's surgeon will just be an honorary officer.

CHAIRMAN LARSON: The next paper is by Mr. E. W. Boots, engineer of maintenance of way, the Pittsburgh & Lake Erie Railroad Company.

Safety Among Bridge and Building Employees

By E. W. BOOTS

Engineer, Maintenance of Way, Pittsburgh and Lake Erie Railroad Company

The employees of the Bridge and Building Department of the Pittsburgh and Lake Erie Railroad Company include carpenters, masons, mason helpers, painters, tanners, slaters, roofers, structural iron workers, locomotive crane operators, steam ditcher engineers and firemen, steam hoisting engineers, bridge watchmen; their assistant foremen, foremen, general foremen, track scales inspectors, supervisor of bridges and buildings and clerical forces in the office of the supervisor of bridges and buildings. The scope of work includes principally the maintenance of bridges, buildings, platforms, paved driveways, signs, track scales, ash pits, sewers, turntables, fuel stations, water tanks, pump houses and round houses.

The Pittsburgh and Lake Erie has the greatest traffic density of any American railroad. It extends through the southwestern section of Pennsylvania and the east central section of Ohio and traverses the valleys of the Youghiogheny, Monongahela, Ohio, Beaver, Shenango and Mahoning Rivers, serving the coal fields and manufacturing plants of this immense industrial section. In 1929, the maintenance of way department of the Pittsburgh and Lake Erie had the casualty ratio of 1.41 per cent per million man hours. This casualty ratio was the lowest of any of the American railroads. The bridge and building department is a part of the maintenance of way department and contributed to this low casualty ratio.

The bridge and building department casualty record for 1924 to September, 1930, inclusive, is as follows:—

Accidents Causing Personal Injury Resulting in Loss of More Than Three Days

Year	No.	Ratio
1924	10	26.87%
1925	12	26.21%
1926	3	6.52%
1927	1	2.09%
1928	0	0.00%
1929	0	0.00%
1930	0 (First nine months)	0.00%

It was the opinion of bridge and building department officers in 1924 and 1925 that the casualty ratio was as low as could reasonably be expected because of the efforts made prior to 1924 to reduce the number of accidents. However, the personal injury accidents resulting in the loss of more than three days time or in death

was greatly reduced in 1926 and in 1927. In December, 1925 a study by the officers of the bridge and building department of the accidents that occurred in that department in 1924 and 1925 convinced them that a greater reduction in accidents could be made. The study of these accidents showed the following:—

Ties were being renewed on a bridge. The rails were raised and temporarily supported on blocking. A tie in being placed in position struck one of the lines of rails and pushed them off the blocking and injured a foot of a carpenter. The blocking was too short. The fault was that of the foreman in not providing blocking of proper length.

Ties were being renewed on a bridge. A carpenter had a thumb lacerated when it was caught between the rail and a tie which was being placed. The fault was that of the foreman in not requiring the carpenter to use a rope sling on the front end of the tie.

A carpenter was working on a timber scaffold in the interior of the hopper of a fuel station. Some of the planks of floor of scaffold extended considerably beyond their supporting joists. The carpenter stepped out to end of planks which tipped and he slid down to bottom of hopper. He had two ribs fractured. The fault was that of the foreman in failing to place the supporting joists properly.

Rails were being driven as piles by a pile driver. A rail was being hoisted into position in the guides, when it swung and struck a carpenter and fractured his jaw. The fault was that of the foreman in failing to provide proper means of controlling the rail while placing it in the guides.

A Typical Case of Infection

The deck plates of a track scale were being renewed. A carpenter had one finger slightly lacerated when it was caught between a cast iron stand and a steel plate being placed in position. The carpenter continued working and did not have the wound examined and dressed. Seven days after the accident infection appeared in the finger and he was taken to a surgeon; he was off duty seven additional days. The fault was that of the foreman in failing to send the carpenter to a surgeon. Proper dressing of the finger would have prevented the accident causing loss of time.

A ditcher fireman broke a bone in the thumb of his left hand when wrench he was using slipped off a nut and struck his thumb. The fault was that of the ditcher engineer in allowing him to use a wrench too large for proper fit on nut.

A painter was painting while standing on a scaffold and attempted to reach beyond the limits of the scaffold and fell off and injured his right arm. The fault was that of the foreman in failing to direct the painters to move the scaffold so that the painter could paint without reaching beyond the end of the scaffold.

A carpenter was lifting a plank from the ground to the floor of a trestle by using but one rope sling. The plank got out of balance and struck the carpenter and injured his right hand. The fault was that of the foreman in not providing two carpenters to use two slings for lifting this plank. There were other carpenters under the direction of this foreman on this trestle.

A carpenter was turning a 12" square timber with a cant hook. This timber was in a pile of creosoted timbers. The timber swung and struck the carpenter and his right leg was injured. The foreman was at fault in failing to have another carpenter work with the carpenter and each using a cant hook to move the timber. There were other carpenters on this work.

A mason helper was placing a 3x10 inch x 16 foot plank in place. The plank swung and struck his foot and injured his foot. The foreman was at fault in failing to have two mason helpers handle the plank. There were other mason helpers on this work.

The result of this study showed that fourteen of the accidents could have been prevented by the foremen and that two of the accidents were minor ones that would not have involved loss of time had the foremen complied with instruction to have any minor injury attended by a surgeon, and that six of the accidents were the result of carelessness on the part of the mechanic injured. The officers of the bridge and building department renewed their efforts to reduce accidents by calling attention of the foremen to what could have been done and the foremen renewed their efforts and discussed accidents with their mechanics. Immediately a decided improvement took place to the extent that not an accident occurred during the first six months of 1926.

However, on July 10, 1926 a foreman left his gang of carpenters for the purpose of making a bill of material. During his absence a carpenter jumped off a ladder that had been insecurely placed. The carpenter was injured. The foreman should have made his bill of material where his carpenters were working and had he done so he would have observed the insecure placing of the ladder and would have corrected it and thus would have avoided the accident. Also on July 14, 1926 a foreman attempted to move a scaffold along the side of a building with the help of three carpenters. The work required the help of four carpenters. The foreman had other carpenters working on this building but did not call for the fourth carpenter. A plank of the floor of the scaffold fell and struck one of the carpenters and injured his ankle. The foreman was wholly at fault. Both accidents were avoidable.

It was a Salutary Lesson to Foremen

These two accidents were explained immediately to all employees not only in the bridge and building department but also to all other employees in the maintenance of way department. There has not been an accident since in the bridge and building department in which a foreman has been at fault. On October 19, 1926 the roof above the rafters of a roundhouse was being renewed. Sufficient walks for the safety of the workmen were provided, but a carpenter stepped off a walk and fell and broke his leg. On July 1, 1927 a carpenter with the assistance of another carpenter was placing awnings on a building. He had two ladders of different lengths suitable for placing different awnings. He placed the longer ladder on a flat slope but was cautioned by the other carpenter that the ladder would probably slip. The carpenter paid no attention to the advice given him and mounted the ladder. The ladder slipped and the carpenter was injured. Both of the accidents were immediately explained to all employees in the bridge and building department and also to all other employees in the maintenance of way department. The result is that there has been no accident in the bridge and building department from that date to the present date; a period of three years and three months, a praiseworthy achievement. The efforts of the foremen and other supervisory officers have been an incentive to the mechanics to take proper precautions and the result is that the accidents that mechanics were having are eliminated to a considerable extent by the mechanics' efforts. The character of the work performed has been the same through the entire period of 1924 to 1930 inclusive.

Foremen and other supervisory officers by constant attention to the work of the employees under their supervision can prevent all accidents with very few exceptions. The descending casualty ratio of the bridge and building department is the result of making safety a part of the work and practicing constantly safe methods.

There has been no accident causing a fatality nor permanent maiming in the bridge and building department since December 5, 1923.

CHAIRMAN LARSON: Our next paper is by Mr. A. E. Willahan, of the Kansas City Southern Railway Company.

Hazards In Operating Modern Power Maintenance of Way Equipment

By A. E. WILLAHAN

Assistant Chief Engineer, The Kansas City Southern Railway Co.,
Kansas City, Mo.

One of the parts that machinery plays in modern industry is the reduction of unit cost. Our transportation systems have recognized this fundamental fact. Wherever and whenever human brains can conceive a machine that will produce a thing cheaper and do away with the drudgery of manual toil, industry demands that it be built.

Machines have come to stay, and will increase in number rapidly. Our problem then, becomes one of devising ways and means of using them efficiently, and from the human standpoint, with the minimum amount of injury and loss of life.

I have been exceptionally favored in the past ten years, in having had the opportunity to observe most of the machines now in use by Maintenance of Way departments. This observation has been in connection with various organizations, and on several railroads. Where my own field lacked detail, many of my friends have supplied me with data and with their experience, for which I wish at this time to render grateful thanks.

During the past decade there have been developed more than twenty machines of various types for maintenance work. Some have a single function, others are adapted to a variety of uses. It is obviously impossible to describe each machine in minute detail during the period assigned. I will refer only to those that are causing the greater number of accidents.

Excavating Machinery

The most fruitful cause of accident charged to excavating machines, is the failing of either a part or the entire load from dipper, clam-shell or bucket.

I reviewed a report not long ago of an instance which will illustrate. One man was seriously injured, suffering a partial fracture of the skull, a broken shoulder, and a compound fracture of the right arm. The other was buried beneath a cubic yard of rock. The accident was caused by the operator accidentally tripping the dipper latch. You may say, "they should not have been within the swing of the dipper", but they were, and a death resulted.

Under-cutting on the working face, to the extent of leaving overhanging material is dangerous, and yet, you commonly see it being done. Workmen being struck by the dipper or clam-shell seems a careless thing, but it happens more often than one would suppose. Frequently, men are injured while making minor repairs or adjustments to some part of the machine while it is in operation.

The remedy for the class of accidents I have mentioned is obvious. The most potent one is closer supervision by the man in charge, and a careful machine operator.

Hoisting Cranes

The movement of materials by the use of cranes causes a large number of injuries in which the percentage of fatality is high. A rough check of the statistics, showed one death for each twenty-nine reported injuries.

Those accidents most frequently occurring are the result of falling loads.

Falling loads are due primarily to carelessness in securing them. Poor hitches, improperly designed lifting hooks, faulty containers and slings either not strong enough in the first place or weakened by the numerous defects that can so easily escape notice. These, combined with reckless handling of the lifting line or boom,

contribute to economic waste and human suffering. We have found that good equipment with proper inspection and supervision, which includes instruction of the crane operator and his helpers in the best of safe practices, paid a handsome return in accident prevention.

Rail Handling

Handling rail is a prolific source of injury. As weight of rail increased, the difficulty of manual handling led to the design of machinery to do the work. The introduction of mechanical handling eliminated some of the former hazards but, unfortunately created others.

Where a thorough investigation of an accident is made, the cause of it is usually revealed.

A railroad whose number of injuries in the rail-laying gang were about 20 per cent higher than those on a neighboring road, discovered that a change in the design of the lifting tongs, reduced their accident rate about 50 per cent.

The best method of keeping down the number of broken limbs and crushed hands and feet is:

Careful and painstaking instruction of the men who work about the machine; the assignment of men to do certain parts of the work, and intelligence in their selection.

There also should be close and frequent inspection of the parts of the machine subject to excessive wear. This should be a part of the duties of the man in charge.

Ballast Machines

Most roads have an assortment of devices for shaping sub-grade and ballast section. From the nature of the work done, they are heavy in design and require the application of considerable power. Various parts of the machines are adjustable and call for special care if they are to be operated safely. Rapid changes in the position of wings or blades sometimes catches a man off his guard. When this happens, he is usually badly hurt or killed outright.

An accident of this sort came under my own observation. The man was standing within the swing of an adjustable blade. The operator applied the air to the piston which swung the part, and the blade caught the man just above the shoulders. He had tried to get in the clear but a loose half sole on one of his shoes caught under a sharp piece of angle and he did not get there.

You will note that there were two contributing causes to this accident. One, lack of proper instruction as to action and direction of movement of the blade; the other, a dangerous condition of the man's shoe.

One of the best safe-guards lies in the employment of physically active and mentally alert men. These men should then be carefully instructed in safe practices and should be thoroughly familiar with the operation of each part of the machine.

After satisfactory men have been secured, there should be as little change in the personnel as conditions will permit.

Tie Tamping Equipment

There has recently been developed a machine for tamping ties. We look forward to seeing large numbers of them in use by railroads. Some of the machines are direct acting, being operated by two or three men, while others are either electrically or pneumatically operated. In the case of the two last mentioned, the actual work is done with a hand tool weighing twenty to forty pounds.

There was reported last year, two serious accidents resulting in the death of nine men. Again the high fatality rate is impressed upon us when collision between trains and work equipment occurs.

The underlying cause of these accidents was improper flagging in one instance and a disregard of the flag by the train crew in the second case.

I recall another type of accident, while not usual, illustrates what can happen if what we commonly call "horse-play" is allowed on the job.

A crew using pneumatic tampers had stepped to one side to clear a passing train. One of the men had stepped into the loop caused by a kinked hose and was intent on watching the train pass. A fellow workman gave the hose a sharp jerk, the other man fell and was struck by the train and killed.

A good deterrent for accidents of this sort is instant dismissal of the guilty man or men.

Adzing Machines

A mechanical adzing device is being widely used. The machine, due to the rapidly revolving cutting head, has caused numerous eye injuries from flying chips. In one case there was total loss of sight. To remedy this condition, safety-guards have been applied to the cutting head, and as a further precaution, the men working nearby are required to wear goggles.

It is too late to caution a man to wear his goggles after he has lost his sight. Therefore, definite instruction should be given the men to protect themselves and, if necessary, suitable discipline should be resorted to, to see that they do.

Spike and Bolt

Due to insufficient classification of injuries, I am unable to give the number of injuries caused by the use of mechanical spike drivers, pullers and powered bolt tighteners.

Observation of them in use discloses the fact that injury to the hands and feet are quite numerous.

Great care should be taken in setting the spike because there are always several men within range. If it flies from under the hammer someone is apt to be seriously hurt or killed.

Ordinary care will reduce the number of accidents caused by these machines to relative unimportance.

Welding Machines

A few railroad companies have adopted the practice of building up battered rail joints by the process of arc-welding. On steam roads, the work requires that current be produced by portable generating sets.

The use of electricity introduces an additional chance for accident. While the voltage used is not extremely high, there are conditions, as when a man's resistance is low, under which he can be dangerously shocked. Perhaps the most care should be taken in the use of the grinder which is a part of the equipment. The usual voltage on this machine is two hundred and twenty. Poor grounding and defective insulation of the feed wires has accounted for several reported cases of shock.

Further, eyes must be protected from the injurious rays generated by the arc. Also, there is constant danger of eye injury from flying particles of metal and dust in using the grinder.

Suitable head helmets are provided for the welders and goggles for the other men. It is an open question as to whether or not a man's eyes may not become defective from constant use of the electric arc. The suggestion has been made that workmen be rotated at suitable periods and given some other kind of work for beneficial eye rest. This idea is being carried out as an experiment by some firms. Up to the present time adequate reports have not been made on the results obtained.

Weed Burners and Sprayers

Weed destroying equipment is a part of the machinery found on most roads. One type depends on heat, the other makes use of poisonous chemicals, mostly compounds of arsenic.

The burners develop high temperatures and, as minor adjustments and repairs are frequently necessary, cases of severe burns are encountered. The usual first aid kits are carried on these outfits and emergency relief is given. However, subsequent lack of care, resulting in infection, has caused permanent disability.

In handling solutions of arsenic, extreme care should be taken to remove it from the skin in the event of contact. The poison is insidious and immediate effect may not be observed.

We have a record of foot infection from a man who had walked about the machine in the wet grass. If the right care is not given at once, fatal poisoning may be the outcome. To avoid burns or poisoning, is a matter of ordinary intelligence and yet, we have constant repetition.

Careless handling of gasoline from tank cars to the storage tanks on the machine has been the cause of more than one disastrous explosion.

General Hazards

All of the machines described are of such weight that they must be moved from place to place on the tracks. Most of them occupy the track while they are being used.

If I were asked the question, "What constitutes the greatest hazard", I would say—Train Operation.

Under these circumstances, liability to accident becomes greater as railroads expand from single to multiple tracks and traffic density increases.

Rules governing the movement of work equipment are in effect and are strictly enforced on every well managed road, but regardless of the rules, we have wrecks entailing serious injury and frequently loss of life.

Investigation usually develops the fact that the work gang failed to clear the track, due primarily to improper flagging or disregard of it by the crew of the train flagged.

The high percentage of fatality, about 15 per cent, resulting from such accidents caused by collision places this hazard in the front rank.

General Hazards Independent of Train Movement Mufflers

I will mention a general hazard not connected with train movement. A feature common to most units and one deserving of our attention, is the practice of using internal combustion engines without adequate muffling. We have mufflers, what we should have is a silencer.

Shortly after we had begun the use of our rail welder, we had a man killed. The facts brought out were that he had put his foot on the rail and was intent on tying his shoe lace when a passing train struck and killed him.

The investigation showed that the engineman had blown his whistle, vision was not obstructed, and yet he did not hear the approaching train. Why?

As one of the contributory causes, he was standing near the generating unit driven by a gasoline engine. All of you have experienced the deafening effect of the explosions from a motor running with the cut-out open. Your experience was that within a certain radius it was very difficult to hear any other sound. The human ear is a delicate mechanism receiving vibrations and recording them in our brain as sound. There is a very definite limit to its capacity to receive and record, and when this limit is reached, the ear and brain cease to function. I want to say again

we should have silencers. After this accident, the road with which I am connected, has taken steps to equip engines of this sort with devices which will practically eliminate noises.

Since somewhat similar conditions exist when inadequately muffled gas engines interfere with hearing orders, approaching trains and shouts of warning, it seems inconsistent to give ourselves a handicap that requires exceeding alertness to overcome.

The question confronting the railroads is:

Can track work be done with a machine with less injury to the men than by strictly hand methods? The answer is Yes—because it reduces man-hours. But we must first recognize the inherent hazards of each type of machine used, and then do everything humanly possible to eliminate them. There are several advantages in our favor. Three specific ones are: Lesser number of men involved, a higher grade of intelligence and better organization.

We have proved to our own satisfaction that this is true. The road with which I am connected, have one or more of each of the machines I have been discussing. Our safety records show, that as mechanical means for doing track work have expanded, our injuries per million man-hours have been consistently decreasing.

CHAIRMAN LARSON: Is there any discussion?

MR. HAMMOND: I would like to ask Mr. Willahan if he requires men using automatic tie tampers to wear goggles.

MR. WILLAHAN: The practice is to wear goggles when near these machines.

M. J. FLANIGAN (Chicago, Milwaukee & St. Paul Railroad): I would like to ask Mr. Willahan if he requires the men to wear foot-guards when operating the adzing machines.

MR. WILLAHAN: We haven't yet, but we are inclined to think that we will.

ADJOURNMENT

Wednesday Morning Session
October 1, 1930

C. F. LARSON, Chairman
Missouri Pacific Railroad Company, St. Louis, Mo.

The third session of the Steam Railroad Section convened, C. F. Larson, the general chairman, presiding.

CHAIRMAN LARSON: The first number this morning is "How Can We Reduce Accidents to Employees Due to Being Struck and Run Over by Cars and Locomotives?" by George H. Warfel, Assistant to the General Manager of the Union Pacific Railroad Company, Omaha, Nebraska.

How Can We Reduce Accidents to Employees Due to Being Struck and Run Over by Cars and Locomotives?

By GEORGE H. WARFEL
Assistant to General Manager, Union Pacific Railroad Co., Omaha, Neb.

This is the most serious and the most important matter coming before this session from the standpoint of the conservation of human life.

During the last four years there has been an average of about 1350 employees on duty killed in each of those years from all causes, and roughly speaking one-third of those employees are killed from being struck or run over by cars, or an average of 420 men killed per year, and 600 injured, which means that the fatality percentage is almost fifty per cent. It is at least better than forty per cent of the total number of accidents. The maintenance of way men account for 226 per year out of 420 killed, and 217 of the 600 injured. Of those, the track men represent 187 killed and 180 injured. Do you realize those figures?

The yard forces and train forces together account for less than the track, 130 killed a year and 261 injured, as against the maintenance of way, 226 killed and 217 injured. I want you to get this picture. For each year the casualty rate has remained about the same, except for 1929 when it was a little worse. We have made no impression on this type of accident during the last four years.

Most of the track men who were killed by being struck and run over are section and ordinary track workers. Extra gangs are usually employed on heavy jobs under slow order protection, and consequently are better taken care of.

Few accidents occur on track motor cars and only a very small percentage of "struck and run over" accidents by trains involve motor cars. These accidents occur to men working on and walking along the track, section and ordinary track patrol men.

There is another peculiarity about this type of accident. Nobody else at the time can do anything to aid the man to avoid the catastrophe. Whatever is to be done has to be done by previous preparation and training. What is the first fundamental thing we might try to do for this type of man? I would say teach him, train him, and check him on this first fundamental rule: "Look both ways when you hear anything that sounds like a train."

One of our serious weaknesses is our failure to get our section foremen to teach their men, to talk to them like teachers. They are reluctant to do this.

We had a man killed while laying steel between two stations. This experienced

track laborer was working between the main tracks on a curve. A train was approaching, and the foreman called out, "Hot rail," but he didn't remind them that this was single track today. This laborer laid down his shovel and ambled slowly and thoughtlessly across the north track. But the train was on the north track. He was struck and killed before the eyes of the foreman and his men.

How had the foreman warned his men about the single track? When they put the motor car on the track that morning he said, "Put her over on that south track, there is nothing on that this morning." He expected these colored laborers of low intelligence to glean the fact that the track was being singled. We must train our foremen to give explicit orders.

A serious situation arises when any section gang has work on a high speed track where the view is restricted. If there is any failure to whistle warnings around obscure points, the train may be right upon them before they realize it. I feel that the foreman should take the position of lookout and do nothing else, where the view is restricted to less than 1,000 feet on fast track or 600 feet on medium track. Check up and insist upon engineers whistling at points where the view is obscured. For the benefit of maintenance of way men that should always be done.

On extra gangs of fifteen men or more, a foreman or assistant should always be the lookout man. This is necessary in large gangs to assure immediate warning when a train is approaching. A good habit is to carry a police whistle or a crossing flagman's whistle. If you buy whistles, I suggest you buy the hard rubber whistles so there is no danger from freezing to a man's lips or the plating wearing off and men getting brass infection from the brass whistles. Every man in that gang should be taught that when the whistle blows, he immediately looks both ways and gets off the track. Don't get back on the track until that whistle blows again.

Track walkers are frequently struck and run over. The track walker is out by himself. He gets thoughtless walking about; he is prone to think of other things, and fails to keep looking behind him. To look behind, especially on single track, is his only salvation, especially in the winter when his ears are covered up. On double track he should walk against the current of traffic.

Motor cars can best be protected by flagging. The observance of block signals by every motor car operator to help him place the approaching train is very necessary. We have a peculiar situation with colored light signals, particularly on single track operation. Most colored lights today are advance light. It takes a train to light the signal, and if there is no train approaching, the poor fellow coming up on the track guard gets no information, for the signal is blind to him. I suggest that we insist on colored light signals on single track being so wired that the light will show red when there is a train in that block, regardless of whether any other train is approaching. If a foreman approaches a blind signal he will have assurance that no train in that block is approaching from the other side of the curve, because if there is, that signal should show red. It costs but very little and certainly is worth while over a period of years in saving track men's lives and the expedition of track men's motor car movements.

Switchmen and trainmen have contempt for a bare track. They are used to working around on them and they don't sense the hazard.

It is hard to get a hard-boiled switchman to fear the open track, but that is his one salvation. All men in yards and about stations, trainmen as well as track men, should be taught, watched, checked and reported, for stepping on a track without first looking both ways. They should go across it and get off as soon as possible.

They should not go between cars until they know that the stop signal has been repeated and understood. Too many times men are run over going between cars to make a cut or to couple up air because they had not given the stop signal; they thought they had time to make it, or had given the stop signal but didn't know whether it had been received.

Don't stand foul of a track when there is noise or disturbance about you. There is a sort of hypnotism about standing and watching a moving train from the side, watching the recurrent passage of the trucks and wheels, and a man becomes rather hypnotized and forgets where he is.

We must continue to teach yard men, switchmen and trainmen to do all their inspecting from between the tracks, get outside of that track, between the tracks to make either running or standing inspection.

Break the habit of walking between rails. We should detail safety workers among assistant yardmasters and foremen who are willing to go over and tap the workman on the shoulder and say, "You know what we have been preaching about this."

Break the habit of trying to get on cars moving too fast, whether in the hump yard or in the kick-and-pull yard, or whether on the road train out along the line. Engineers start to leave town too fast—the rear man should not tolerate speed at which he cannot hit the hind end. He should not be forced to hit the middle of the train, or along toward the rear of the train, for too frequently he goes under.

For the benefit of trainmen and switchmen drive home to them at every opportunity that the most dangerous moment in the trainman's life is when he goes onto the brake platform, operates the brake, and leaves that platform. The hand brake is, not only a means for stopping a car, but a very effective hand-hold; if a man remembers that, it will save him from the impact when another car is kicked into the one he is on.

L. G. BENTLEY (Chesapeake & Ohio): Is there any objection to a rule prohibiting trainmen from giving a signal and crossing in front of the car that is moving in accordance with the signal?

Mr. WARFEL: We have found no objection to that rule, and I believe it is very strictly enforced. One of the most frequent causes of accidents is in kick-and-pull switching. A train has just been on that track, comes out, before the trainmen goes over to throw the switch, he gives a back-up sign and then steps over and throws the switch. He should first throw his switch, then get back on the other side, and then signal to the fireman. If the supervision is sufficiently aggressive, he will do that without the loss of a second's time.

J. J. HEAVEY (Erie Railroad): Mr. Warfel, do you have a rule that requires track men to get off all tracks while there is movement on any of them?

Mr. WARFEL: Within the past year we have permitted extra gang work to continue on one main track while a train was passing on the other, if a track intervened between the two, to avoid disrupting the work of a 100-man extra gang for several minutes while a slow-moving train was going by. They must, however, keep clear of the intervening passing track. During all of the time a train is passing, we have watchmen at both ends of the gang with their whistles at their mouths; there are four other whistles ready in a gang. We do not permit this where the straight view is less than one mile.

ROBERT SCOTT (Atlantic Coast Line): Mr. Warfel, what is the most effective way to teach men in the maintenance of way department on safety.

Mr. WARFEL: I only know of two reliable ways. We call in maintenance of way foremen from November to April. We hold maintenance of way foremen safety meetings attended by half the foremen one month from a district and the other half the next month. They are drilled and schooled in what to teach their men; they must teach their men the same things we teach them. We try to familiarize all the laborers with their safety rules which we furnish every laborer in book form.

During the warmer weather, from April to November, we insist that the division engineer, the general roadmaster, the safety agent, and oftentimes another officer, shall make a motor car trip over part of the division each month, usually about one-third or one-half of the division, and hold a fifteen or twenty minute safety meeting with track men, bridge men and other gangs.

They stop the work, no matter what is going on, and hold a safety meeting.

C. T. BAILEY (Oregon Short Line): We have required each motor car operator to pass an annual examination on safety rules which has reduced accidents in the track department.

Mr. WARFEL: Furthermore, every track walker must also qualify as to sight and hearing, and pass an examination on the rules.

W. F. JOHNSON (New York Central): We have been requiring our section foremen to devote at least ten minutes of their time, usually the first thing on Monday morning, to a discussion of some lively topic before they start out on their week's work. Then, if some special work comes up during the week, the section foreman gets his men together and goes over the dangerous points in order that they know what to look for. We have one sub-district in the bridge and building department that has not had a reportable case so far this year. Formerly we had a number of injuries in the department.

CHAIRMAN LARSON: The next number on the program is by Mr. C. W. Hammond, Assistant General Safety Agent, New York Central Lines.

Overcoming the Hazards of Operating Hand Brakes

By C. W. HAMMOND

Assistant General Safety Agent, New York Central Lines

Mr. C. T. Bailey, chairman of the committee on train service accidents of the Safety Section, American Railway Association, in his report submitted before the A. R. A. Convention held at Denver, Colorado, called attention to the fact that there had been a 44 per cent reduction made in casualties due to train service accidents by comparing 1929 with 1923. He also stressed his gratification on the results that had been obtained, to all of which I most heartily agree. However, when we start to sub-divide train service accidents occurring during this same period, we find that casualties caused by operating hand brakes were reduced only 31 per cent and if the Safety Section of the American Railway Association were obliged to base their comparison of reduction on accidents of this character alone, during this same period, they would not have reached the goal of 35 per cent which they hope to attain.

I believe that the goal of 35 per cent reduction will be reached by the end of 1930 due to this cause of accidents because, when we compare the reduction in casualties as between the years 1928 and 1929, we find that there were 25 killed and 1,867 injured during 1928 as against 37 killed and 1,752 injured during 1929, or an increase of 12 killed and a decrease of 112 injured, which represents a total decrease in casualties of 100, or 5 per cent; and if the same percentage of reduction is maintained during the year 1930, we will surely decrease casualties due to this cause, at least, 35 per cent covering the seven year period, 1924 to 1930 inclusive.

While this is nothing to be especially enthusiastic about, it will show a 35 per cent reduction, but it would indicate to me that special safety activities should be introduced about to curb this type of accident, especially as it applies to the number being killed. Experience has taught me that accidents due to operating hand brakes can be prevented as I have operated hand brakes for twenty five years of my railroad service and have never been injured due to this cause, therefore, it is my belief that what I can do, others can do.

When we start to analyze the twenty one causes of hand brake accidents submitted by the Interstate Commerce Commission, Bureau of Statistics, we find that there are, at least, three outstanding causes that contribute to nearly 85 per cent of the deaths and 50 per cent of the injuries as follows:

1. Losing hold, slipping, or falling, not otherwise classified.
2. Sudden stopping, starting, lurch or jerk of train or car.
3. Brake club, struck by, because wheel flew around.

Allow me to take these three causes of accidents up in their respective order and see if I can possibly recommend a remedy. When we say that an employee loses his hold, it means, in many instances, that he has first lost his foot hold which invariably means that this causes him to lose his hand hold at about the same time due to being thrown off balance, which naturally causes him to fall and can only be prevented by first knowing that you have a proper foot and hand hold and that your hand brake is tested before depending upon its use. This is especially true when we realize that today, at least, 75 per cent of our hand brakes on freight car equipment are operated from the brake step board, and oftentimes covered with ice and snow.

Hand brakes kicking or brake chains kinking or twisting has caused many employees to lose their foot and hand hold and can be only overcome by the employee expecting that every brake he operates may be "kicker" and be on his guard to prevent being struck by brake club or lose his hand hold account of wheel flying around. Kinked or twisted brake chains should be observed by the operator of brake before depending upon its use, as a brake with a kinked or twisted chain is not necessarily defective.

Cause No. 2 can be overcome by first knowing that the car is detached from string of cars being switched before starting to operate hand brakes, that is, if you are flat switching, as many employees have been jerked from top of car because the man that was supposed to cut the cars failed to pull the pin. This, of course, does not apply when doing hump switching, as the employee should be in a position to test and operate his brake before cars are detached but in motion. Another good rule to follow while operating hand brakes is always anticipate that a sudden start or stop of cars may be made at any time and be ever on the alert to guard against it, as falling from the top of cars or from a brake step board usually results in serious injury.

Cause No. 3 can be overcome by using brake pawl while operating the brake, ever remembering to push on brake club with left hand and pull on brake wheel with right hand (providing brake club is being used). Strongarming brakes is an improper practice and should be prohibited, as this practice has caused many employees to be struck by flying brake club.

Much has been said about the use of geared brakes on freight equipment as a remedy to overcome accidents while operating hand brakes and while the New York Central Lines have installed one thousand of these brakes for trial purposes, they have not been in use a sufficient length of time to determine their efficiency and safety. Perhaps, some of the members present from the railroads that have standardized on these brakes can give us their opinions in the discussion that will no doubt follow my remarks.

Years ago when yard and road movements of trains and cars were controlled by hand brakes there was a very great similarity in the class of brakes being used and while they did not have the same braking power as the brakes we have today they were simple to operate, whereas, today we have the horizontal, vertical, lever, pump handle and various other designs, all of which are supposed to be efficient but not as simple to operate as the type used in past years and it is my belief that, if there was a more uniform standard of hand brakes adopted on freight equipment that was easy and simple to operate, it might be another medium of overcoming hand brake hazards.

Let us consider for a moment what class of employees are being killed and injured due to the operation of hand brakes. When we look over our Interstate Commerce Commission figures covering the year 1929, we find that practically all casualties due to operating hand brakes were to trainmen. What class of trainmen

were they, road or yard? I had occasion recently to ask a road brakeman this question, "how long has it been since you have operated a hand brake?"—his reply, "about once in two months, and that was on a car that was set out on side track account of hot journal." Now if this applies on all roads of the United States, and I am of the opinion that it does to a greater or less degree (with the possible exception of road crews doing local freight work) then we must agree that the majority of accidents due to operating hand brakes occur to yard men as this is the class of service doing this type of work.

My observations prove most conclusively that there are less hand brakes being used each year, therefore, there really should be less accidents of this nature for two reasons. First, many railroads are running solid trains which are classified as initial terminals and run to final destination with as few switching movements as is consistent with the make-up of the train. This not only saves additional switching at many terminals but also saves delay to freight, which is a very important factor in railroading today when railroads are looking for more business. It is apparent, therefore, that from the standpoint of road freight train movements that there are less hand brakes being operated each year as the train is controlled mostly by the engineer and instead of hand brakes being used on steep grades, this feature is overcome, to a great extent, by the use of retaining valves. The second reason why there are less hand brakes used annually in yards is not only because of more solid trains and less switch movements, but many railroads are installing car retarders in their hump yards which control the switch movement of cars, which greatly reduces hand brake operations. However, I really think it is a blot on our intelligence to admit that we should be obliged to depend on mechanical devices to reduce casualties of this nature, when proper education and practical demonstrations will bring about the desired results.

Gentlemen, we are not making the progress that we should in reducing employee casualties caused by operating hand brakes, or in other words, we are slipping to a certain extent; that is, we are not keeping pace with the reductions being made in non-train accidents.

Proper inspection and maintenance of hand brakes should not be overlooked in connection with reducing hand brake accidents as we still find employees being injured due to faulty equipment in some instances, and while the percentage is small compared with the improper practices used in operating hand brakes, I believe our inspection forces should do everything in their power to detect any defects, and at repair points where cars are placed for major or minor repairs, proper consideration should be given to maintaining each car with an efficient hand brake according to the Interstate Commerce Commission ruling. This is especially true in this advanced age of fast road and yard movements with cars loaded to their full capacity.

Gentlemen, the time has nearly arrived for us to ring down the curtain for the final act of the campaign to reduce all casualties, at least, 35 per cent on the railroads of the United States during the seven year period ending with 1930. As I stated in my previous remarks that being an optimist, I believe that this will be accomplished, in fact, many of our railroads have already exceeded this goal, and I am hoping that when we have occasion to look back over the achievements of this campaign, we will have no cause for regrets and that the class of accidents under the caption of operating hand brakes will also show the required reduction. Will you do your part to bring this about?

M. J. FLANIGAN (Chicago, Milwaukee & St. Paul): Mr. Hammond, what ought to be the standard brake on our freight equipment? I don't quite agree with what was said about the freight brakeman not manipulating the hand brakes except on local freight trains.

Since our box type cars are much higher than in the days when I was braking, it is almost impossible to get the brake wheel high enough on top of the car on account

of the clearance, and you have to have a step on the end of the car or either sit down on top of the car to set the brakes.

I would like to know if the railroads as a whole ought not adopt some ratchet type brake, in other words, a one-hand brake. I don't think that we ought to pick out any one manufacturer's brake. We have made three or four tests on a hump in our Milwaukee terminals, and we have found three ratchet type brakes of about the same braking power.

MR. DOLAN (New York, New Haven & Hartford): The Ajax type hand brake has been adopted as standard for all freight equipment on the New Haven. It is a hand brake that you swear by and not at. It has proven eminently satisfactory to everybody.

We drafted a special circular on the operation of hand brakes, which was adopted by the management. We made it compulsory to operate a pawl or dog with every type of hand brake. We showed how every type of hand brake should be operated, and it brought our accidents down to practically nothing.

MR. DOUGHERTY (Michigan Central): I happen to be a yard brakeman, not necessarily, a hard-boiled one. I notice that out of the 37 deaths, 28 of them were yard brakemen, and out of the 1755 injuries, 1165 of them occurred to the same employees. This indicates that the men who should be considered are the yard brakemen. As a result of my experience and observation, I believe that you will never improve conditions until the railroads come to the high-powered hand brake. However, I don't believe that the Ajax is the only high-powered hand brake that meets these specifications. It is unquestionably a good brake, but in so far as box cars are concerned, it has certain defects that can be gotten away from by installing the horizontal type brake. The visibility is not at its best on a brake step below the level of the car with your head almost flush with the roof of the car. Remember that we operate these brakes not only in the day time, but in the night time, in foggy weather, and when there is snow and ice. To couple onto cars, it is necessary to see above, along and below the car. By operating the vertical wheel type of brake, with your right hand and having the left hand free to protect yourself, you are supposed to eliminate all classes of hazards but you don't.

Install the vertical wheel type of brake on gondolas or open type of equipment because visibility is not a factor. On this type of equipment you can't get away from the hazard of the brake step in between or over the wheels, regardless of its location, ahead or behind. It has the added advantage of forcing a man to work on the outside of the car, and thus eliminates the hazard of a shifting load catching his hand, foot or body.

If the horizontal wheel type of brake is put on box cars, with the ratchet and pawl flush with the roof of the car, the man operating the car can get almost perfect visibility. He can go to the head end of the car or the rear end of the car. If there is a sudden lurch, a man is far better off if he is on the roof of the car to receive that jerk or to have the slack pull away from him, than he will be if he is on the brake step or between the ends of the cars.

If a vertical wheel type of brake is used, it is placed in the most hazardous place—in between the cars—and I don't care to see the day when that type of equipment is made standard.

J. L. WALSH (Missouri-Kansas-Texas): The power brake at the end of the car on a platform five feet below the top of the car is, in my opinion, a very dangerous brake. To stop the car, the power brake is excellent. I believe we can get manufacturers to put it on the side or end of the car, close enough for a man to go up a ladder and set the brake from the ladder, instead of getting around on the platform five feet below the top of the car. It would prove just as effective and remove the man entirely from all the hazards that he is subject to now by getting between the

cars. If he slips or falls, he falls on the track. A shifting load may get him. He has no visibility ahead.

J. F. H. WISE (Canadian National Safety League, Toronto): Mr. Hammond, have you ever tried a shoe with a non-slipping sole for the brakeman?

MR. HAMMOND: I have a pair of them myself made by the Williams Shoe Company of Bertram, Ontario, and I have not found the substance on which they will slip yet. It is possible that such a shoe furnished to the brakemen might prevent slipping.

MR. DOLAN: We have used the Ajax brake for the last three years. All of the points Mr. Dougherty referred to have been met in actual operation and have not proved objectionable in the operation of the hump yard.

CHAIRMAN LARSON: The next number is by Mr. C. L. LaFountaine, General Safety Supervisor, Great Northern Railway Company, St. Paul.

Coupling and Uncoupling Accidents

By C. L. LaFountaine

General Safety Supervisor, Great Northern Railway Company, St. Paul, Minn.

In the annual accident bulletin prepared by the Bureau of Statistics, Interstate Commerce Commission, reportable accidents are divided into three primary groups, namely: First train accidents; second train service accidents; and, third non-train accidents.

In 1929 there were 909 fatalities to employees on duty in train service accidents which represent 67 percent of the total number of employees killed; 20,965 injured, representing 35 percent of the total number of employees injured on duty.

Accidents due to coupling or uncoupling cars or locomotives, the subject assigned me, is one of the classifications of train service accidents. The following table shows the number of employees killed and injured annually for the ten year period due to this cause:

Year	Killed	Injured
1920	151	2,450
1921	78	1,540
1922	81	1,498
1923	103	1,954
1924	72	1,592
1925	64	1,538
1926	64	1,591
1927	48	1,325
1928	37	1,145
1929	59	965

You will note in checking over the column showing fatalities that, with the exception of the years 1920 and 1923, we have showed a constant downward trend to the year 1929; the latter year shows an increase of 60 percent over the record for 1928 and 23 percent increase as compared with 1927. Without making any further analysis this would appear alarming. However, in making a comparison in the number of fatalities in 1929 with 1928, we are selecting the best record by far ever made by the American railroads and the record in 1927 was second only to the 1928 record. In comparing the number of fatalities in 1929 with the average for the ten year period, we find that we had a decrease of 7 percent. Further, railroads enjoyed a greater

volume of business in 1929 than any previous year, which must have required a larger addition of new employees and literally thousands of additional coupling and uncoupling operations.

Accident Causes and Remedies

In endeavoring to determine the causes of the fatalities and injuries, I am going to refer to table No. 71, Interstate Commerce Commission Accident Bulletin No. 98, where we find that the unexpected movement of cars while adjusting coupler, either due to slack, mistake or misunderstanding in giving or observing hand signals, and other causes, resulted in the death of 19 employees and the injury of 148. These causes alone show an increase of six fatalities over either of the previous two years. Accidents due to the unexpected movement of cars are generally the result of lack of understanding between the members of the crew as to the work which is to be performed. While definite instructions, the observance of which would positively avoid such accidents, cannot be issued, nevertheless any member of the crew can convey to the balance of the crew, either orally or by signal, knowledge of the work he is about to do in such a way that it will not be misunderstood. A full understanding on the part of all concerned in train and yard service is of vital importance in doing their work, but a thousand times more so when some member of the crew is about to put himself in a position whereby an unexpected movement of the cars would result in killing him or maiming him for life.

The unexpected movement of cars due to slack was responsible for 2 deaths and 64 injuries. There is a possibility, under certain conditions, of slack in cars running out sufficiently to cause accidents. Just when and under what conditions to expect this is unusually difficult to explain to inexperienced men except by actual demonstration. Even experienced men do not always foresee the full extent to which the slack may run and to a new man the situation is especially full of danger. There are certain precautions to take that will occur to every practical train or yard man. Supervisory officers and older employees should instruct the younger men when to anticipate this condition and how to guard against the hazard, either by setting of brakes or by waiting for the brakes to release and slack to run out as the circumstances might warrant.

Mr. Jeffers, vice-president of operation, Union Pacific System, in his address at the annual meeting of the Safety Section, American Railway Association, this year at Denver, in his opening remarks stated: "Proficiency in the art or science of railroading has to be acquired by experience and by word of mouth instructions. There is probably no general trade, profession or industry with so little of the technique recorded or outlined in text books," and I fully concur in this statement.

Accidents due to adjusting coupler when moving cars were nearing each other resulted in 15 deaths and 82 injuries. This practice is unnecessary and reckless. A common instance is the habit of men stepping between moving cars when coupling is about to be made, usually to determine if the knuckle has fully opened or to adjust the location of the coupler. In the majority of such cases their efforts serve no good purpose in making the coupling. That such condemned practices should persist in spite of company rules, is due to, I believe in a measure at least, the unfortunate fact that such practices were once perfectly legitimate. They are the offspring of the link and pin age when train and yardmen had no choice but to go between the cars and make every coupling by hand. Then a maimed hand was a badge of honor and a tribute to the intrepid spirit of pioneer railroading.

The habits of years are not easily shaken off and even after the advent of the automatic coupling device, many of the older men continue the unnecessary practice of stepping in between the cars to adjust knuckles and coupler at or about the time the cars are to come together without any fear of meeting with an accident or

realizing the bad example they are setting for the new employees entering the service who naturally follow the example set by the older employees, with the result that these evils have been handed down through the years.

My remedy for correcting this dangerous practice would be to prohibit employees from going between moving cars when nearing each other. This can be done. It may take some little time, as the habits of men are not easily changed, but I am sure it can be accomplished if desired and an honest effort is made.

The causes which I have referred to were responsible for 58 percent of the fatalities in coupling and uncoupling accidents and resulted in 230 of the personal injuries, including those of a serious nature.

Manipulation of the uncoupling lever accounted for four fatalities and 253 injuries. Every transportation company should insist upon a careful inspection of all coupling and uncoupling equipment and see that it is kept in good safe and efficient working condition. Every train and yard man should be an inspector of the equipment he is called upon to handle as far as his duties will permit, so that he will know for himself that coupling appliances are in condition to perform their required function. When defects are discovered, he should refrain from taking chances.

We must secure the hearty cooperation of operating officers to insure that men entering the service are correctly instructed and that safety rules are strictly enforced. This, together with the continuance of the educational campaigns which are now in force, I am sure will bring about a reduction in this class of accidents.

CHAIRMAN LARSON: I will now call for a report from the Nominating Committee.

Report of the Nominating Committee

C. T. BAILEY (Oregon Short Line): The Nominating Committee wishes to present for officers for the ensuing year, the following:

George H. Warfel, Chairman.

William A. Booth, Vice Chairman.

J. L. Walsh, Secretary.

The following chairmen of standing committees:

Poster, L. G. Bentley, Chesapeake & Ohio.

Program, Charles E. Hill, New York Central.

Prevention of Highway Crossing Accidents, E. G. Evans, Louisville & Nashville.

Membership, W. H. Failing, Central Railroad of New Jersey.

Publicity, F. E. Strouse, Pennsylvania Railroad.

Public Relations, M. J. Flanigan, Chicago, Milwaukee, St. Paul & Pacific, for the United States; W. A. Booth, Canadian National, for Canada.

Engineering, A. E. Willahan, Kansas City Southern.

Present and Future Activities, J. E. Long, Delaware & Hudson.

Accident Causes and Remedies, T. H. Carrow, Pennsylvania.

Safety Contests, A. V. Rohweder, Duluth, Missabe & Northern.

Health, Dr. J. W. Gormery, Delaware & Hudson.

Executives at Large:

C. F. Larson, Retiring Chairman.

D. G. Phillips, Wabash Railroad.

F. M. Metcalfe, Northern Pacific.

HERBERT A. ROWE (Delaware, Lackawanna & Western): Mr. Chairman, I move that the report of the Nominating Committee be accepted, that the nominations be closed and the Secretary be directed to cast a single ballot of the convention.

(The motion was carried unanimously, and the Secretary cast the ballot.)

ADJOURNMENT.

Wednesday Afternoon Session
October 1, 1930

C. F. LARSON, Chairman
Missouri Pacific Railroad Company, St. Louis, Mo.

The meeting convened with C. F. Larson presiding.

CHAIRMAN LARSON: The first speaker is Mr. C. W. Galloway, vice-president of the Baltimore & Ohio Railroad Company, Baltimore. I am going to delegate the pleasure of introducing Mr. Galloway to Mr. W. W. Wood, superintendent of safety and welfare of the road represented by Mr. Galloway.

W. W. WOOD: Some men are born great, some achieve greatness, and some have greatness thrust upon them. The man I am going to introduce to you is one of the achievers. Three generations of his family have been connected with the Baltimore & Ohio Railroad. When his father was killed in a railroad accident, the boy became an office boy in the office of one of the vice-presidents of the road.

We who know him are willing to stand up before the world and say: "This is a man." And I take pride in introducing to you Mr. Charles W. Galloway, vice-president in charge of operation and maintenance on the Baltimore & Ohio Railroad.

Address

By C. W. GALLOWAY
Vice-President in Charge of Operation and Maintenance, Baltimore and Ohio Railroad Company, Baltimore, Md.

The railroad plant is so constructed, thirty feet wide in some places to several hundred in others, and from 5,000 to 10,000 miles long, that the safety problem covers a wide stretch of territory. These problems may be grouped roughly into four classes; accidents to passengers, accidents to employees, accidents to trespassers, and accidents at road crossings.

In the handling of passengers the railroads have risen to such a high degree of safety that for years accident insurance companies have been offering double indemnity to any clients that may be hurt while riding on trains; one casualty company, I understand, has a standing offer of ten thousand to one that you will not be killed while riding in any given twenty-four hours. That you may not feel hesitant in taking advantage of this apparently liberal offer, statistics prove that the chances are about 11,000,000 to one that you will not be killed if you ride in the forty miles of average travel; and 870,000 to one, if you take a journey of 1,000 miles; so the casualty company has a very comfortable margin of safety.

About seven years ago the American Railway Association undertook to reduce accidents to employees, 35 per cent. At the end of 1929 this goal had been reached and surpassed by so many railroads that it is now proposed to raise the ratio of improvement to 50 per cent and perhaps higher. Accident prevention to passengers and to employees is directly under the control of the railroad management and a noteworthy improvement is obvious from year to year.

When we come to trespassers the case is different. It is impossible to place along our lines such signs as "No admittance" and "Call at the office." The records for 1919 as compared with 1929 show a slight improvement. In 1919, 5,211 trespassers were killed or injured by the railroads. In 1929, 4,870 were killed or injured. Just why this slight improvement has been made is impossible to say, although the chances of a hitch-hiker on the highways have probably increased and the improved surface of the public roads may account for part of it.

It is to the problem of grade crossing accidents that I especially wish to call your attention. The public has an incomplete right to the use of these crossings, perhaps a complete right to use them when not used by the railroad; but it is the indisposition on the part of the automobile driver to recognize our mutual rights that makes our problems so difficult of solution. We put up warning signs, wig-wags, and flash-light signals, and have watchmen at busy crossings; we sound our whistles and ring our bells; we do everything we can, except to stop the operation of the railroad, to avoid these accidents, and still they occur.

This is not a railroad problem, primarily. It is a national problem, and an association such as this, nationwide and made up of leaders in our business and social life, should head the campaign to arouse the public to the enormity of losses and devise ways and means to check such criminal destruction of human life. Increased speed means increased hazards and the automobile drivers seem determined to go to the limit at railroad crossings and road intersections.

Recently it was revealed in the publication "Railroad Data" under a caption in large print that 31,500 died in automobile accidents in 1929. This is an increase of 13 per cent over 1928, and is equivalent to the death of one person in automobile accidents each and every seventeen minutes last year. In the previous year it was about one every nineteen minutes. Estimates based on the first half of 1930 show one death in every 14.5 minutes. Consequently the situation is getting worse. When measured in comparison with the casualties in the World War, automobile accidents last year alone took a toll of life equal to forty per cent of all the casualties to American participants in the World War.

I was greatly impressed with the remarks of Honorable R. P. Lamont, Secretary of Commerce, in a radio address some months ago. He said, "Safety is a serious national problem, primarily because our people generally are not fully aware of the increasing hazards of life and the alarming facts that confront us."

He pointed out that there were 10,000,000 accidents each year in the United States; that fatal accidents alone run close to 98,000. Consequently the 31,500 who were killed in automobile accidents last year is about 33 per cent of this total of all fatal accidents. Considering accidents from all causes, he revealed that one person out of every twelve is injured or killed every year, a most serious situation.

Let us consider the relation of automobile fatalities to persons killed in train accidents. In the ten years 1920 to 1929, inclusive, on all railroads in the United States, there were 579 passengers killed, and having in mind that there are more persons injured than killed in railroad accidents, the total number of passenger casualties on all railroads in the United States in the ten years to which I have referred, numbered 22,854. The number of persons killed in automobile accidents in one year is thirty-nine per cent greater than the number of railroad passenger casualties in ten years. During this period passenger trains ran 5,600,000,000 miles, and the railroads carried 9,300,000,000 revenue passengers a total distance of 361,000,000,000 passenger miles.

The number of casualties at grade crossings on all railroads in the United States for the eleven years, 1919 to 1929, inclusive, in automobiles alone were 23,628 people killed, while during last year alone in all accidents involving automobiles, I repeat, 31,500 were killed. At grade crossings, 2,085 were killed as against 31,500 killed in all automobile accidents, or only about seven per cent of the total.

It would therefore seem that the railroad grade crossing, is not the place to look for the correction of this trouble. Yet hardly an accident occurs at a grade crossing which has not aroused a great clamor from every direction demanding the removal of the crossing, utterly disregarding the factor that should really have consideration, which is; What is being done to insure a better supervision and control over those who are permitted to operate motor-driven vehicles? Typical of this particular point is an accident that occurred last winter at a grade crossing where the motorist,

in a snow storm, was driving at such a furious rate of speed that the motor car skidded onto the tracks, colliding with the train, and in the mix-up the crossing watchman, who tried to stop the driver, was killed while performing his duty. Immediately there appeared in a local paper a bulletin urging that a bond issue be placed before the voters at the next general election for the elimination of the hazardous grade crossing, wholly disregarding the fundamental cause.

With 2,085, or only 7 per cent of the fatalities resulting from automobile accidents occurring at railroad grade crossings, and taking last year's figure of 31,500 as the total number killed in all automobile accidents, we have over 29,000 who were killed at points other than at railroad grade crossings, many of which occurred at intersecting highways. I do not believe that any question has ever arisen or any clamor has been made for the separation of grades of intersecting highways.

Comparing 1929 with 1922, there was an increase in the total motor cars registered in the United States of 116 per cent, but the fatalities increase 136 per cent. It would seem from these figures that experience does not improve the situation.

In the 1929 report of the Dean of the School of Law, Columbia University, he points out that the automobile has raised new law problems, and adds that, according to recent estimates, more than 180,000 people were killed and over 6,000,000 injured in automobile accidents in the United States during the last decade, and concludes with this: "In any event, existing rules of law and the machinery for their administration are proving inadequate to cope with the situation." These figures are a serious indictment of our conduct.

To take out all of the grade crossings on the railroad with which I am connected will cost roundly \$600,000,000, and the best figures obtainable indicate that to take them out on all the roads in the United States will cost roundly \$20,000,000,000, approximately equal to the tentative valuation of the railroads as fixed by the Interstate Commerce Commission. This makes the whole thing prohibitive. Despite the efforts that are being made to reduce the number of grade crossings, there was a net increase of 1,697 in crossings in 1928, according to the figures made public by the Interstate Commerce Commission. This increase came on the heels of a net gain of 952 in 1927 and 1,457 in 1926, and it is pointed out that there will also be a gain for 1929.

It has not been many years since the general demand for the elimination of highway grade crossings began. Our company alone has eliminated 250 crossings at an expenditure of around \$12,000,000; other roads have done as much or more. We have before us now, for the elimination of grade crossings, an expenditure of approximately \$28,000,000. Nearly half of this work is now under way.

The money to meet the enormous cost which is being assessed against the railroads for the elimination of grade crossings must be produced by them from their earnings. It is quite the contrary when we come to look at how the states provide for their proportion of these costs: The forty-eight states and the District of Columbia in 1929 collected \$431,636,456 in taxes from the sale of 13,400,000,000 gallons of gasoline. This record includes a twelve-month collection in forty-six states and the District of Columbia, a five-month collection in Illinois, and only an eight-month collection in New York.

The average tax rate per gallon last year was 3.22 cents as against 3 cents in the previous year, this tax varying in different states from 2 to 6 cents. After deducting collection cost of the gasoline tax, the net revenue in thirty-four of the forty-eight states with full year collection, was used in the construction and maintenance of rural roads. Not only have the railroads no way, except from their earnings, of recouping what they put into these improvements, but being a taxpayer they also contribute to such work; consequently they get hit both ways.

Ten years ago it occurred to me that we should make some observations of the manner in which motor vehicles cross our tracks at grade at the principal highways

on the various sections of our line. We set up what we thought was a fair standard to be expected of a motorist in crossing railroad tracks at grade; for instance, was speed reduced when approaching the crossing, did the driver look and apparently listen, or in other words did he indicate by his conduct in the driving of the car that he was interested in determining as far as possible whether the way was clear and safe? These observations were made by subordinate officers who had been schooled for the purpose. They have reported roundly 3,028,000 observations, of which 397,706, or more than thirteen per cent, were failures. These failures indicated that drivers failed to exercise proper care in approaching and crossing the tracks at grade. I can say, however, that the motorists of the territory on the Baltimore & Ohio east of the Ohio River, were substantially better in their observance of safety rules than the motorists in the territory west of the Ohio River, the difference being about seventeen per cent. We know it was bad. These figures, serious as they are, did not cause any amazement.

Every morning many reports come to my desk from which I have selected a few to give you.

An automobile, on the track, was struck by a freight train 150 feet past the crossing. Two men occupying the car were asleep.

In the report of September 29 of accidents occurring the previous twenty-four hours, there are eight casualties, seven of which involved automobiles. One had been driven off the crossing onto the track. One was driven into the side of a rail motor car. Another was driven into the side of a freight train. Another was driven into the side of an engine; three injuries resulted. All of the occupants of the car were intoxicated.

There were 224 people killed in automobile accidents at grade crossings in Ohio in 1929, while in New York, with its large population and enormous traffic, 148 were killed; in Massachusetts with its heavy seasonal tourist travel, twenty were killed in automobile accidents at grade crossings; in Pennsylvania, 112—one-half the number of people killed at grade crossings in Ohio, although Pennsylvania has 3,000,000 more population than Ohio.

In the April issue of the *Maryland Motorist*, it is reported: "Certain eastern states have reduced accidents about twenty per cent through license laws requiring examinations of all new drivers, according to Sidney J. Williams, director of the Public Safety Division of the National Safety Council, who addressed the Road School of the Wisconsin Highway Commission recently."

"The following states, according to the National Safety Council, now have driver's license laws: Arizona, California, Connecticut, Delaware, District of Columbia, Indiana, Maine, Maryland, Massachusetts, Nebraska, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Wisconsin."

"He stressed the fact that such laws needed enforcement by a strong centralized state motor vehicle bureau to be effective."

"These seventeen of our forty-eight states that have passed driver's license laws are mostly eastern states. Wisconsin, one of the five states in the entire middle, south and western parts of the country to have a driver's license law, was also one of the thirty-five states in the country to show a decrease in motor vehicle fatalities last year."

"A few legislatures, in their next sessions, will take up this problem. Traffic authorities are agreed that the enactment of driver's license laws is one of the ways in which the country can combat its alarming toll of 31,500 annual motor vehicle deaths."

Some time ago I was asked to review the requirements imposed upon the student before a license to drive was granted. I would say that not more than ten per cent are fit to drive under the very limited supervision that generally now exists. While some states have no regulations or definite requirements for the licensing

of a motor car operator, the figures we have been able to develop indicate the average motorist is created in about seventeen minutes. He undertakes to drive a machine which can be operated at a speed equal to that of the average passenger locomotive, and which can be and is driven all over the highway at the will of the operator, quite a contrast with a passenger locomotive engineer.

I had the records of fifty passenger locomotive engineers running our high speed trains taken from our files at random. From the time these men first entered the service, until they ran a passenger locomotive was seventeen years. It did not, of course, require seventeen years to qualify these men, but the fact remains that they were that long in seasoning, running on tracks that guide them, under signals that, so to speak, talk to them, and under definite rules and closest supervision to see that they are obeyed.

Therefore, when you ride in a passenger train on our American railroads, you have almost definite assurance of safety because of the qualifications and thorough seasoning and supervision over the fine body of men running locomotives, as against the inexperience and incompetence of motorists to which we constantly expose ourselves when on the highways.

If the locomotive engineer should fail to stop at a red signal, unless he had an exceptionally good record, the penalty is dismissal. Although we have spent well onto a million dollars to install flashlight signals for the protection of the motorist at highway grade crossings, we know definitely that these signals are frequently disregarded by the motorists, many times resulting in fatalities. These signals are operated through track circuit in the same general manner that the electric automatic signals governing the locomotive engineer are operated, and yet we accept the disregard of these signals by motorists, a thing you would not stand for one minute if it were done by the locomotive engineer.

In a two-day check which I had made in June of last year at certain crossings on our road, controlled by flashlight signals and bells, we found 140 instances of motorists disregarding the flashlight signals, most of which occurred on only one of the two days the check was made. This is typical of many similar checks.

Only five years ago the newspapers carried a story of the thirtieth anniversary of the greatest marine disaster in the history of the Atlantic, when the White Star Liner Titanic went down off the grand banks of Newfoundland with a loss of 1,517 lives, due to colliding with an iceberg. An officer of the coast guard commented on this, saying, "Most people imagine it is a matter of luck that such an accident has not occurred since that time," adding that they do not realize it has been made impossible. It was explained that the disaster aroused a universal demand for protection from icebergs, resulting in the International Conference on Safety of Life at Sea, at London, on November 12, 1913. In January of the following year the convention was signed by the representative maritime powers of the world, and the United States was invited to assume direction of a derelict destruction and ice observation and the ice patrol service, and in the following February the President directed the coast guard service to commence the work as quickly as possible. It was reported in the press that with the exception of two years during the World War, cruising cutters have operated along the transatlantic steamer lanes for the protection of ships. Constantly on duty in the spring and early summer months, these cutters are broadcasting the location of bergs, studying their rate of drift, water temperatures, ice erosion, atmosphere, and currents. As a result of this one disastrous accident that sacrificed 1,517 lives, immediate action followed to guard against a repetition, and with obvious success, while 31,500 died in automobile accidents last year alone, and aside from the clamor for the elimination of highway grade crossings at railroads and the installation of signal lights so frequently disregarded, nothing is seemingly being done by the lawfully constituted authorities to improve this situation, at least, such effort as is being made is not effective.

There is such general apathy to this great problem that I felt this occasion offered an exceptional opportunity to present the subject to you and urge that you in your various activities give it your earnest consideration and attention, with a view of developing a greater and more sympathetic interest toward promoting a better and more helpful supervision and control over those authorized to operate motor-driven vehicles on our highways. The safe operation of our railroads is ample evidence that it can, if properly handled, be done.

CHAIRMAN LARSON: The next number on our program is by Mr. T. H. Carrow, chairman of the Committee on Accident Causes and Remedies.

Accident Causes and Remedies

By T. H. CARROW

Superintendent of Safety, Pennsylvania Railroad System, Philadelphia, Pa.

What I want to do is to give you all the knowledge that can be gleaned from statistics. I want to give you all the inspiration that can be gathered from the progress that has been made, and I want to point out how we can from time to time improve our record.

I shall use the figures for the first six months of this year as a basis on which to draw some comparisons. The figures include all classes of accidents, such as employees, passengers, trespassers, crossing accidents, and other persons.

In the first six months of this year, there were 2600 people killed, using round numbers, representing a reduction of 12 per cent. There were 26,000 injured, or a reduction of 30 per cent.

The reason the fatal injuries show so little reduction is because they include crossing accidents and trespassers and others over whom the railroads have no control.

I shall first refer very briefly to the highway crossing situation—962 people killed, a reduction of 14 per cent. The number of non-fatal injuries dropped from 3,000 to 2,700. If we take into consideration the reduction in business, we held our own. I think that the reduction in travel might be construed, if you associate that with the figures in the highway crossing accident situation, that we merely held our own.

What are the influences at work in America that enable us to hold our own on the highway crossing accident situation? First, I would mention the unprecedented work of the Committee on the Prevention of Highway Crossing Accidents. There is no doubt in my mind if nothing had been done by this committee to apprise the public of the dangers of carelessly driving over highway crossings and seeing to it that the bulletins were distributed and people everywhere informed about this danger, today instead of having a thousand fatal injuries in six months, we would probably have twice that number.

The next point I want to stress as having contributed to this remarkable figure is the lectures in the schools that have been conducted by the safety agents and the police department representatives of the railroads. In the last year on our own railroad, we have addressed literally hundreds of thousands of children, with a model flashlight to show them what the flashlight means. There is no gainsaying the fact that a lot of people do not know the significance and the meaning of a flashlight at a highway grade crossing. I think it is high time that we devote a little more attention to educating the public in its significance.

To my mind the efficient use of the locomotive warning whistle has contributed more than all the rest. It is perfectly asinine, to think that a person with low mentality will drive right in the front of a locomotive whistle at full blast, if he can stop his car. We must see that the locomotive whistle is used. Check up your locomotive whistle and see if it is being blown right.

The next problem is trespassers. The railroad does not have any legal responsi-

bility involving accidents to trespassers; they perhaps do have a moral responsibility. We show a slight decrease of 2 per cent, but an increase of 13 per cent, in injuries, 1050 killed and 1400 injured. Continued education in the schools and the public press, and particularly policing and doing whatever we can to impress the public with their responsibility for this class of accidents, are the remedies I suggest.

Now we come to passengers. We had 21 fatal injuries, and although that is a drop of 48 per cent, only one of those fatal injuries involved any responsibility on the part of the railroad. That is to say, only one passenger was killed on all the 250,000 miles of railroad in the United States in the first six months of this year, which is almost complete immunity. The number of injuries dropped from 1900 to 1930, or 18 per cent reduction.

Of the 21 fatalities, 11 of them were killed while getting on and off cars, and 6 were struck by trains after they got off or before they got on the cars.

A similar proportion of the non-fatal injuries are attributable to causes over which, to a very large extent, the railroad has no control. I think that is another case of public responsibility, and we suggest to our friends of the Interstate Commerce Commission that there might be some way to emphasize this question of the responsibility of the passenger as contrasted with the responsibility of the railroad. We are willing to accept our responsibility, but it does seem kind of tough for a dumb-Dora passenger to walk off a car and get in front of a moving train or to jump off a car when it is going ten, fifteen or twenty miles an hour and kill himself.

Passenger transportation on steam railroads today is not only the safest form of transportation in the world, but a passenger train itself is a safe place to be. It is infinitely safer than the street. It is as safe or safer than being in this very hotel. The chances of meeting with an accident on a passenger train are practically nil.

This is attributable to the unrelenting effort put forth by the railroads to maintain the track and the property and the signaling systems in the proper condition.

The next problem is employee accidents. It was out of an interest in the employees, in recognition of the fact that our fellow workers were injured in greater numbers than necessary, that the safety movement originated.

In the first six months of 1930 500 railroad men were killed as compared with 625 in the previous year, a drop of 21 per cent. The number of injuries fell from 30,000 to 20,000, a drop of 35 per cent. Isn't that a magnificent reduction? Isn't it a comfort to the railroad managements in these troublous times to know that instead of having 600 men to account for, pay compensation, they have only 500 and that instead of having 30,000 injuries to account for they have only 20,000? It is my firm belief that not one additional dollar has been expended on account of safety activities.

There is one fact that stands out like a lighthouse; 47 per cent of the fatal injuries occur in the train and engine service as well as 34 per cent of all non-fatal injuries. At first blush, that figure is disconcerting. It has, however, the greatest promise of all of the statistical information put out by the Interstate Commerce Commission, because we can already put our fingers on railroads whose engine and train service employees have mastered the dangers of their occupation. We know that there are other railroads that are going to fall in line.

We know we are going to level engine and train service accidents to a reasonable rate. Why? Because 80 per cent of all accidents that occur in train and engine service are of a preventable nature.

At Salt Lake City in 1924, the Committee on Statistics said: "We want to transform the bulletins of the Interstate Commerce Commission into a kaleidoscope to show you the rise and fall of the casualties on the American railroads, the causes of the rise and fall, and outline the ways and means by which we can prevent the rise."

In that same address we said: "So far as the observance of rules is concerned, we

predict that within the next ten years we shall almost reach perfection. Given the money we can make them almost completely safe, due allowance being made for acts of God or other causes over which human agency has no control."

Let us see how that prophecy works out in detail. Let us see if we can't read, in the Interstate Commerce Commission's statistical information, the observance of rules or the exercise of precautions that common sense and intelligence dictate.

Coupling and uncoupling cars. Seventeen fatal injuries occurred on all of our railroads in the first six months of this year—42 in the same period last year. Just think of those 25 men being alive today who might not be alive if no effort had been made to enforce the rule, which reads: "Going between or in front of moving cars to couple or to connect or disconnect hose is prohibited." That rule is in effect on every railroad in the country, and while we are not getting 100 per cent enforcement, we are getting about 80 per cent, and that explains exactly why fatal injuries dropped from 42 to 17.

Operating locomotives. The number of injuries dropped from 1621 to 1044, a 36 per cent reduction. Accidents on locomotives are occurring in firing engines, shaking grates (or nearly all of them), operating water plugs, and so forth. Every one of those operations is covered by specific precautions or rules.

Operating hand brakes. We had 13 fatal injuries last year in the six months, and 12 this year; 805 non-fatal injuries last year and 602 this year. I am satisfied that we can make a reduction of at least 30 per cent in 1931. I am certain of the possibilities of more definite, effective, constructive education and instruction of our train service men, particularly on the humps, in the operation of hand brakes.

Operating switches. The number of injuries dropped from 417 to 225, 46 per cent. In 1923 there were 1085 injuries from that cause, and in this year we will have less than 500. Isn't it clear that in running about the tracks, in close proximity to the train, nothing short of a constant admonition and warning and checking would have caused a reduction in that kind of accidents?

Coming in contact with fixed structures. I regret to report an increase under this heading—13 fatal injuries in the last six months of 1929 and 16 for the first half of 1930. The number of non-fatal injuries, however, dropped from 207 to 154. I don't believe that there is a railroad in the country that has any short clearances where it is reasonable to remove them. The only alternative is to pound away at the rule, which says: "Watch to avoid coming in contact with structures alongside of tracks or cars or adjacent tracks." I am satisfied that there is a big field for constructive accident prevention under that head.

Getting on and off cars. The number of fatal injuries this year dropped to 30 from 39. The number of non-fatal injuries dropped from 2228 to 1478, or 34 per cent reduction. In 1923 the number of fatal injuries under "getting on and off cars" was 101 as compared with probably 50 for this year. The number of non-fatal injuries was 8,000, compared to possibly 2,500. It is my opinion that it will be easier to cut a third off our present figures than it was to bring the original figure down to the present one. In other words, we have laid the foundation and employees are more amenable to instruction than heretofore. We recently made an analysis and found a very large percentage of the accidents due to getting off standing cars. We have simply put the order into effect: "Hold onto the hand-hold until you get a solid footing," which practically wiped out the accidents.

Struck or run over, not at public crossings. This is a most serious cause of accidents on or around the railroad. There was a total of 271 fatal and non-fatal injuries, a reduction of 44 per cent. There is no figure that gives me more encouragement and illustrates the possibilities of education, supervision, and discipline, than this particular cause.

Our general manager issued instructions to our supervision to make a check of thirty days on every rule in our book which covers struck and killed by trains. We had

a mighty fine falling off in fatal injuries, and it is my belief that it was that check that did it. Don't ever feel that it is any imposition to require a check, because if a man is on the job, he is making that check anyway.

Non-train accidents. In Salt Lake City we said, "In the future our greatest progress will be made in non-train accidents." In the present year the number of fatal injuries that will have been saved will be almost 200 and the number of non-fatal injuries will be almost 90,000, you can see how that prophecy came true.

If we can't make a reduction in our fatal and serious injuries, then all effort is wasted. Fortunately, we can report a reduction from 625 fatal injuries to 494, or 21 per cent. But in my judgment it will be easier to save 100 fatal injuries on all the railroads next year than it was to save 131 this year, and if we do that, we will have cut down the fatal injury rate by 40 to 50 per cent. Now remember, when you get home, get busy on the causes of accidents that most commonly result in fatal injuries.

Nothing has been done by any body of men in the world that is finer than the progress made in accident prevention among employes on the American railroads. What has been accomplished is merely an indication of what is going to take place for the fatality rate will be cut in half in a short time, and the non-fatal rate will also show a very decided drop.

I am willing to stake my reputation as a prophet that within another three years you will see a drop in train accidents on the American railroads that will be equivalent to the drop that was made in personal injuries in the first three years after the Salt Lake City meeting. I should like to analyze the collisions and the derailments and the other locomotive accidents. I hope the recommendations made in the last circular will be complied with, that reports will be properly made, that you will check your accidents, and that you will put machinery in motion to bring down the train accident rate.

CHAIRMAN LARSON: The next paper is by Mr. A. J. Gates, safety inspector, Personnel Department, Pennsylvania Railroad, Philadelphia, Pennsylvania.

Head and Eye Protection for Welders

By A. J. GATES

Safety Inspector, Personnel Department, Pennsylvania Railroad,
Philadelphia, Pa.

In the protection of the head and eyes of welders, consideration must be given to numerous features which involve not only the injury cause, but the efficiency of the operation being performed. The work has been sub-divided into the three most common classifications for which protection is necessary.

These classifications are:

- I. Oxy-acetylene cutting and welding.
- II. Metallic electrode welding.
- III. Carbon arc cutting and welding.

In these operations two injurious invisible light rays are encountered, the infra-red and ultra-violet, as well as visible light of varying high intensities.

Filter Glass

When guarding against these injurious light rays, the first consideration should be given to protection for the eyes, involving the use of filter glass. Almost any piece of colored glass will cut down visible transmission, and to a major degree will eliminate ultra-violet, but will have no effect on the infra-red.

These invisible rays are colorless; therefore, the color of the protective glass has nothing to do with the elimination of them. They can be absorbed only by glass of

the proper chemical composition. However, the color of the protective glass is an important factor from the point of visible transmission as it is well known that a glass of one color will obscure details while a glass of different color, but the same density, will bring out details not seen through the first glass. Therefore the ideal screen or filter glass is one that will absorb the invisible light rays and give the proper visible transmission and clearness of object with the least amount of glare. This is accomplished by having the field of visible light within the range of yellow to green bands of the spectrum.

Filter glass must be free from striae, waves, flaws or other optical defects which would cause eye-strain or fatigue. This glass is manufactured in a number of colors and of different densities in each color. The color should be selected that will give the highest visible light transmission, or, clearest definition of object, with the least amount of glare, but the density of the color in the glass can best be decided by the operator using it because of the individual difference in keenness of sight which enables one man to see through a certain glass that would be too dark for another man.

Filter glass is quite expensive and for this reason a piece of thin clear glass is placed in front of it, to protect it from scratches and from being pitted by sparks. This protective glass is known as a cover glass. It should be free from optical defects.

We submit all filter glass to our test department for 100 per cent test and approval before placing it in service.

We do not permit the use of broken filter glass or cover glass.

Oxy-Acetylene Welding and Cutting

In gas cutting and welding the chief hazards are glare with its injurious invisible light, and small flying particles of molten metal or sparks. Light rays from these operations are not so intense as to affect the skin, and adequate protection is given by a pair of cup type goggles. Particular care should be given to the proper fitting of goggles, especially at the side of the nose bridge. If there is an opening here, sparks will enter and burn the corner of the lids or the eye itself. Serious eye-injuries have been caused by poorly designed or ill-fitting goggles.

Such goggles are held in place by head-bands, and must be made of non-inflammable, non-heat conducting material and comfortable to the wearer. They should be well ventilated and so constructed as to exclude all direct light not passing through the lenses from a source in front of the wearer, and all stray light from the sides. The cups should form a complete seal around the eye cavities and their interior surfaces should have a permanent non-reflecting finish.

The hazard of glare with its content of injurious invisible light may be eliminated by fitting the goggles with screen or filter lenses having high invisible light absorption qualities with a moderate reduction in visible light transmission. For gas cutting the density of the glass should be low because there is little reflection of light and the workman needs to follow template or lay-off lines which demand a clear definition of the object or work.

In welding the intensity of the light is somewhat greater, a condition that can be eliminated by using a glass of higher density.

Metallic Electrode Welding

Most of our electric welding is done with the metallic electrode. The arc from this operation is very intense and sufficiently rich in invisible light and glare to warrant protection for the face as well as eyes. The protection consists of a helmet or a hand shield equipped with filter glass to absorb the invisible rays and gives a considerable reduction of visible light transmission. If hand shields are used they

should be constructed of wood or fibre. They should be large enough to cover the face and the edges turned back to protect the sides of the head. The handle should be designed with a shield to protect the hand of the operator, or, he should be required to wear gloves.

Helmets for this class of work should cover the entire face and front portions of the neck, and be so constructed that the window holding the filter glass, the top portion of the helmet or the entire helmet can be raised to enable the operator to inspect his work from time to time. They must be made of a material which is light in weight and a non-conductor of heat or electricity.

To protect other workmen from direct or reflected light rays, and sometimes as a matter of convenience, this electric welding should be isolated or done in booths formed by fixed partitions or shop walls. Only one operator should be permitted in each booth unless they are separated by screens.

When work is such that it cannot be taken to a welding booth, the operator is obliged to go out into the shop to do the job. Under no circumstances is this operator permitted to proceed with the work without first putting up screens which insure complete isolation of the job from other employees in the vicinity. These screens usually consist of fireproofed canvass held in place by a rigid frame.

When arc welding is done in booths or confined space, care must be given to insure sufficient ventilation to carry off injurious fumes created by flux on the welding rod or surface conditions of the material being welded. In places where it is impractical to provide ventilation, the operator should be required to wear a respirator of filter pad or chemical cartridge type.

Carbon Arc Welding and Cutting

Light from the carbon arc is of an extremely high intensity and is rich in ultra violet and infra-red rays which cause serious injury if prolonged or repeated exposure occurs unless adequate protection is provided.

The operator must wear a helmet covering the entire face and front portion of the neck. Unless the helmet affords complete protection to the upper portion of the chest and lower portion of the neck, a short bib or apron should be attached to the lower portion of the helmet. It is important that this bib be made of fireproof material. If two or more operators are working together on the same job, say cutting down steel cars or other similar operations, the back of the neck should be protected against rays from the adjacent operation.

The inside of booths, sheds, portable screens or curtains used for electric welding operations should be painted with a zinc oxide paint colored to a bluish grey by the use of lamp black. This will absorb the invisible light rays and reduce the reflected visible rays!

Goggles, Helmets and Hand Shields

All gas and electric welders and cutters should be supplied with individual goggles or helmets according to the requirements of their work. These devices once used regularly by any individual should never be used by any other person until they have been sterilized.

Helmets and hand shields should be made of material having a low moisture absorption quality, should not be easily warped by heat and sturdy enough to withstand shop usage.

We require foremen to make frequent inspection of goggles, helmets and shields to see that they are in good condition and that no light leaks have developed.

Helmets and hand shields are ordered less glass and after receiving them the proper filter and cover glass must be applied before the device is placed in service.

In conclusion it can be said that there is a definite recognized hazard which can be controlled in direct proportion to the efficiency of the devices used in relation to the operations.

CHAIRMAN LARSON: We will go to the next subject by Mr. F. R. Bradford, Superintendent of Safety of the Boston & Maine Railroad, Boston.

Collapse and Fall of Objects in Shops

By FRANK R. BRADFORD

Director of Safety and Fire Protection, Boston & Maine Railroad, Philadelphia, Pa.

The first recorded accident in this class that I have been able to find, was due to an apple falling on Mother Eve in the Garden of Eden. Incidentally, that is the first "Alibi" for a man-failure on record. Since then, man has been the victim of things falling from trees, from mountain sides, from caves, and even his house sometimes collapsed and squashed him.

There are few types of railroad accidents in which the fundamental cause is so clearly and invariably defined. We know without possibility of doubt, alibi or argument, that inanimate objects, insecurely fastened or supported in an elevated position, will tend to reach a lower level at an accelerating rate of 32 feet per second and the person so unfortunate as to interrupt that progress is quite likely to spend some time in the hospital depending, of course on the comparative mass and density of the falling object and of the person involved.

That this has occurred with rather disturbing frequency is indicated in the reports of our friends the Bureau of Statistics of the I. C. C. which show for the year 1923, 46 fatalities and over 15,000 reportable injuries due to collapse and falls of objects in non-train accidents. In the seven years of war, politics and strikes just previous to the present safety era, there was reported under this classification, an average annual toll of some fifty persons struck down and killed, and nearly twelve thousand severely injured. This class of accident, is not confined to shops, on the contrary, it includes all branches of railroad activities, and its casualties account for over twelve percent of those in all types of non-train accidents.

About the time the 35 percent reduction program was set up, you gentlemen began to pick the apples before they had a chance to fall and hurt somebody. Whether the number of falling objects has actually been diminished, or you have taught your employees better how to dodge, or both, I am unable to definitely determine, but the result has been a percentage year to year reduction in total number of reportable fatalities and injuries considerably in excess of your contemplated 5 percent per year as follows:—

14.6 percent, 14.4, 10.4, 17.8, 10.6 and 5.2 percent respectively in the years 1924 to 1929 inclusive, the number of such accidents in 1929 being only about 4200 as compared to over 15,500 in 1923, a grand reduction of 11,300 injuries or 73 percent.

Remarkable as have been the reductions in this type of accident which, up to only a few years ago, were generally considered "unavoidable", or as "something that just happened", there is still plenty of opportunity for further improvement for here is the chance for the foreman to step up and do his stuff. The foreman is the one who selects the materials and directs the placing of scaffolds, staging, ladders, shoring, etc., and his is the direct responsibility for their strength and adequacy. Obviously, however, the foreman must first have had the necessary training and experience to qualify for this responsibility and the management must be willing to furnish the proper quality and amount of materials required. With large erection, tunneling, ditching and similar jobs, it is probably advisable and most efficient to engage the

services of an expert staging or shoring contractor, but the stagings, jacks, etc. used in ordinary shop or rip yard work, and in bridge and building maintenance are distinctly within the province of the local or gang foreman. The safety of his men and others depends to a very large extent on the ability of the foreman to visualize and prepare in advance for the loads that his staging may be called upon to support and to recognize the need for bracing and shoring where progress in the work may introduce the possibility of collapse.

In recent years, largely owing to the activities of interested foremen, employees and Safety committees, improved types of ladders, blocking, stagings, supports and braces have been and are being developed; some of which have been standardized and put on a commercial production basis. This inventive activity undoubtedly has had a marked effect in improving efficiency and reducing accidents and should be encouraged to the fullest extent by the management. As each particular type of work has its own specialized requirements for staging, platform, etc., it would be impracticable in the time allotted for this paper to enter into any detail discussion, but I would call your special attention to the Safe Practices Pamphlets of the National Safety Council, and to the many excellent articles contributed to the several Safety Magazines in which these improved devices are pictured and described for the benefit of us all.

While the collapse of structures, stagings, jacks, etc., probably contributes an excessively large proportion of the fatal and permanent injuries in this class, the simple falling of tools and materials, mostly comparatively short distances, undoubtedly causes the greatest number of injuries and in the aggregate probably the greatest loss of time and expense. We know that a personal injury is the result of only one of a succession of accidents. Some enthusiastic investigators figure as high as three hundred accidents to one serious personal injury. On this basis, and disregarding severity, it seems conservative to estimate for the American Railroads, 10,000 injuries occurring during a year due to falling objects, which would mean an almost continuous downpour of some three million wrenches, chisels, boards, boxes, crow bars, axes, and what have you. Thirty seconds would not be too long a time to allow for stopping work to pick up each of these things that have fallen which figures up to a quarter of a million hours wasted in non-productive time and effort.

We are apt to laugh when something drops on the other fellow's head, but when you consider that it takes a day's work of over thirty thousand men to clean up the mess besides putting upwards of five thousand men out of business for more than three days time—and some are never able to return to work—you begin to appreciate the seriousness of the situation. The reason for things dropping has been explained by Newton's Law of Gravity, but the reasons for things being in a position to drop accidentally, are the old offenders, indifference, negligence, thoughtlessness, clumsiness, ignorance, hurry and occasionally maliciousness. However, call them what you may, none of them has any justifiable place on a well managed railroad. Their presence as indicated by repeated casualties due to falling materials, tools, stock, etc. is a reflection on the ability or willingness of the foreman to personally direct and lead his men in all of their activities. That accidents in this class are readily susceptible to practically complete elimination through reasonably adequate supervision is clearly apparent in the records being made by the leading industries represented in such groups as the Metals, Cement and Quarry sections as well as by the railroads in our own section which lead in safety.

In six years, reportable casualties listed in class (h), collapse, fall, etc. of objects, have been reduced 73 percent. Gratifying as this reduction may appear, the very fact that such a material reduction has been so readily made, supports the belief that a further large decrease from the present figures is still easily possible by intelligent and continued improvement in supervision.

CHAIRMAN LARSON: The next paper is by Mr. G. M. Kramerer, Shop Safety Agent, Bessemer and Lake Erie Railroad Company, Greenville, Pennsylvania.

Shop Burns and Falls

By G. N. KRAMERER

Shop Safety Agent, Bessemer and Lake Erie Railroad Company, Bessemer, Pa.

In the last six years 24 per cent of our lost time accidents on the Bessemer have been caused by falls and burns. In the year 1929, only 12 per cent of our lost time accidents resulted from these causes. Our accidents now are only about one-fourth of what they were six years ago. This means that we now have about one-eighth as many accidents from these causes as we did six years ago.

The most common causes of these accidents in their order of frequency are—

Falls. From engine or car or into car.

Slipping or tripping ground level.

Holes or loose obstructions along track.

Slipping or tripping from above.

Burns. Hot metal, blue dust or flame.

Steam, hot water or acids.

In the last six years we have had but four lost time accidents resulting from falls from ladders, one from falling into an unprotected hole, none from falling from scaffolds, and only one from electric shock.

The Carnegie Steel Company safety booklet states that "A dirty plant means accidents". Good housekeeping is one of the most important factors in the prevention of accidents from falls. A foreman cannot expect to have a good safety record if he does not provide a place for tools, surplus material, scrap material, etc. and insist on these things being kept in their place when not in use.

Aisle ways and walks should be kept clear for pedestrians and trucks. A good idea is to paint lines or nail thin metal strips to outline aisles, and then keep material back of these lines, piled in neat order. This will also provide more floor space. It is the supervisor's duty to take the initiative, and the men will soon form the habit of good housekeeping.

A clean up day each month, or a week during a year is valuable to get rid of obsolete material and scrap. When men get the habit, they will not revert to former practices.

Fruit skins, oily waste or other rubbish should not be tolerated on floors. Covered containers properly labeled must be provided if the shop is to be kept clean of slipping hazards.

Grease and oil should not be allowed on floors. Rubber soles and heels are particularly slippery on oily surfaces.

Men cannot work safely on rough, uneven or loose floors. A great deal of attention is given to the floor in a modern shop.

Metal plates, used to cover valve pits or sewers, should be roughed up or corrugated, especially when used outside, for in frosty or snowy weather smooth plates are a real slipping hazard.

Low places in yards, where water stands and freezes should be filled in before freezing weather. When spots of ice are covered with snow, they give no indication of bad footing. All obstructions throughout yards should be kept at least six feet from the rail. Give the switchmen a chance.

Jumping from rail to rail and across pits should not be allowed. It is bad practice to step on rails; they are very slippery, especially when frosty, or when a man has greasy shoes. I have been told that one large R. R. System prohibits employees stepping on rails.

Turntable and transfer table pits, engine pits and ash pits cannot have guards around them, but should be well lighted to prevent falling into them.

Cleaning grease from engine parts or machinery on floors or runways is bad practice. These places get very slippery when wet.

Floors about pits, elevators and revolving machinery should be of the best material and kept clean.

All stairways, more than three steps high should have a hand railing. Laying tools or material on steps should not be allowed. Men need well lighted shops and yards if they are going to work safely.

Ladders

Ladders and trestles, condemned as unsafe, should be sent to the carpenter shop at once for repairs or else destroyed.

We, on the Bessemer, learned our lesson. A painter who had some work to do on top of a box car, used a defective ladder which had been thrown on the scrap pile—this ladder was handier to get than a safe one. He did his work, but when getting down, the ladder broke, he fell to the ground and broke his hip. He has not worked since and never will, just because some one neglected to destroy the ladder.

Ladders and trestles should be inspected and tested frequently; the ones that are in need of repair should be sent at once to repair shop and those beyond repair, should be destroyed. Not long ago I saw a man on a ladder, about twelve feet from ground. The ladder looked suspicious, so I walked over, and when I saw its condition I almost held my breath until I got the man down. The side rails were full of weather cracks and some of the rungs were split diagonally and tied with twine. I asked him why he was using it, and he told me that it was handy. I told him that I would park right there until that ladder was destroyed; he got a saw and cut it in short pieces.

Sometimes an apparently good ladder is not safe. We had one which looked to be 100 per cent safe. A man was coming down it and the rung next the bottom broke off, almost as square as if it had been sawed. Investigation showed that the rungs had been made of black ash which had become brashy in about two years. White ash or Hickory make the best rungs.

A good way to test a ladder is to place one end up about a foot from floor, then jump on each rung. If it stands this treatment, it is safe to use. Spikes or safety shoes should be used on the bottom of ladders, according to the floor. Ladders should be kept on the floor; not set up on boxes or benches.

Only men who are accustomed to climbing should do work on roofs, cranes, crane runways, and on scaffolds. Whenever it is practicable a safety belt with life line should be used. Men working around and on top of engines should use good safe wrenches. Many falls have resulted from a wrench breaking or spreading, or being too large for the nut.

Scaffolds

Too much care cannot be given to the erection of scaffolds. Of course they are but temporary, but lives depend on their being strong. Only good straight grained lumber should be used, free from defects. Railings and toe boards should be used, and all nails driven in full length.

The specifications for high scaffolding as laid down by the state law, should be followed closely.

Where loose floor planks are used, cleats ought to be fastened to ends, on the bottom, to keep them from slipping off supports. Spruce or yellow pine make the best flooring plank. Supports should be placed about every eight feet, especially if more than one man is to work on them. If heavy material is to be handled on

scaffold, greater care should be taken in erecting it. It's a good idea to test a scaffold, a short distance off the ground, with about twice the weight that it is intended to carry, before actually using it.

Men working on a roof should wear rubber soled foot gear and if the roof is smooth, it is best to have safety belt and life line attached. Don't send up the fellow who is afraid of high work. There's always something for him to do on the ground.

Coal Chutes

Open coal chutes are hazardous. Some companies have a screen over them, large enough to permit coal to go through, but not large enough to let a man through. A good precaution for a man entering hopper is to wear a life belt and line, at least he ought to have a companion near him. Open trestles should have standard railings.

I've brought a small model of a ladder which was designed by Mr. Gray, our superintendent of motive power. It is used by men who clean out pockets in hoppers and eliminates the danger of man going through chute.

Burns

Probably most eye burns are the result of being struck in the eye with hot sparks, scale, hot chips, etc.

Every person who is exposed to eye hazards should have a pair of comfortable, well adjusted goggles. On the Bessemer we have a list of occupations, for which, we insist that men wear goggles. This list covers the more dangerous occupations, but in addition, we are trying to educate all employees to put on goggles, if there is the least danger of having an eye injured. Extra precautions are taken with a man who has only one eye. Work requiring the use of goggles at all times include; handling acids or lye; all welding and cutting with torch; riveting or heating rivets; any grinding operation; machining any hard metal; operating hot saws or pouring any molten metal.

The operation of oil burners require the use of goggles, the operator should be an experienced hand. These burners go out, if the burner is not hot enough or the oil is too thick or cold to run freely.

If unlighted gas is blown into a confined area, then lighted, it sometimes explodes with serious results. In our shops we use oil burners to fire locomotives, for pop setting and tests.

Up until a short time ago, the operator of a burner stood beside it on the deck of the engine. After a number of near accidents, caused by the flame becoming extinguished and the operator lighting gas, when combustion chamber was full of it, valves were changed from burner to tanks which are on the floor, so if gas explodes there is no one near enough to get burned.

A man should stand back a safe distance when wetting down hot ashes, as there is sometimes an explosion of steam. Goggles should be worn for this job. Care should be taken in walking over fresh ashes because man is liable to sink through where they are red hot.

A man should be well equipped with good shoes, gloves, jacket and goggles, when entering a hot fire box to work. He should have a companion at fire box door; he might be overcome with the heat or the door might become latched. A few years ago, one of our men was in fire box when someone swung the door shut. Fortunately the man inside was able to make himself heard and no harm resulted.

Several years ago a boiler maker and his helper were working on the front end of a locomotive. About the time they were ready to close up the front end, the foreman asked them to go to another engine and do some work. They finished the job and the boiler maker went off by himself a short time. When he returned to the first

engine to finish that job, his helper had disappeared. He closed the front end and tightened all clamps and reported the engine ready to be fired.

The helpers got up fire wood and oily waste and were about ready to fire the engine. In the meantime, this boiler maker was wondering where his helper was, who was prone to lie down and go to sleep very easily. He told them not to fire up, opened the front end, and sure enough there lay his helper sound asleep. It's not hard to imagine what would have happened, had fire been started and the blower started.

In foundry work the greatest hazard is flying bits of molten metal. Goggles should be worn at all times when working with molten metal.

Many burns about the feet and legs result from improper shoes, and short trousers. A foundry should have a good floor and free from tripping or slipping hazards.

Some time ago a near accident happened in our foundry when pouring molten brass around a rocker arm shaft. The shaft was hollow; both ends had been plugged by pressing steel plugs in with a hydraulic press. The hot metal around the shaft, heated the air inside, causing it to expand, and blew one plug out with great force. Fortunately it hit no one. When the centers were drilled, the holes should have extended through the plug, so the air could escape.

Wet or damp ladles ought never be used for molten metal; dampness causes explosions. The increasing use of electricity brings hazards which we did not have a few years ago. Severe shock and burns come from defective insulation, sockets and switches.

Pliers made from fibre or other non-conductor material should be provided for placing and pulling fuses. No one but an experienced electrician should be allowed to repair equipment. See that electricians and linemen are equipped with good, safe climbers and safety belts, and if working on high tension lines, have rubber gloves and foot gear.

All men working around electricity ought to be instructed, at least, once each year, in the Shafer method of Resuscitation. Even 110 volts have proven fatal, under certain conditions.

Accidents from the use of acetylene carbo gas and oxygen generally come from inexperience or carelessness in handling or repairing tanks, gauges and torches. Great care should be taken with this equipment, and the instructions sent out by these companies, followed closely.

The operator of a burning or welding outfit should be protected by well fitting goggles or helmet, long sleeve gloves, jacket and leggings.

It's a good plan when anything hot is left lying on the floor, to take a piece of chalk and mark it HOT, so someone will not come along and burn their fingers.

Statistics tell us that only about 15 per cent of accidents come from defective equipment; the remaining 85 per cent are caused by man failure. Then, in addition to practicing good housekeeping and keeping equipment in good order, we should strive to educate men in Safety, so they will not break the Safety Rules and will do more real thinking. Don't forget that "The best Safety Device is a Careful Man".

ADJOURNMENT

Thursday Morning Session October 2, 1930

C. F. LARSON, Chairman

Missouri Pacific Railroad Company, St. Louis, Mo.

The final session of the Steam Railroad Section convened with Chairman Larson presiding.

CHAIRMAN LARSON: Mr. D. G. Phillips will discuss the subject of "Motor Car Accidents."

Motor Car Accidents

By D. G. PHILLIPS

Superintendent of Safety, Wabash Railroad, St. Louis, Mo.

The introduction of the motor car has brought a string of serious injuries. These injuries have been caused by defective equipment, improper handling or operation, or a combination of both, in spite of the fact that the section foreman and the road supervisor know more about motor cars than anybody else.

I believe the best way I can get at this motor car transportation problem is to let you be a section foreman, with whom I am going to take a trip to work. It would be a good thing, as Mr. Hartenstein told us yesterday, to take more trips out with the boys and find out what is going on.

I have come to your house. Don't get in a fight with your wife before you leave home in the morning. Leave your home in a good frame of mind. You are going to operate a motor car, a dangerous machine, so leave your troubles behind, and have your mind on the job for the next eight or nine hours.

The first thing is to get a line-up on the trains. I don't mean for you to ask the operator what is on the line and for him to say, "Eighty-two is on time. Ninety-six is about on time. An extra over at Evansville—they are tied up there, don't know when they will get out." Get a written line-up with the dispatcher's name on it.

The dispatcher has thus acknowledged his responsibility for its accuracy. In the next place, Mr. Foreman, it is foggy, so we are not going out this morning. We are going to work on the passing track until the fog lifts, unless there is something so important that you must do. In that case you must flag both ahead and behind, for there is nothing more helpless on the road than a motor car in a dense fog. Don't take your men out in the fog.

Mr. Section Foreman, I want you to inspect that motor car before we go. I know you tested the brakes as you came in last night. Be sure the nuts are on the bolts, the bolts are there, and the brakes are there. While you are looking it over, say just a few words to the men about safety today. Get their minds on safety first. When you put the car on the track, be sure you have a definite, recognized method of doing it. Don't let a big strong man try to put the whole car on alone. Make him wait until all the men are in position. Many sprains and hernias have been caused because some big strong man or some little man attempts to get the car on before the rest of the gang are ready.

Your motor car is on the passing track. Be sure your men are all on the car before you start, except those who start the car. Have the men who start the car, start it from behind and not from the side or front.

Your motor car is started. Of course, you don't go very fast on the passing track to the main line. Get off yourself and handle that switch. If your car is tight, it is better to lift it over the rails and not operate the switch. We try to

impress on our foremen that the car should always be lifted over the points and not run through the switch, but in hard times, when you don't have many men on a section, it is sometimes better to throw the switch and run your car through. But handle that switch yourself. After the motor car has passed, throw your switch, lock it, watch the position of the switch carefully yourself. A designated man should remind the foreman before he starts the car, "Mr. Jones, you left the switch locked for the main line," or, "You left it locked for the passing track."

Another motor car comes up. Have a talk with the other section foreman. Let it be understood that he is going to follow you today, and under no circumstances is he to run within 400 or 500 feet of you.

You start out. You turn to me and ask me: "How fast do you want me to operate this motor car today?" On straight, good track with an open view, you might safely say, "You can run twenty miles an hour." On the other hand, if there are curves, obstructed crossings, steep grades a different speed is necessary. In other words, twenty miles an hour is perfectly safe at one point and five miles an hour is absolutely dangerous at another.

I don't think it is safe to operate a motor car over an interlocking plant at any speed. It is one point where you should push the car because that switch is liable to be thrown at any time.

We come to a grade crossing. It is absolutely open, for you can see a long way in either direction. I think it is safe to cross at five miles an hour, but not faster because there may be something lying between the rail and the track that will derail the car.

If there is an automobile in sight, let the automobile have the right-of-way. If the crossing is obstructed, if there is an automobile in sight, stop. We tell our foreman: "Whenever you get hit by an automobile or whenever you hit an automobile, automatically you are discharged, you are through."

We come to a switch. The foreman is supposed to inspect every switch he goes over. No man can inspect a switch going over it at fifteen or twenty miles an hour, so we slow down to five miles an hour to avoid derailment and for proper inspection. We tell our foremen: "When you run through an open switch, you are through."

Another thing—see that some of your men are looking both ways, behind and ahead and don't let any Tom, Dick and Harry operate your motor car. Run it yourself unless you have a man who is a better operator.

Whenever you do have a motor car accident, bulletin it to every section foreman on your railroad. A section foreman in New York never hears what happens on the other end of the line. Because he isn't having any motor car accidents, he takes it for granted that all is well. Let them know what is going on all over the line for information will open their eyes to what is liable to happen.

Don't follow a freight train too closely. Let's keep away back here, several hundred feet. We have had many accidents on different railroads due to motor cars striking trains.

A motor car caught up to and struck one of our fastest trains. The general manager sent for the head of the signal department (this happened to be a signal department gang), and said, "If you are going to operate your motor cars faster than I can operate our passenger trains, we will make arrangements to have the passengers transferred."

He could not have said anything more effective to stimulate that signal supervisor to slow down his motor cars.

Be very careful about curves. When the look-out man can't see far enough around a curve to stop in time to get the car off if a train approaches, he should be directed to flag around that curve. As long as motor cars are operated around curves without a flagman out ahead, motor cars will be struck and destroyed.

From a financial viewpoint alone, it is better to take a little time and flag around the curve. You have no right to expect your men to take chances.

The safe operation of your motor car depends on whether the section foreman himself does the things he ought to do. He already has the knowledge; you can't add much to it. Your job is to impress upon him the absolute necessity of using it as he should. Make that road supervisor a safety first man. A safe section foreman will overcome your motor car troubles.

Mr. J. L. WALSH (Missouri-Kansas-Texas Railroad): The prolific cause of deaths and injuries is placing tools on the motor car. Men need to be drilled on the safe place to put their tools where they will not fall off. Furthermore, every man should have his place on the car, knows what he is going to do when an emergency arises such as removing the car on the sudden approach of a train.

Installing Remote Control at Switches

M. J. FLANNIGAN (Chicago, Milwaukee & St. Paul Railroad): On our railroad we are putting in remote power control switches. We just had an accident which killed a section foreman and put another man in the hospital, when the switch was thrown with the motor car going about twenty or twenty-five miles an hour.

We have a rule in our safety book of rules for maintenance of way men that they must stop their motor cars at derailing switches and power control switches and push the car over the switches. In this case the section foreman, with all other section foreman and automatic signal foremen, had a one-day session on handling motor cars and a half day discussing these power control switches. This particular section foreman took a car over the switch four different times up to the time of the accident, stopped his car, and pushed it over the switch, so he thoroughly understood what to do, but in this case he failed to do it.

It cost us \$55,000 so far this year for accidents causing derailments, personal accidents, and injuries to our employees because tools fell off the car. We were beaten in court because we didn't have a screen to cover the tools.

Wm. F. JOHNSON (New York Central): We have instructed our foremen to organize their gangs, so that the same man will be in the same position day after day for he becomes more efficient and knows the strength required for certain lifts and is freer from strains and slips and falls than if he is working at one position today and another position tomorrow.

Mr. Phillips mentioned that it was advisable to have the section foreman operate the switches. If the section foreman is to delegate the operation of the car through every switch there is going to be a constant change from one position to another all the time. I think the assistant section foreman should operate it, and the section foreman check up.

Two motor cars start out, one trailing the other. We have tried to instill in our foremen that the lead car must signal a trailing car before a stop is made, and then not to stop until the trailing car has answered the signal.

One method to overcome the danger of interlocking plants is to have the section foreman with the power man, and have the power man look out for the motor car.

There are different hazards in going through switches, and it is well to remember whether you are going through a trailing point switch or a facing point switch.

I want to call your attention to skylarking in the transportation of men on motor cars or trailers. We had a death case that arose through skylarking. The section foreman was responsible because he didn't stop it.

Make someone responsible for the safe loading of tools. Before the car is started, have that man report to the foreman that the tools are in safe condition to ride.

CHAIRMAN LARSON: The next subject on the program is by Mr. E. G. Evans, superintendent of safety, Louisville & Nashville Railroad Company, Louisville.

The Prevention of Accidents—Handling Rail, Ties and Track Material

By E. G. EVANS

Superintendent of Safety, Louisville and Nashville Railroad Co., Louisville, Ky.

I interpret my subject as being a discussion of those measures which should be taken to stop or hinder accidents from happening when ties, rails and track material are being handled—a subject of decided interest to me since on our road more than 50 per cent of our total track department injuries each year occur while handling rails and ties.

Since 65 per cent of our total injuries occurring while handling rails and ties happened while rail was being handled, I will first deal with the handling of rail—you must pardon me if I refer to what we have done and are doing on our line. If I should try to generalize, my remarks would not have behind them the force, the sincerity which a reference to our own activities will give them.

The Handling of Rail

While some authorities recommend the loading of rail in low sided gondolas we greatly prefer for our rail to come to us on flat cars, properly stripped between the ties—where and when possible they should be handled by a crane or other equipment. Their weight and bulk (especially that of frogs) make it extremely difficult and dangerous to handle them safely by hand.

At the commencement of unloading the foreman should, in all cases, place himself where he may see what is being done and if necessary direct the moves.

All rails should be marked at the center so that tongs may be placed so as to prevent rails from tilting or falling. No attempt should be made to lift a rail until it is free from other rails in the car. The boom should be in a position directly over the rail to be lifted so that the rail will not swing sidewise. Just before I left the office a report was received which read—"Will Carr was engaged in loading rail with his gang and while raising rail with rail machine the rail swung cross-wise causing machine to drop it and it fell on Carr's foot, bruising it slightly." The report ended by saying—"The matter has, of course, been handled with all concerned and they have been cautioned regarding the improper manner in which this work was being performed."

All parts of the rail handling machine should be given frequent inspection, not only by the foreman, but by supervisors and roadmasters. Tongs, cables and cable fastenings must be given especially thorough examinations.

Under no circumstances should men be permitted to jump over or pass under suspended rails, or place themselves in dangerous proximity to skids when they are used to unload rails.

Rail should never be lifted by a derrick when a train is passing on an adjoining track, for some untoward event might swing the rail into the side of the passing train; for the same reason the derrick boom should be securely fastened when a train is passing. Loading or unloading should never be done when the vision on an adjacent track is obscured.

When rail is unloaded between the tracks, unless the ballast is trenched, the rail should be turned over on its side to prevent possible fouling of tracks by vibration.

All signals during the handling of rail should be given by one designated employee who should be thoroughly grounded in the principles of safety and who will refuse to make any moves that involve a hazard.

Rails should, of course, be placed as near as possible to the point where they will be used so that the hazard of re-handling will be reduced to a minimum. Should

it be necessary to move rails any considerable distance, however, a truck car should be used and great care exercised in the loading and unloading. Before attempting to load the car the wheels should be securely blocked. Sufficient men should be at hand, if possible, to carry the rails by hand as it is easier to lift rails the required height for placement on a truck car by hand than to lift them with tongs. Men should be placed at each end of the rails leaving the middle clear to rest on the car.

The actual loading of rail on truck cars on our line is covered by illustrated instructions which have been made up in the form of a cardboard poster and placed in each tool house. This poster, which also covers the loading of cross ties, angle bars and tie plates and lists the amount of each permitted on a load, provides, in the case of rails, that the load limit for truck cars with 16 inch wheels is six 39 foot 100 lb. rails and reads as follows—"Where available, use two truck cars for trucking rails being very careful to place the rails on the cars so as not to interfere with the free movement of the cars around curves, turnouts, etc."

"If necessary to haul rails on one truck car, place not more than 4 rails workway on the car. On the front end of the rails they should extend out over the motor car but should not rest on it. At the rear end, the ends of the four rails should be placed close together."

After the rails are placed on the car one man at each end should attend to the spacing, extreme care being taken so that one will not have his hands on the rail while the other is moving it.

Truck cars loaded with rail should not be pulled by a motor car except in an emergency and then only under full flag protection and at a very low rate of speed. Only one man should ride the truck car to handle the brake and see that there is no danger of the rails creeping off the car while in motion.

One of the fertile fields for the occurrence of accidents is in renewal work—it is here that the real test of the supervisory official comes—the prevention of accidents depends entirely upon the men being properly trained, properly supervised and upon the material having been properly loaded on the work train. Safest and most economical is the distribution of all fittings as close as possible to the point of use. Joints, tie plates and rail anchors should be dropped directly opposite each panel of track, leaving only spikes, bolts, nut locks and tie plugs for distribution by truck car from kegs or bundles left at certain intervals. All material should be strung out at one operation of the train, the speed of which should be kept to an easy gait.

Every movement must be made with the thought of Safety uppermost in the mind of each man—if possible joints, plates or anchors should be on flat cars—if they are in box cars one man should drop and the others keep a supply in the door, two drop-pers being necessary for plates in bundles of five. If these materials are in gondolas each man must drop his own quota per panel of rail. Care should be exercised to avoid pressing men too closely to get the material out. They should be spaced apart to prevent bumping into each other or stumbling and from dropping material on their feet. Where material is in piles, care should be taken to avoid undercutting with the resultant collapse of the pile.

Men on the ground, whose duties are removing pieces of material dropped too close to the rail, must be made to keep clear of falling pieces. If the material is being unloaded toward an adjacent main track, a man must be at hand to clear the rail instantly for fear a train may pass, but he must keep himself enough to the side so as to avoid being struck by bouncing material.

The unloading of kegs of spikes and bolts by hand so often results in injured hands and toes that if possible a light block and fall arrangement should be rigged up for this purpose. If they are merely dropped they are apt to burst or to roll.

The same safety precautions which must be observed in the unloading of this material should be observed in the loading of released and surplus rail and material. A savings will be noted both in time and safety if the small material is loaded from small lots alongside the track, clear of the released rail onto the same train that

loads the rail. This saves the time required in piling the material in large piles and it prevents the confusion and danger which would result in a large number of men working at one pile.

Old rail which is being loaded onto cars should be piled and stripped. It takes more time and care but this is saved in the time and hazard in unloading.

Renewal work and new construction often call for the employment of men with no experience in track work—it will be found that it is of advantage to place these men on maintenance work and to use the older, more experienced men thus released, for the renewal or construction work. It is most important, from a safety standpoint, that capable and conscientious foremen, assistant foremen and gang leaders be in charge of gangs doing this work. Experience has shown that in such work injuries most frequently occur to men handling the rails with tongs. Next, to men installing bolts and spikes—next in order, the spike pullers and next, the men throwing out the string of old rail, tie plates, etc. Therefore, the following details of safety should be watched.

Rails being unloaded for installation should be separated so that one will not be turned over on the men's feet when others are lifted. All tools and material should be kept out of the way of men carrying the rail, all other men should keep out of the way of rail being carried. The designated employee should place himself at the rear of these gangs where he can see the movements of all the men and he should call all signals, to lift, to lower, to slide, etc.

Each pair of claw bar men should be spaced a half a rail from those on either side. Men using adzes should be placed four ties apart. All men passing these two classes of workers should walk outside the rail on the opposite side of the track from them.

In laying switches, work such as kinking and drilling rails should be done in advance by a detachment who should also do the lining and full spiking of switch plates, frogs, etc. Then the steel laying gang can go on with their work without bunching up and becoming disorganized which always increases the hazard of accident.

One of the most dangerous jobs in laying switches is the moving of heavy frogs by hand and the most extreme care must be exercised, every movement must be called, but only after it is seen that everyone is in the clear.

Both safety and efficiency demand that in the handling and working of rail an ample supply of good tools be on hand at all times. Foremen should watch this matter very carefully, but the roadmaster should not take the foreman's interest in the matter for granted, he should frequently inspect the tools on the job and the reserve supply in the tool houses. In short, in the handling of rail, careful planning of all details and constant supervision are the best safe-guards.

The Handling of Ties

The handling of ties, which, on our line, is responsible for 35 per cent of the total injuries chargeable to handling rails and ties, is a class of work which can be made accident free by proper supervision and training or can be made a fruitful source of accidents by failure to exercise the proper care.

The work must be directed by the foreman and the movements of the men watched and when necessary corrections made in the method.

In the loading or unloading of ties there should be strict attention to the work with no hilarity, horse-play or talking beyond that required for the indication of movements so that these indications may be more clearly heard and better understood.

If ties are being unloaded out of a car by one or more sets of men their movements should be timed so that they do not interfere and they should keep back out of the way of possible rebounds. If ties are being unloaded from gondolas extreme care should be taken so that the men will not catch their hands between the edge of the car and the ties. The safest way to throw ties over the edge of a gondola

is for one set of men to place the end of the tie on the edge of the car, grasping it far enough back so that there will be no danger of mashing fingers, then the men holding the other end shove it over the side. This is, as you can readily see, a much safer method than that of the men taking hold of both ends of the tie and attempting to throw it bodily over the side of the car.

The men on the outside of the car should never be permitted to pick the ties up until the throwing out of the car has ceased. Time after time, where this precaution has been neglected, have we seen men killed and injured due to being struck by the falling tie.

These men on the outside should not be permitted to toss ties into position when piling them—it is much safer to place them in position and piles should be built no higher than ties can be placed.

On some of your roads you no longer permit the unloading of ties from a moving train; others of you do. To those who do I would say that double care should be exercised when unloading in this manner. A foreman or a designated leader should be in each car, he should be trained and impressed with his responsibility to see that the loads are worked down evenly to prevent ties being shaken or rolling down in the cars by the movement of the train. The engineer of the train should handle it with a minimum of jerking and slack taking. The men on the ground must not be allowed to walk alongside the train—they must follow it and pull back any ties that have fallen too close to the rail.

Ties should never be hauled on a motor car, but they may safely be hauled on a truck car properly coupled to a motor car.

Our rule covering the loading of ties on a truck car, a part of the illustrated instruction poster referred to heretofore, provides that the load limit for truck cars with 16 inch wheels is 35 cross ties, the first layer to be loaded across the truck, the next layer lengthwise of the truck and so on to the limit of 35 cross ties—being careful to keep ties a safe distance from the edge.

No one should be permitted to ride on a truck car loaded with cross ties nor should there be any attempt made to unload the car as it moves along. It must always be pulled by the motor car—never pushed. Ample flag protection and definite stop signals should be provided as a positive line up has been secured. Under no circumstances should a loaded truck car be moved at a speed greater than ten m.p.h. Push cars should be regularly inspected, well oiled and heavy material, which will damage cars, must not be dropped onto them.

In the replacement of ties, injuries very frequently occur as the result of men falling while drawing ties in or out or being struck by ties carried up to the point and thrown down. The foreman should see whether tongs are being used to drag ties in and out of track and that they are the type that will afford a sure grip, in both old wood and new—if shovel blades are being used to drag ties in and out this should be stopped. Sharp picks may be used to drag out badly rotted ties if tongs will not hold, but the use of these picks must be guarded for they offer a decided hazard—in fact the use of all track tools presents a hazard at all times. Tools should not be dropped unless the men are certain that no one is standing near enough to be struck.

Shovels should not be left with blades turned up—in fact tools should not be left under foot or between the rails except when they are actually in use. Men using picks, mauls, etc. should be spaced well apart and should look about them before swinging. When tie plates are being applied the track jack should be used instead of nipping the rail up with a bar which frequently slips resulting in mashed fingers.

Track Tools

The proper use of track tools will eliminate a lot of injuries which have always been considered a part of track work. Jacks, claw bars, mauls and sledges, chisels

and punches, wrenches, bars, picks, shovels, adzes, axes and scythes all are potential instruments of damage to the careless users.

Jacks, with worn teeth, pawls, etc., should never be used. The lever should never be left in a jack after the lifting operation is stopped, nor should any part of one's body ever be placed in a position over the jack lever so that it might be struck were the lever to fly up. A jack should never be used inside the rail without flag protection. Lifting should never be done with jacks tilted nor should jack loads ever be dropped without ample warning being given and every effort made to see that all men are in the clear.

The proper use of the claw bar should be demonstrated to every new man who comes into the gang after this is done an adequate supply of bars should be kept on hand so that men will not use damaged bars and the same rule applies to other cutting, striking or prizing tools.

Mauls and sledges that are cracked or worn, with handles cracked or broken; chisels with mushroomed heads or crumbly edges; wrenches with jaws spread; picks with dull points; shovels with cracked, splintered or rough handles, with loose rivets; axes and adzes loose on their handles all are the dogs that bite but do not bark.

Ballast

I have discussed the handling of rail, of ties and of track tools, their remains only one thing left as I view the subject under discussion—Ballast Work—in the handling of which very few injuries occur on our line.

The same general rules that I have given before also apply to the handling of this class of track material with a few additions.

First, where ballasting is being done a slow order should be provided both to protect the impaired track and to decrease the danger of men being hit. Gangs should be trained to clear the track and all tracks upon the approach of trains. This is of first importance in all kinds of track work.

When unloading from a ballast train there must first be a definite understanding between the man in charge and the trainmen regarding signals to be given for movements. No signals should be given except by the foreman or a man designated by him, except stop signals in emergency. The trainmen should be impressed with the fact that the safety of all the men engaged in the work depends upon the careful handling of the train according to signals.

If the work is being performed on double track the enginemen of the work train should whistle an alarm when a train is approaching on the other track and all work should be stopped until the train passes. Only active, experienced and cautious men should be allowed to work on a ballast train.

They must not be allowed to go into a car to assist in working down the ballast until the top of the load has caved in and then only when the construction of the car is such as to offer them security from falling through into the hopper bottom.

If the ballast is wet or does not run freely and the car is to be shaken up or jarred by letting the wheels run over some object men on the car must be warned and known to be in safe positions. Such shaking often makes it unnecessary for men to go into the cars at all.

Care and the proper tools should be used in the opening of the drop doors—wrenches flying around when doors are suddenly released or give way have seriously injured many good men.

If it is absolutely necessary to plow ballast with ties placed ahead of the wheels, men must be made to keep their hands and feet off the ends of the ties, using shovels to hold the tie in place. They should walk at the side or ride at the sill step but they should not get up on the end of a car.

Men must not be allowed to climb across moving cars but may, at the foreman's discretion, be allowed to drop off a slowly moving car and climb onto another. They

must look carefully before dropping tools off or throwing them onto the platform of a car so as to avoid striking others.

The safe way to do work is generally the common sense way—this we believe is particularly true of track work. Our task is not so much to teach our foremen and their men to distinguish between the safe and the unsafe way of working, as it is to arouse them to a point where their interest will cause them to observe more keenly the actions of their men and the possible or probable results.

CHAIRMAN LARSON: Mr. P. M. Gault, Signal Engineer of the Missouri Pacific Railroad Company of St. Louis, was to be the next speaker, but unfortunately, was taken ill. He was good enough to detail his assistant to read the paper which they prepared together. Mr. Foster is Assistant Signal Engineer of the Missouri Pacific lines.

An Accident Prevention Program for Linemen and Signalmen

By PAUL M. GAULT

Signal Engineer, Missouri Pacific Railroad Company, St. Louis, Mo.

There are comparatively few men comprising these two groups, but, while their work in itself is not of an extremely hazardous nature, lax supervision or carelessness on the part of the men themselves—which sometimes comes from familiarity with the work—may bring about conditions which lead to serious accidents.

As these men usually travel and work alone—both day and night—in all kinds of weather, it is necessary that they use every precaution for their own safety. In the performance of their duties, both classes must depend largely on motor car transportation; under these working conditions, this is considerably more hazardous than when two or more men are traveling together, in which case bad curves are flagged and a sharper lookout for trains or obstructions may be maintained. In either case, however, the motor car operators should not depend on their watches and time cards, or on time-ups obtained from the telegraph operators. Except in cases where motor cars are actually operating on written train orders, such details are merely information, and precautions taken to avoid delays to trains and observance of these details are not a guarantee of their safety.

Every man required to operate a motor car should be given an examination by a supervisory officer, who will issue certificates to those showing the proper qualifications. These examinations should be of such a nature as not only to determine the applicant's qualifications for such work, but should be instructive as to the proper care of the car and its safe operation. Such details as speed restrictions, flagging rules, the proper loading of tools and materials, and the handling of a trailer should be particularly stressed. The exercise of care in operation over highway crossings is also a very important factor, which should be called to the attention of the motor car operator. In case of an accident where it is clearly shown to be due to carelessness or disobedience to the rules on the part of the operator, he should be taken out of service and required to canvass his division on his own time, and explain to all men working in a similar capacity what rules he had violated and what steps he should have taken to prevent the accident, before being allowed to resume work.

Signal and line work requires men of a high degree of intelligence, who have had some years of training along these lines either in gangs or under competent signalmen. They are usually therefore quite ready to take advice and to follow instructions intelligently. Supervisors and foremen should be thoroughly acquainted with the qualifications of the men working under them and should be certain that a man is capable of handling such work as is assigned to him, particularly when such work may become hazardous if handled by a man not entirely familiar with it.

Particular care should be used in the selection of men to work on or around high voltage lines. Working on live supply lines carrying above 250 volts, is prohibited. Before starting on such lines, the man who is in charge, should personally cut off the power and then test all wires to be worked on for voltage by making the static test. After completion of such work, only the employee who cut off the power should restore it, and then only when he has notified all who have been authorized to work on that line that power is to be restored and he positively knows that they are clear of the line. A lineman, before going to work in any territory, should acquaint himself with the characteristics of the circuits on the line on which he is to work, as well as those on lines adjacent to his territory. No work should be attempted unless sufficient qualified men to do the work safely are on the job.

There are certain customary safety devices for use of men doing this class of work. Each supervisor or foreman should see that his men are equipped with these devices and that they are properly used; too often the experienced or expert lineman feels it beneath his dignity to use a safety belt when climbing. The habit of being cautious should be maintained at all times and warning signs and signals should never be ignored. A man, in order to work safely, should keep his mind on his work at all times and horseplay should never be permitted among the men while on duty.

Observance of the Rules is the fundamental requirement of safety. It is therefore necessary, first, that the supervisory forces be strongly impressed with their responsibility for the safety of their men; and, second, that they make their men feel a sense of their own responsibility both to themselves and to their fellow workers.

Each man should be supplied with a book of Safety Rules and the supervisor or foreman should personally see that the men under their jurisdiction have familiarized themselves with, and properly interpreted, these rules. Perhaps the best way to handle this is by group meetings, at which times the rules should be read and discussion encouraged as to their interpretation by the men; these meetings should be either divisional or general, held periodically, and call for compulsory attendance. The men should be advised that surprise checks will be made to see that the safety rules are being adhered to; they must understand that these checks are not to be made in the spirit of eavesdropping but for their personal welfare and to assist in keeping them on the alert. After such tests, the man should be advised as to when and where they were made, whether or not he was violating any rules, and, if so, what the rules were and wherein he endangered himself or others. At these group meetings, such instructions as apply to resuscitation and first aid should be demonstrated to the men, who should themselves take part in the demonstration and show that they understand the methods and first aid practices.

Inspection of tools is a highly important factor in safety practices. Those, such as safety belts, climbers, rubber gloves, ropes and blocks, as well as insulated line tools and other safety appliances, should be inspected from time to time by the supervisor or foreman, whether or not these tools are the property of the company. The men themselves should immediately turn in for repairs any tools found to be defective.

Line work especially offers a greater opportunity for the careless worker to set up dangerous conditions. This work is often carried on around public highways, where pedestrian or vehicular traffic is heavy. When doing such work, the men must be impressed with the necessity for added precaution. Temporary work should be made as strong and safe as permanent work. Manholes or post holes should not be left unguarded or uncovered when leaving the job. Piles of material or other obstructions on or near highways should be placed, if possible, so as to be clear of traffic or be properly marked by flag or light.

When accidents do occur, a clear, detailed report should be made immediately to the proper officer. Investigation should be made to verify the report and obtain any necessary details not given. These reports should be broadcast to the men so

they may take warning from the experience of their fellow workers. Such reports as show carelessness or infraction of the rules should be featured by the supervisor in the safety meetings and discussion encouraged as to the rule or rules which had been violated. Too often men become calloused to their work and the hazards connected with it, so that they come to look at an accident report in an abstract manner, thinking such a thing would never happen to them.

Safety work on the part of the employers not only means the issuing of rule books and holding of meetings, but it means continually keeping the idea of safety before the men by placards around the work and by exemplary conduct of the supervisory forces when they are in contact with the men. Supervisors, foremen and workmen alike must be made to realize that the A, B, C of efficiency and safety is to *Always Be Careful*.

Discussion

CHAIRMAN LARSON: I request Mr. Bailey, of the Oregon Short Line, to take charge of the Inspectors' Session.

(Mr. C. T. Bailey took the chair).

CHAIRMAN BAILEY: I understand this is a meeting to be thrown over to inspectors and not supervising safety officers. If there is any subject that any of the inspectors wish discussed, now is the opportunity to bring it up.

J. A. CROWLEY (Boston & Maine): What is the practice of starting motor cars when a trailer is attached, carrying rails or ties? What position should the men take who start the car?

CHAIRMAN BAILEY: On the Union Pacific we require the men to take position on the rear of the motor car, one on each side.

J. L. WALSH (Missouri-Kansas-Texas): How about with the trailer?

CHAIRMAN BAILEY: It doesn't make any difference.

MR. WALSH: How is he going to push with the trailer behind?

CHAIRMAN BAILEY: There is plenty of room to push from the side.

MR. McNALLY (Wabash Railroad, St. Louis): You can start your motor car away from your push car and then push the push car up to it and couple on.

MR. WALSH: If it is a free running engine, there is no trouble, but when it is not, there is no way to start a car from the rear with a load of rails on behind.

MR. CROWLEY: That answer is all right on a free running engine, but how about the direct drive?

G. H. WARFEL (Union Pacific): We permit pushing against the front hand rail when there is a trailer so loaded that the pushing cannot be done from the rear. The men can push from each side against the front hand rail of the motor car, and step on from the side. We recognize, however, the hazard. The most serious hazard is on the right-hand side of the track car. The man who is pushing from the right-hand side of the track car against the front corner must step up onto the side platform of the car with the left leg which is hazardous, especially if the gravel shoulder or ballast shoulder slopes away abruptly from the edge of the ties. Free running motor cars should be substituted for direct driven to avoid this situation.

D. G. PHILLIPS (Wabash Railroad): How do you fasten a trailer onto a motor car?

MR. WARFEL: I would like to amplify the question. Has anybody had experience using long coupling poles or pulling trailers loaded with rails or other raw materials? I should also like to know whether anybody uses a form of coupling between hand cars and push cars.

H. A. HOSTLER (Belt Railway): We use a long connector there, twelve to fifteen feet long.

MR. WARFEL: Is it a rod?

Mr. HOSTLER: Yes, with a jaw on each end.

Mr. WARFEL: Did you ever have any trouble with it?

Mr. HOSTLER: Not that I know of.

H. J. FLANIGAN (Chicago, Milwaukee & St. Paul): I would like to know something about the general practice of headlights on motor cars.

CHAIRMAN BAILEY: Are there any representatives of lines present that furnish headlights on track motor cars?

Mr. WARFEL: May I state that in a little different way? Will one of us who uses a motor car headlight or a track man's car headlight other than an ordinary oil lantern, please tell his experience and state what kind of lights he uses? We are about ready to establish a standard track car headlight for use of track men called out to patrol track at night, go to wrecks, and so on.

Mr. WALSH: We are experimenting with a carbide light with a charge that lasts six hours. We keep three charges of lights on hand all the time, and find them very effective, especially in stormy weather. They are very good lights.

Mr. WARFEL: Mr. Walsh, have you had any of those lights blow out in a heavy wind?

Mr. WALSH: We haven't had any failures yet.

L. J. HENDERSON (Bessemer & Lake Erie): I have been using an Edison night light for my motor cars for five years; it is equipped with a 90-ampere hour battery. We charge a battery about once every thirty days, whether they are used or not. It is a spotlight like on an automobile. The light has 16 feet of cord, and it rolls itself up.

Mr. WARFEL: In other words, it makes a good wrecking light, a good trouble lamp for signal work, and a good head lamp.

Mr. HENDERSON: Yes, you can see your wires as well as in daylight.

Mr. WARFEL: Would it be usable on branch lines where they don't have facilities to recharge the battery?

Mr. HENDERSON: You can buy a charger for \$7.

Mr. WARFEL: And charge from any house current?

Mr. HENDERSON: Yes.

Mr. WARFEL: Does the light cost around thirty or forty dollars?

Mr. HENDERSON: It costs \$31.80.

J. T. PRATT (Reading Company): We have been using that electric trouble light for some years on the motor cars for the trouble men; we charge the batteries as needed.

Mr. WALSH: Are all the section men furnished that light?

Mr. PRATT: Only those liable to be called out in our larger towns.

Mr. WARFEL: Can any one give me his experience on that carbide lamp, described by Mr. Walsh as a car inspector's lamp? Have you had any trouble with it going out or carrying a charge to run all night or any other difficulty?

Carbide Lamps as Standard Equipment

Mr. DOLAN (New York, New Haven & Hartford): We use carbide lights for car inspectors as standard equipment. There is no comparison between them and the old type of oil lamp. They are eminently satisfactory.

Also, in our electric transmission department, our high tension men, transmission employees, use a battery inspector's lantern with a lens of approximately eight to ten inches. It shows all the overhead wires very clearly at night, even the high transmission lines that are several hundred feet up. That same lamp would be useful as an emergency lamp for section men. It is heavy, substantial, and throws a light several hundred feet, a straight beam.

Mr. WARFEL: A successful lamp for track motor cars must be one that can be set up in a tool house and neglected for months, but will be all ready to go when the emergency arises. I am wondering about any type of electric lamp. I understand the Edison night light will stand almost indefinitely without serious deterioration, and that it is not subject to the same troubles that the ordinary sulphuric acid storage battery light is. This is also true of carbide lamps, I understand. If the carbide charge is rinsed out when put away, it can be made ready in fifteen or twenty minutes. Is that your experience with the carbide?

Mr. DOLAN: Yes. The carbide people are also interested in a hand lantern but they couldn't get light enough. We subjected a carbide hand lantern to every possible abuse and the hand lanterns do not go out.

Mr. WARFEL: You never got it in a wind or a storm?

Mr. DOLAN: We put it up against an air hose and turned on 90 or 100 pounds pressure and it didn't go out.

Mr. WARFEL: We experimented with a few of them, but we have never had them in a Wyoming blizzard.

Mr. Flanigan raises a question, does a carbide lamp ever freeze up in low temperature?

A. M. SMITH (Erie Railroad): It will freeze around zero.

Experiments With Prestolite

F. R. BRADFORD (Boston & Maine): We are now experimenting with a Prestolite outfit, using the standard Prestolite tank similar to what we used to use on the automobiles, a searchlight, reflector and lens fastened with a clamp and a swivel arrangement so that it can point in any direction. The Prestolite tank is very reliable.

We wouldn't have carbide around and depend upon the intelligence of the section foreman to handle the carbide lamp. You must keep it clean and it must be serviced intelligently or it goes bad very quickly.

We use the carbide outfits on our wreck trains, the big lamps that stand three or four feet high, as well as the small ones.

This Prestolite outfit is heavy but looks pretty good. You wouldn't want to carry it very far. They have a lamp that will go on the motor car very satisfactorily.

Mr. HEAVEY (Erie Railroad): In my territory motor car accidents, which are very few, happen entirely to the one-man car. I want to know the experience of other railroads with the levers provided for lifting one-man cars off and on the track. Is there a portable handle or is there a permanent handle used for that purpose by your railroad?

Mr. WARFEL: On one railroad we use a slide-out handle on all Fairbanks Morse 41 cars or similar one-man type cars.

Mr. HEAVEY: Are they fast?

Mr. WARFEL: They are. They are permanent. They can't be pulled clear out. They are stop-locked, but they can be slid out and in. A number of them are rigid with an extension handle like a wheel barrow handle that enables the man to run the car around like a wheel barrow.

Mr. HEAVEY: There are about 1000 Erie signal men on the floor. What is your standard headlight on the Erie Railroad? Have you got one?

N. E. SCRIBNER (Erie Railroad): We are experimenting with an Edison night light.

Mr. HEAVEY: What is your standard now or have you got one?

Mr. SCRIBNER: We have no standard.

MR. HEAVEY: Does anybody use the carbide light for car inspectors on the Erie Railroad?

MR. SCRIBNER: There are several that use carbide lamps.

E. E. SEYFARTH (Belt Railway of Chicago): We have a very important problem on electric hand lighting for trainmen. The switchmen want to be supplied with electric hand lanterns. We have supplied the car inspectors with carbide lamps for years. They are getting a better job of inspection which is important from a safety standpoint. However, I think an electric hand lantern in the hands of a switchman represents a hazard.

CHAIRMAN BAILEY: Our general storekeeper carries a stock of electric lamps. If a switchman desires to use an electric lamp, he may sign up for one and have a reduction made from his pay check for the price of the lamp. We furnish the batteries and the bulbs.

MR. WARFEL: Do you offer the same privilege to car inspectors?

CHAIRMAN BAILEY: No, sir. Our car inspectors are all furnished with the carbide lamp.

MR. FLANIGAN: Do any of your trainmen use them?

CHAIRMAN BAILEY: Practically all of them.

MR. FLANIGAN: Do you use electric lanterns for flagging?

CHAIRMAN BAILEY: No.

MR. CROWLEY: How about car inspectors using gasoline?

CHAIRMAN BAILEY: Where gasoline is used, they are required to use an electric flashlight.

Fool-Proof Electric Light Preferred

C. C. LAW (Pennsylvania Railroad): I personally prefer the electric hand light. The type I use is practically foolproof and is a cheap lantern.

The lantern has two bulbs on the bottom—shove the lever to one side and you light one. If that bulb fails, slip the lever over to the other. There is another bulb in the top.

If you equip your train crews with that type of light, it will be necessary to make it somewhat inconvenient for them to get bulbs and batteries. If they are too easily had, the men will not handle them carefully and keep them in condition.

The battery gives a little over six hours' notice before it dies, by giving a yellow light, which is far stronger than the average hand lamp.

The lamp will stand a severe shock. I dropped it to see how far it would go. I dropped mine from a standing position on a baggage car floor to a concrete station platform. The light was burning when I picked it up. It had comparatively no effect on the bulb.

CHAIRMAN BAILEY: The switchman using an oil light on a stormy windy night sometimes finds the light out when he wants to give an emergency stop signal. You can usually depend on an electric light for a signal when it is needed in a hurry.

MR. SEYFARTH: The engineers complained that the man shut off the light after giving the signal to save the battery.

CHAIRMAN BAILEY: We require signal men to leave them lighted while out on the job.

MR. PHILLIPS: Are your lights constructed so that there is no difficulty in giving signals to the engineer? Our engineers complain that when the light is on the bottom, unless a switchman is careful, the engineer will not get the signal.

CHAIRMAN BAILEY: A switchman learns to use it in such a way that he gets the signal to the engineer.

MR. HEAVEY: Mr. Warfel, do you think it advisable to remove from motor cars any temporary handles other than the ones securely fastened on the car?

MR. WARFEL: Yes. Frequently track car men find their cars pretty heavy to handle, particularly gang motor cars. When handles are not furnished, they will use lining bars with a chain sling or loop on the rear end to use for leverage to help get the track cars on or off. Oftentimes they are mere makeshifts and are a serious hazard which should be met by using a permanent pull-out lever.

MR. HEAVEY: We have a universal complaint on our railroad that the brake lever on a Fairbanks 41 or smaller car is too short to give the proper braking power.

MR. WARFEL: We have never had any difficulty if the brakeshoes and the brake collar are properly maintained and adjusted.

(Mr. Larson resumed the chair).

CHAIRMAN LARSON: We would like to have the Chairman of the Resolutions Committee read his report.

Report of the Resolutions Committee

MR. BAILEY: The Resolutions Committee desires to present for your consideration the following resolutions:

"Whereas, The National Safety Council Steam Railroad Section, in regular session, Pittsburgh, Pennsylvania, 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 extend 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. And be it further

"RESOLVED, That the sincere appreciation of this Section be extended to Dr. J. H. Parmelee of the Bureau of Railway Economics and to Mr. Lew R. Palmer of the National Safety Council, the Employee Safety Contest Committee, for their contribution in statistical form, graphically indicating the standards of all Class 1 railroads."

(The resolutions were adopted).

New Section Offices are Installed

CHAIRMAN LARSON: I see Mr. Lew Palmer is in the audience, and I want him to speak a few words to us.

LEW PALMER (Equitable Life Assurance Society, New York City): This has been a fine session, as all of the previous sessions of this Section have been. As a member of the National Executive Committee I am proud of our Section. I hope we all will be more so at the end of the year.

CHAIRMAN LARSON: We will next install the officers for 1930-1931.

You have done well in the selection of Mr. J. L. Walsh of the Missouri-Kansas-Texas Railroad to the position of secretary and News Letter Editor.

Mr. J. L. Walsh is too well known to all of you to need any formal introduction. Mr. WALSH: I appreciate very deeply the honor that was bestowed upon me yesterday. I ask for your help and assistance in getting out the News Letter, which is the big thing on the job. I will appreciate it.

CHAIRMAN LARSON: I want to introduce Mr. W. A. Booth, the vice-chairman of the Steam Railroad Section of the National Safety Council for the year 1930-31.

Mr. BOOTH: My job as Secretary and News Letter Editor this past year has been a real pleasure and I take this opportunity of thanking you for electing me your vice-chairman.

The Vice Chairman's job, of course, is a period of rest. Having such a staunch, broad-shouldered, able and amiable Chairman, my work will certainly be made easy. As you all know, Mr. Warfel is a tower of strength.

General Chairman Warfel

CHAIRMAN LARSON: Your retiring Chairman has experienced much happiness and joy in his work. I shall continue to lend all of the assistance I can to further our work, and will pledge to the most efficient Chairman who will succeed me, all the assistance that I can give.

It is now my very great pleasure to introduce the general chairman of the Steam Railroad Section of the National Safety Council for the year 1930-31, Mr. George H. Warfel of the Union Pacific Railroad.

Mr. WARFEL: It was mighty nice of Fred Larson to make those remarks. A little fellow told me to recognize him immediately because he had already obtained the privilege of the floor.

(Mr. Warfel took the chair).

A Vote of Thanks to Chairman Larson

ROBERT SCOTT (Atlantic Coast Line): I wish to offer a few remarks about our retiring chairman. I know something about the arduous tasks that fall upon a chairman because it was my honor and my privilege to serve this Section a few years ago in that capacity. Those of you who attended the Safety Section of the A. R. A. in Denver, who heard your new chairman undertake to eulogize Mr. Bentley, who had served us so well during the year, will recall how graciously and how fittingly he spoke.

Fred Larson has made a most capable and most efficient Chairman of this Section. He has conducted this annual meeting through a storm; we are passing through a critical period. Nevertheless, Mr. Larson has conducted one of the most successful annual meetings in the history of this Section.

Mr. New Chairman, I propose a rising vote of thanks to Mr. Larson.

CHAIRMAN WARFEL: Moved, seconded and approved.

Mr. LARSON: I thank you, Mr. Scott, for those kind words.

E. E. SEYFARTH (Belt Railway of Chicago): I have not seen our friend Cott here this morning, and I think the thanks of the Section are due him for his excellent service.

CHAIRMAN WARFEL: We shall be very glad to convey to Mr. Cott that very thoughtful expression which I am sure comes from the entire Section.

The incoming chairman fully appreciates and is deeply grateful for the honor conferred upon him, this expression of your confidence, of your willingness to leave

to my hands, to some extent, the guidance of the Section. Your Chairman will undertake to further the best interests of the Section and to make the Section an even more potent influence, if that can be, in safety.

ADJOURNMENT

NINETEENTH 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. VITZ, Plymouth Cardage Co., North Plymouth, Mass.
Chairman Membership Committee—D. FRANK LORD, M. J. Whittall Associates, Ltd., Worcester, Mass.
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.

Retiring Officers

General Chairman—D. FRANK LORD, M. J. Whittall Associates, Ltd., Worcester, Mass. *Vice-Chairman*—SYDNEY INGHAM, Ludlow Manufacturing Associates, Ludlow, Mass. *Secretary*—E. E. PLACE, American Mutual Liability Insurance Co., Boston, Mass. *Chairman Poster Slides Committee*—F. W. SEHL, Aetna Life Insurance Co., Hartford, Conn. *Chairman Membership Committee*—JOHN H. SOUTHAM, Sanford Mills, Sanford, Me. *Chairman Publicity Committee and News-Letter Editor*—ARTHUR BARLOW, Armstrong Cork Company, Linoleum Division, Lancaster, Pa. *Chairman Engineering Committee*—G. W. COOK, The Travelers Insurance Company, Hartford, Conn. *Chairman Program Committee*—ARTHUR S. JOHNSON, American Mutual Liability Insurance Company of Boston, Boston, Mass.

**Tuesday Morning Session
September 30, 1930**

ARTHUR S. JOHNSON, Chairman
American Mutual Liability Insurance Company, Boston, Mass.

The first session of the Textile Section of the Nineteenth Annual Safety Congress convened with Arthur S. Johnson, American Mutual Liability Insurance Co., Boston, Mass., presiding.

CHAIRMAN JOHNSON: Mr. D. Frank Lord, who is general chairman of the Section, wrote me as follows:

"It is with sincere regret that I am forced to tell you of my inability to be present at the Congress. I had looked ahead to being there surely but last Saturday my physician strongly advised against my taking a chance of a set back through the extra exertion that would certainly be required, etc. Sincerely, Frank Lord."

Those of us who have worked for and with Mr. Lord on our Executive Committee realize the terrific strain under which he has worked for the last couple of years. We deeply regret, of course, his not being here.

MR. BARLOW: I would like to make a motion that we send our regrets to Mr. Lord.

(The motion was seconded and unanimously carried.)

CHAIRMAN JOHNSON: The secretary will attend to that matter and consult with Mr. Barlow on the framing of the message.

I will read the remarks prepared by the chairman which he asked to have read as his report.

Remarks of the General Chairman

By D. FRANK LORD

Safety Engineer, M. J. Whittall Associates, Ltd., Worcester, Mass.

We are met here in annual session to review the past and use its experience as a guide to our future activities in the cause of Accident Prevention and the consequent relief of the workers and their families.

A few of the outstanding points in the activities of the Textile Section for the season 1929-1930 are as follows.

Since the annual congress in Chicago in 1929, there have been three meetings held, all of which were well attended.

The first meeting was held November 8, 1929, at Worcester, Massachusetts, in the rooms of the Worcester Chamber of Commerce. Our newly elected President, C. E. Pettibone, was present and made a few remarks on the work; at the conclusion of the meeting luncheon was served at the Hotel Bancroft, and our Executive Committee was joined by the Industrial Division of the Worcester Safety Council.

President Pettibone delivered an address on "Safety." This was the first time that an active president of the National Safety Council had spoken at such a joint meeting in Worcester.

The second meeting was held on February 7, 1930, at the mills of the Lorraine Manufacturing Co., Pawtucket, Rhode Island, at which a goodly number of our officers were present. After the morning session the members of the plant safety committee entertained us at a luncheon served in the dining room of the plant; after which William B. McColl treasurer of the Lorraine Manufacturing Co., extended a hearty welcome to us and expressed his satisfaction on being able to

extend the courtesies of the plant official to us. At this meeting there was present the manager of the Providence Safety Council.

The third meeting was held on May 9, 1930, at Sanford, Maine, where we were the guests of the Sanford Mills and the Goodale Worsted Co. The meeting was held in the spacious quarters of the Sanford Club. At the same time and place a meeting of the State of Maine Safety Council was held; at noon an elaborate banquet was provided at which many prominent men and officials of the state and officers of the mills with their safety committees were present, in all some 125. Many valuable and interesting suggestions were given and the cause of accident prevention was given a forward step in the state of Maine.

Outstanding Features

Several outstanding features have been started and some have been completed. Among these may be mentioned:

1—Holding our regular meetings at some large industrial plant; this broadens the scope of our work and gives to industry the idea that the National Safety Council is providing for industry something worth while.

2—Contact with and endorsement by educational institutions; this gives to the student the idea of safety in industry and where can the "safety consciousness" be built up better than in the schools.

3—Contact with the manufacturers of machinery through the American Society of Mechanical Engineers; this promotes the guarding of machines at the source.

Notwithstanding the general depression in business the membership of the Textile Section has showed an increase which in itself reflects credit to our membership committee.

During the year we have lost from our list of officers an earnest and conscientious worker, the chairman of the Statistics Committee, Jerome Gaudet, of Pawtucket, Rhode Island, who passed away in March. He was very highly thought of and his passing is deeply felt.

I want to call your attention to the very large strides that our News-Letter has taken under the very able management of Arthur Barlow of Lancaster, Pa. When we look at what our letter was and what it is now any one must be impressed, and I bespeak for him your most hearty cooperation.

I wish to express my sincere thanks to Charles Eames, president of the Lowell Textile Institute of Lowell, Mass., for his interest in and contributions to our success. He has been present at all of the meetings and some of you may recall that early in the year of 1929 we were the guests of Mr. Eames at the Textile Institute in Lowell where there was a joint session of the Textile Section, N. S. C., and the American Society of Mechanical Engineers.

In passing from the General Chairmanship of the Textile Section, I do so with the satisfaction that comes to one at the conclusion of a service in which the unstinted assistance of all of his co-workers is given, and I sincerely hope that my successor will receive the same help that has been given to me.

I sincerely trust that I may have the opportunity in the future to render to the section such help as I am able to give and shall hold myself in readiness to serve you in the noble cause of accident prevention, and may the height of success be your reward.

CHAIRMAN JOHNSON: Ordinarily, we would not participate in any business of the Executive Committee at this session, but I have just received a report of the Membership Committee, Mr. John Southam, chairman, which seemed to be somewhat impressive in view of the fact that he was able to increase slightly the membership in the Section, in spite of the depression.

Annual Membership Report

By JOHN H. SOUTHAM
Chairman

The membership records of our Textile Section since the Congress a year ago show a little progress. At that time we had an enrollment of 125 members. In the period between October 1, 1929, and September 1, 1930, we enrolled 12 new industrial members and lost 11 through cancellations.

New members were obtained by direct solicitation on the part of our members and by mail approach. Our selected list of 1,575 Textile Section prospective members received the following solicitation during the year:

- (1) General letter enclosing folder "Large Plants are the Safest", mailed in October.
- (2) General letter on Council's Industrial Health Service enclosing health folder, mailed in November.
- (3) General letter on safety with descriptive folder outlining service, mailed in December.
- (4) Letter to canceled members of past five years enclosing service folder, also mailed in December.
- (5) General letter enclosing booklet "Protecting Life" describing service, mailed in January.
- (6) General letter following up January letter, mailed in February.
- (8) Letter to members by President Pettibone, announcing Spring Membership Campaign, sent in March, followed by letter from Mr. D. Frank Lord, general chairman, enclosing several prospective members' names on cards and urging their solicitation by members.
- (9) General letter enclosing testimonial folder mailed in April.
- (10) Specific letter by Mr. D. Frank Lord enclosing poster, mailed in May.
- (11) Testimonial letter (general) by Mr. Temple Williams, secretary of the Dodge Manufacturing Corporation, also mailed in May.

A summary shows that each prospect received eight general appeals to affiliate and one specific appeal during the year. This mail campaign brought us in a total of three industrial memberships with dues of \$175.

Many of our members have helped by writing to prospects, usually at the suggestion of Headquarters, and their endorsements were of vital assistance in the obtaining of two industrial members with dues of \$150, and in the total of 12 new industrial memberships with annual dues aggregating \$728.50. (A list of new members, and by whom they were obtained, is attached in the event you care to name those who helped). A list of Textile Section members who helped in the solicitation of members is also attached.

In conclusion, I believe that our cause, its aims and purposes, and our Council service have been presented to the industry. Future solicitation at our present rate of growth will become more and more specialized and result in individual approaches to companies rather than general mail appeal. We will advance, too, proportionate to the help given by members of our section in soliciting those companies in our industry not yet members of our National Safety Council.

CHAIRMAN JOHNSON: In preparing this program, your Program Committee tried to arrange the two sessions in such a way that subjects which were similar in treatment might be discussed. They are specific in their subject matter and application. In the first place, "The Prevention of Falls in a Cotton Mill," we were fortunate in obtaining the paper from a man who is the mechanical superintendent of a large cotton mill in Georgia. We have been trying for a long time to get a closer relationship between the members of the North and members of the South. I am very much

disappointed that Mr. Van Tassel could not come up here to deliver his own paper, but he wrote it and mailed it to me and asked that it be delivered for him; which I am going to ask Secretary E. E. Place to read.

The Prevention of Falls in a Cotton Mill

By R. W. VAN TASSEL

Mechanical Superintendent, Massachusetts Cotton Mills Division, Pepperell Manufacturing Company, Lindale, Ga.

While this paper is to be confined to falls in textile mills and their causes, the relation is so closely connected to general safety conditions that it will be necessary to touch briefly on general safety first.

While this mill has always been vitally interested in all forms of safety regulations that would tend to protect its employees from accidents, it became more vitally interested about the time that compensation insurance went into effect, and at that time a safety organization was perfected, composed of the entire official organization of the mill from the agent down through to the second and third hand of the mill. Monthly meetings of this organization are held and all matters pertaining to safety are discussed and recommendations are received and discussed by the members.

The committee also offers each month five cash prizes for the best safety recommendation that is made by the employees. Inspection of the entire mill is made monthly, and a report of safety conditions in each department is submitted to this committee. Special attention has been given to falls and their causes, and by eliminating some conditions and improving others, falls have been practically eliminated.

We found upon investigation that many falls were caused by carelessness of the employees themselves; which, of course, is very difficult to eliminate. This has been overcome to a very great extent by talks that have been given from time to time by the agent of the mill in the safety meetings which are held for all employees from three to four times a year.

Careful inspection of floors often shows worn places, loose boards, or protruding nails, and by eliminating these hazards we found that accidents from these causes were materially reduced.

Another very beneficial practice is proper lighting, and all rooms, stairways, and out-of-the-way places are properly lighted.

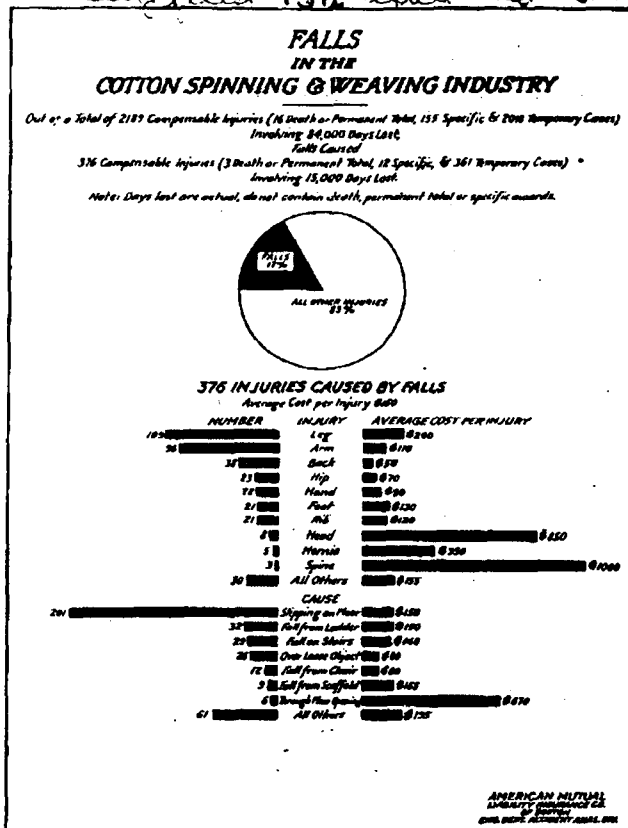
Scrubbing floors should be given very careful attention; for, as you know, wet floors are dangerous floors. Scrubbing powder should be looked into very thoroughly and nothing used of a soapy or slippery nature, but more of a gritty nature; and so far as is practical, floors should be scrubbed at night or when employees are off duty. If this is found impractical, small areas at a time should be roped off or marked with signs, and in this way accidents from this source will be minimized.

Still another source from which accidents arise is worn stair treads, and we are glad to say that we have entirely eliminated accidents from this cause by adopting a tread that can be applied at small expense over the old or worn treads, which makes the tread as good as new, and lasts indefinitely. In connection with stair treads, we have installed handrails on both sides of all stairways; and if, for any reason, a person starts to fall he has the added protection of a rail on both sides.

Great care should be exercised in seeing that pop bottles, hobbins, quills, etc., carelessly thrown on floors, or stairways, or left in window sills, are kept in their proper places. Many serious accidents have been caused by employees playing while at work. This, of course, is strictly forbidden, and if adhered to will prevent many accidents.

Freight elevators in a mill should not be used by any employee except the authorized operator; and we have found it to be of great advantage to install an electric

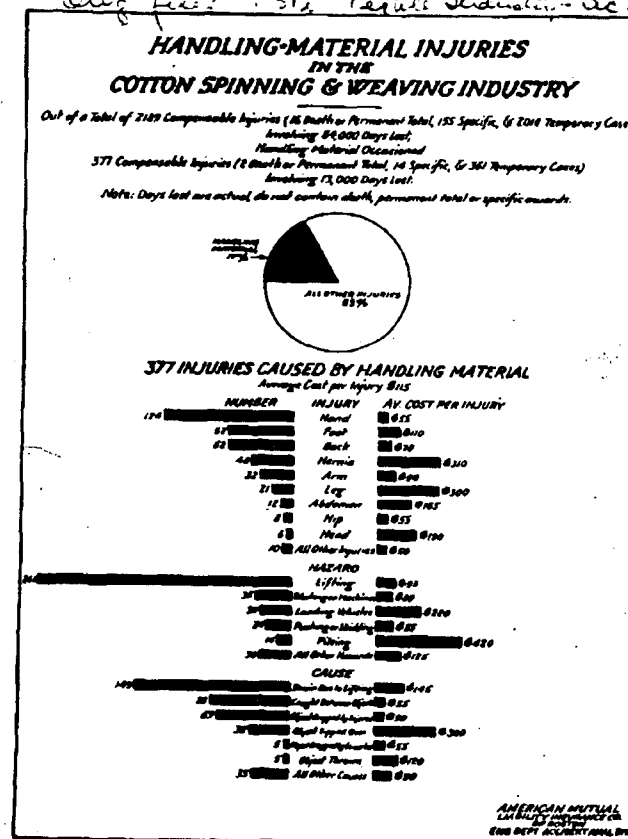
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interlocking device on all elevators, which makes it impossible for any employee not authorized to operate the elevators without the knowledge of the operator, or for the operator to leave the gate open when leaving the landing, thus creating a fall hazard in the shaftway.

Upon investigation it was found that many of our falls were caused by either high-heeled shoes or badly-worn shoes, and we have persuaded a large majority

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of our female employees that a low-heeled shoe is safer from an accident standpoint; and in order to get the proper shoe, an expert from one of the largest shoe manufacturers was called in and a suitable shoe selected and stocked in our local store, and sold to employees practically at cost. Most of them, we are glad to say, have adopted this shoe. Badly worn shoes have also caused many accidents, and

we are continually cautioning our employees to see that their shoes are in proper shape.

The question of ladders in our plant has been given particular attention and all of the ladders at present in use are substantially constructed, with proper footing, or of the safety ladder type, having the ladder stand on four legs instead of two, with bows at the top. In our spinning room we have practically eliminated the necessity for ladders by placing elevated platforms, suspended from the ceiling, along the shafting and under all the motors. These platforms, of course, are provided with substantial railing so as to prevent any fall hazards.

We have found it necessary to be particularly careful on temporary work, such as scaffolding or any other temporary condition which would create a fall hazard, to see that proper precautions are taken to prevent accidental falls; and even on trucking runways, where these are of sufficient height from the ground, substantial hand railings are placed along the side to prevent the men from running the trucks off the platform or from falling off the platform themselves. We have found it absolutely essential to protect in every known way against falls. Anyone working on a platform or near a dangerous edge is very likely to become overbalanced or slightly dizzy, or for some other reason temporarily lose control of himself, which may result in a serious fall.

Even with the utmost of precaution, falls of various nature will occur, but the number of days lost from falls in our particular plant has been reduced to the point where it is no longer one of our major causes of lost time. Our agent is absolutely convinced that it is possible for the mill to run a period of twelve months without a single lost time accident, and he will not be satisfied until this is accomplished.

The above are some of the causes, that, in the past have been responsible for many accidents. There are many things that enter into safety work in a textile mill, and it is the opinion of the writer that the most important of them all is the functioning of the safety committee. The agent, or active head of the mill must be sold on safety, and he in turn must sell it to his committee and to his operators; and when this is accomplished safety work becomes second nature to practically every employee in the organization, and they are all anxious and ready to assist in every possible way to minimize accidents.

CHAIRMAN JOHNSON: As my contribution to the discussion of the subject and the paper, I refer you to a chart with the heading, "Falls in the Cotton Spinning and Weaving Industry." Out of a total of 2,189 compensable injuries, of which there were 16 deaths, 155 specific injuries and 2,018 temporary cases, which involved 84,000 days lost, falls were responsible for 376 compensable injuries, three deaths or permanent total, 12 specific, 361 temporary cases, involving 15,000 days lost.

Please note this: that the days lost are actual, do not contain death, permanent total or specific awards. You will notice that 376 is 17 per cent of the total. I might remark that the reason for using compensable injuries instead of reported injuries—these were taken from the punch cards which the insurance companies use for recording their data reportable to the National Council on Compensation Insurance and the analysis of compensable injuries is not made of just the reported injuries involving some slight medical or few days of lost time.

I took the 376 falls, split them up by the nature of the injury, and it is interesting to note that legs were injured more often than anything else, and arms next. It is very interesting to note that the legs cost nearly twice as much per leg as an arm. One cost slightly less than the average; the other somewhat more.

You will notice that head and spine injuries averaged to be very expensive. While that is true from our own experience, I am minimizing those figures by the fact that it is an average of eight and three respectively and my recollection is that of the spine injuries, one of them was out of all proportion more expensive than the

others, but, nevertheless, it is significant that head injuries and spine injuries, resulting from falls, are always serious.

Now let's drop down into the cause of injury. Please remember these are not basic cases of accidents; they are causes of the injury. Slipping on the floor Mr. Van Tassel covered very thoroughly and carefully and it represents 200 out of 376 falls and the average cost the average of all falls. Falls from ladders Mr. Van Tassel eliminated from his mill as reported in his paper. Falls from stairs or on stairs, falling over loose objects—bobbins, soda pop bottles, etc.—he covered very carefully. Falls from chairs are few and not so serious as others, but notice that six falls through floor openings were in the expensive class, and it is interesting to think of that particular cause as being one that does not come under the general heading of education of the employees; it is a maintenance, housekeeping problem which does not generally go below the supervisory staff and is hardly excusable.

G. W. COOK (Travelers Insurance Co., Hartford, Conn.): I am very much interested in your chart. This problem of falls is one that is of interest in all industry; in fact I attended a meeting of the New York Safety Council last winter in the Construction Section in which they had suddenly realized that falls were the most important cause of injury with which they had to deal.

The first item, "Slipping on Floor," though it is the largest item in the list of causes would show up far more important, I believe, if we had all lost-time accidents. In other words, these falls which resulted in compensation and a loss of an average of \$150 apiece do not begin to tell the story of accidents due to slipping on floors.

In the textile industry I would say that the three important types, not causes, are slipping on floors, falls from ladders and falls on stairs. I am surprised to note that there are only 29 of these falls from stairs. We generally expect a far larger number of accidents due to falls on stairs and also the injury from falls on stairs we would naturally expect to be greater than the average cost of injuries due to falls on the floor.

E. E. PLACE (American Mutual Liability Insurance Co., Boston, Mass.): Three hundred and seventy-six injuries times \$160 gives \$60,160. That is the amount of money represented by these cases. Now, taking the kind of injury, multiplying 109 by \$200, you get a little over \$21,000. Multiplying 96 by 110, you get a little bit over \$10,000. If you add these two together, you have 50 per cent of your total money spent on the first two types of injuries.

In going down to the heading of "Cause", multiplying your 201 by \$150, you get another figure of \$30,000 which represents 50 per cent of the total amount of money spent.

Combining the figures, slipping on floors as a cause of accidents, accounts for 50 per cent of the money spent.

The natural conclusion is that if we could prevent slipping on floor accidents it would be possible to decrease the cost of falls in the cotton spinning and weaving industry.

E. P. KNIGHT (Employers Liability Assurance Corp., Boston, Mass.): I would like to know whether those 201 cases were all due to wet conditions or oily conditions, or whether there are included in those cases, falling over bobbins or any other objects on the floor. I note that there is a classification of falling over loose objects, but I should think it would be quite interesting to get the individual causes under that one classification of slipping on floors.

CHAIRMAN JOHNSON: If you were to study the sheet which represented the tabulation from the card sorting, you would find the various or some of the various subdivisions under slipping, but I don't think that it would give you the point that you want to make, or at least that you want to stress—what types of slipping accidents were they. These represent only injuries as reported and do not go into the basic causes of the accidents themselves.

MR. COOK: The 26 accidents over loose objects—how do you separate that from your slipping on floors?

CHAIRMAN JOHNSON: I don't. It was all separated for me in the injury reports and I am having to take for granted that the person who made out the accident report reported correctly that one was a slip on the floor and the other one was stepping on a quill or bobbin and stumbling over a bobbin, box or falling over a chair or a multitude of clutter that was in the aisles and around the mill.

DR. R. P. KNAPP (Cheney Bros., South Manchester, Conn.): You could take it that there were no loose objects on the floor in the case of the 201.

CHAIRMAN JOHNSON: You can assume that slipping on the floor as such was the major cause of the injury, that the bobbin or what you have does not enter into the 201.

MR. KNIGHT: That is what I mean, dampness or oiliness or something of that sort.

MR. COOK: Isn't it true, Mr. Chairman, that we are depending upon the person who made the original report in those cases?

CHAIRMAN JOHNSON: Absolutely.

MR. COOK: And therefore just as they happen to think of it and designate it as a fall or a slip—that is a man might have fallen over a bobbin or he might have slipped on a bobbin and just as it came to the mind of the man who was making the report, he reported it.

CHAIRMAN JOHNSON: You might very well combine the 26 and the 201 and say, "falls on floors and over loose objects about the floors."

MR. COOK: In other words, it doesn't sound reasonable to assume that the ratio of 201 to 26 would be the ratio of slipping on the floor itself, either wet or oily, to the ratio of falls on floors due to something being on the floor.

CHAIRMAN JOHNSON: I wouldn't make a particularly vital issue of stressing a separation at all. They are both similar in hazard; they are both identical in prevention of accidents to a large degree.

DR. KNIGHT: The only reason I brought that question up with Mr. Johnson was this—there are quite a number of insurance people here who are more or less familiar with this schedule and this method of getting at the analysis shown in the chart, but there also might be a few people here who would come to a meeting like this with the hope of going away with a definite thought and suggestion as to what they might do to cut down, we will say, this 201 as shown in the chart. A lot might wonder whether it was due to faulty shoes or poor condition of the floor or wet conditions or oily conditions. I didn't mean a catch question at all; I didn't mean to try to draw you out; but to see if we couldn't get somebody here to talk about a few of the causes they might know through their experience in that particular mill; so the rest of us might get the benefit of those suggestions and go back and put them into use.

CHAIRMAN JOHNSON: That is absolutely my fundamental reason for not being too much impressed by statistical analysis. It tells an interesting story in the total and in the general separation of this and that. The analysis as I prepared it, without going into fundamental causes or anything of that sort, harmonizes very closely with the conditions that Mr. Van Tassel covered in his methods for cutting them out of his mill. Shoes was one of the items that he covered, etc. I agree absolutely with him that an accident preventionist cannot go back to his mill after reading an analysis of some injuries and some causes and prevent a single one of them, but it will direct his attention to an outstanding contribution in his accident frequency and accident severity, and that is all.

DR. KNAPP: The item, "Falls from Chairs," does that mean standing in a chair? CHAIRMAN JOHNSON: I presume so. It is listed under the item, "Falls From Chairs, Boxes, etc.," a few odds and ends of things which are similarly used as a

temporary thing to stand up on to pull a curtain down or screw an electric light bulb in or the usual foolish things that mill operatives do with chairs. It just flashed through my mind that it is fortunate that mills don't use rocking chairs, because that item would go up into the class with household accidents.

DR. KNAPP: Going back again to that slipping on the floors, can you tell me what proportion of those accidents might be prevented?

CHAIRMAN JOHNSON: Van Tassel says that he has got most of them; he has eliminated all of those caused formerly by improper washing of the floors and he has got rid of all of those caused by bobbins and soda pop bottles, etc., on the floor. That soda pop bottle interests me because I never saw any on the floor. The preventability, as Van Tassel brought out in the last paragraph or two in his paper, is so convincing that his boss's bogey is absolutely no accidents for a year, all kinds.

JOHN RENNIE (Joseph Bancroft & Sons Co., Wilmington, Del.): In these compensable injuries you don't mention how much loss of time there is before the compensation started. Why I ask that is this: We have many accidents that lose time and go back again to work before the compensation starts.

More Facts About the Compensable Injuries

CHAIRMAN JOHNSON: That is a good point. I wanted to make myself clear in the beginning that the analysis as prepared—I didn't study the cases; this was a tabulation for a cost purpose and not for an accident analysis purpose—was arranged with the analysis for the compensable injuries only. Those which cost only medical, that is were just lost time injuries in the waiting period, were not taken apart.

Here is the ratio informally: 2189 compensable injuries total for this particular group of mills and the time covered to develop these injuries. There were six thousand odd injuries reported. That means there were four thousand odd that came in the non-compensable group. I can't give you the average of lost time because this is over several states, different waiting periods. You can't pay too much attention, too strict attention to these average costs, because they represent the functioning of different compensation laws. Those of us who attended the Textile Section a couple of years ago remember that Ethelbert Stewart, Commissioner of Labor Statistics, pooh-poohed the idea of trying to compare statistics of different states, but I believe that over a considerable period of exposure, a large number of mills and a large number of employees, those peaks in your curve more or less flatten out and the general slope of the curve is just as impressive.

The ratio is about two to one with these figures, lost time, but non-compensable, as against these compensable accidents. Of course, the cost is insignificant compared to the cost of these. I have forgotten what the cost of the four thousand lost time, non-compensable cases was, but it was instead of being a ratio of two to one it was one to twenty or thirty or something like that.

MR. COOK: Getting down to specific causes of these falls, the textile industry has one peculiar cause of slipping and falling which we don't find in other industries to any extent. That is your slipping due to washing floors. Other industries do not attempt to wash floors while the operators are at work or around the machines. I believe that the slipping accidents and falls due to wet floors is particularly a textile problem. I recall certain textile mills which over a certain period found that the large part of their compensation cost was from this one cause and the proper control of washing in textile mills is a vital problem in textile mill accident prevention.

CHAIRMAN JOHNSON: That, I think, is the experience of every one of us with individual members.

I will ask the Chairman of the Nominating Committee, to read the report of nominations for officers and Executive Committee members of the Textile Section.

Report of the Nominating Committee

G. W. COOK (Travelers Insurance Company, Hartford, Conn.): Following are the names of officers selected for your consideration:

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. VERTZ, Plymouth Cordage Co., North Plymouth, Mass.

Chairman Membership Committee—D. FRANK LOHN, M. J. Whittall Associates, Ltd., Worcester, Mass.

Chairman Poster Committee—FRED W. SEEL, 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 INGRAM, Ludlow Manufacturing Associates, Ludlow, Mass.

CHAIRMAN JOHNSON: You have heard the report of the Nominating Committee; what is your pleasure?

(It was voted that the report be accepted and that the secretary cast a unanimous ballot in favor of those elected.)

CHAIRMAN JOHNSON: "Handling Material—a Textile Accident Problem". We will enjoy now a paper on that subject by Mr. W. A. Dearborn, Chief Engineer of the Federal Mutual Liability Insurance Company of Boston.

Handling-Material Accidents—An Engineering Problem

By W. A. DEARBORN

Chief Engineer, Federal Mutual Liability Insurance Company, Boston, Mass.

The handling-material accident is the greatest problem in industrial safety.

Accident statistics tell as clearly that injuries from handling material not only occur more frequently than from any other cause but often are more serious. Over 50 per cent of the accidents in an industrial plant come from handling or transporting material. This is not surprising, however, when we stop to consider that a large part of manufacturing operations consists of loading, unloading, piling, unpling, lifting, carrying or transporting material by hand or by power.

This is true of the textile plant as it is of all other industries. In fact, in Massachusetts, for one recent year in the textile industry the handling material accidents ran as high as 62 per cent of all accidents. It is just as true today as it ever has been, and though the problem of the handling-material accident has been discussed constantly and from all possible angles the appearance of the subject again on your program is an indication of its vital importance. A further review of the situation may perhaps be helpful.

Handling-material accidents at one time were considered almost non-preventable because of the uncertainty of the human element involved, but they can be greatly reduced if a thorough study of the methods of handling material is made and safe practices in performing work formulated and followed. There is a safe and unsafe way of doing everything, and it is usually just as easy to do it the safe way. A

slight change in the method of taking hold of the material or in lifting it may change a dangerous operation into a safe one.

In the last analysis the best way, of course, to prevent hand labor accidents is to eliminate the hand labor. After this has been done as far as possible by means of power conveyors, gravity and air pressure chutes, mechanical hoists, elevators, trucks, and other forms of mechanical transportation, the problem of handling-material accidents resolves itself into a matter of supervising and educating the individual.

A detailed study of a large number of handling-material accidents in the textile industry presents some helpful facts when analyzed to reveal just what the workman was doing which contributed as a cause to the accident. A statement covering this special analysis follows:

Handling Material Accidents—An Engineering Problem

Lack of Attention	27%	63%
Wrong Judgment	21%	
Haste	15%	
Defective Material	12%	
Chance Taking	10%	
Failed to Use Protective Equipment	5%	
Interference by Others	4%	
Inexperience	3%	
Insufficient Instruction	1%	
Physical Defects	1%	
Improper Layout of Work	1%	
TOTAL	100%	
Employee's Action	86%	
Management—Defective Material	14%	

TOTAL

100%

To illustrate that "Inattention" is a common weakness I might cite the following: A man broke his leg when he stepped off platform onto a truck that wasn't there; but the everyday occurrences in the textile mill indicate clearly the predominance of this type of accident.

Investigation would, no doubt, show the workman did not have his mind on his work. The plant nurse, usually considered the best friend of everyone, learns in confidence why the injured employee was thinking of something else—some condition or situation outside of his employment; worrying over the health of a member of his family; a financial problem; watching or talking to a fellow workman; dreaming about a pleasant time the night before, or what he will do when the day's work is over; thinking about the next piece of work or job he will go to when he completes the one he is then on. In other words, any of the hundreds of things that might take his mind from his work and his job of keeping himself from being injured.

Under "Wrong Judgment" we find the following: Placing hand in scalding water to see how hot it is; grasping hot plates or pipes to see if they are warm; holding hand on roll to stop its revolving instead of using brake; attempting to lift too heavy a weight. Misdirected actions—striking hands or feet.

As an instance of this type of wrong judgment accident the following could be given: Removing metal strap or wire from bale which snaps in uncoiling and strikes employee. Trying to pass through narrow passage, carrying box or case, hand jammed.

As an illustration of an accident which might fall under both inattention and wrong judgment and perhaps also defect in equipment, is the following: Cloth being removed from washer and placed on truck between washer and extractor. Free end of rope attached to cover on washer was lying on truck. Employee placing the remaining

cloth in extractor also picked up free end of rope and placed it in the extractor which pulled the rope through his legs drawing him into extractor.

Under heading "Haste" are grouped such accidents as: Hurrying to go from one section of the mill to another section for a number of reasons; i. e., lot chaser falls on stairs; hand trucker removing full truck at machine to replace with empty truck pulls the truck instead of pushing it and foot is struck by wheel of truck. Cloth becomes twisted and in hastening to straighten it he strikes hand or arm against frame of machine. Repair man making adjustments or changing over machine in haste forces gear which is wedged on shaft and gear gives way injuring hand between gear and machine frame.

On this subject of haste—what happens when a car attempting to tow another starts too quickly? Something usually breaks. Trying to move any dead weight too suddenly by either mechanical means or by hand always results in trouble. Haste as it applies in the handling of materials covers the intended action of starting materials in motion too suddenly. A uniform, medium speed of motion produces just as much work with less effort and lessens the chance of accidents.

How men are injured is no puzzle. Both cause and remedy are startlingly alike for all industries. Handling material is handling material when manually done, whether in relation to the manufacture of automobiles, shoes, cotton goods or fountain pens. You can educate, train and discipline most of the workmen to do the right thing most of the time, but some of the men are bound to do something wrong some time.

Gloves, hand leathers, asbestos protectors, respirators, safety shoes, goggles and other safety equipment and all possible instruction—what good are they when men do not use them? We try to offset the weaknesses of the individual, to select men physically and mentally qualified for their work, to stimulate interest and focus attention on safety through the media of bulletin boards, rallies, contests, and so forth, but still "to err is human."

This uncertainty and unreliability of the individual leads us to try to replace the 90 per cent reliable human with a 100 per cent reliable machine, calling the process engineering revision.

Engineering revision is that which changes the common shovel into an agricultural implement. It's highbrow but it does give us a start on the right road, for its aim is to detour the erring mind around the danger points; it replaces human with mechanical hands.

Engineering revision took the old fashioned two-man stone boat, fired one man, put a wheel in his place, and called the result a wheelbarrow. Engineering revision arranges the plant processes so that raw material comes in at one end and the finished product goes out at the other in a continuous one-way stream of non-interrupted traffic. A change of method that can't be properly otherwise classified can always be called engineering revision. Of course, it is just the result of a little brain work on the problem of conserving brawn.

It is the old problem of men vs. machines: 100 per cent mechanical handling of material would be an ideal arrangement as far as injury to the human being is concerned, but our present robots have hardly reached that point of efficiency.

All handling and transporting of stock, of course, cannot be done mechanically. It is necessary in many cases to load trucks and pile material by hand, and even though a conveyor or an automatic device may deliver the stock to the machine, the operator usually must place the material to complete the operation. However, material can generally be handled much safer and cheaper by mechanical devices than by hand and with the installation and use of such equipment a marked reduction in handling material accidents will surely result, and the severe and costly transportation accident will be practically eliminated.

You have no doubt found, as I have, that one out of every three accidents from handling material is a strain and the bugaboo of this class of injury is the hernia.

It seems that nature, provident in most things, has been rather negligent in regard to the strength she has given to the muscles of the abdomen, with the result that man finds himself peculiarly, if not unknowingly, susceptible to constitutional weakness in that region.

While medical authorities discourse professionally upon this weakness and its cure we in industry also know that it is extremely costly in both time and money. Therefore, our chief concern is to find some means to prevent hernia, with its accompanying tremendous loss to employees, employers and their insurance companies—which latter loss ultimately means loss to industry.

From our study of hernia cases we know that a weight of 75 to 100 pounds is dangerous for some men even though they be of the big, brawny type. An improper method of handling material, especially when the height of the lift is over three feet, may develop such a strain in the inguinal region as might later help to produce hernia. The handling of material which is too bulky and consequently unmanageable also causes weaknesses in the abdominal region to become acute. The proper method of lifting of heavy, or bulky material will prevent 75 per cent of the cases in which hernia is alleged. Squat, then lift—is the warning issued by our safety engineering department. Push your entire body upward with your legs, it is easier and safer, is a lesson that should be taught to every employee.

The danger of lifting in handling materials is now recognized by most employers, and here again engineering revision comes to our assistance, with the result that mechanical conveyors, lifts, elevators, and hoists have been installed whenever practical; and it is gratifying to note that in such cases there has been a marked improvement in the hernia accident experience.

Although much good has been accomplished through mechanical aids and instruction in safe working practices, there is something even more fundamental. As we now know, a physical examination can and will disclose any evidence of existing hernia or a weakness in the abdominal walls that may lead to hernia. Physical examinations of employees in industry will without doubt be ultimately undertaken by all employers of labor. That such a procedure is almost necessary is evidenced by the fact that records of such examinations covering a large number of textile plants reveal that on an average one out of every five applicants for employment either has a hernia or has a weakness in the abdominal structure, which would, under the right conditions, easily produce one.

With such a serious situation before us and a realization of the burden imposed on the textile industry through handling-material accidents, which include such trivial occurrences as, object dropped upon another person by a fellow worker, being caught between two objects, injury due to something falling from a load, or piling material, strain in handling, violent contact with sharp or rough objects,—careful thought should be given to the possibility of assisting the human element with properly designed mechanical devices which are only possible through engineering.

CHAIRMAN JOHNSON: Mr. Dearborn, that was a very interesting paper. The opportunity of using mechanical devices, not necessarily engineering revision, to completely change the process, but mechanical additions, indicated by your pictures and remarks, tells me that a great deal can be done to prevent handling material accidents and their consequent injuries by mechanical means instead of passing the buck entirely to the employees who are subject to the injuries.

I am particularly interested in that point that we are inclined sometimes to stress our safety educational work among the employees to such an extent that we pass the buck.

ELLIOTT KNIGHT (The Employer's Liability Assurance Corp., Boston): Mr. Dearborn, what arrangements have you on those portable elevator lifts for keeping them in one spot while they are being in use? In other words, to keep them from sliding away? If they are portable they must have wheels on the bottom to shove them around.

MR. DEARBORN: What you call an island, is one way. Just roll it over into this island or raised molding. Some of those are set in a depression in the floor. It is the same problem you have on a railroad platform with trucks.

DR. KNAPP: Where you are using those for a staging in painting, how can you anchor them?

MR. DEARBORN: That is more or less a permanent operation. Instead of using a ladder stage, they use two lifts.

MR. PLACE: Isn't it possible that they have some sort of device on there like they have on adding machines for use in offices? You can step on something and the wheel comes up and the whole thing rests on the ground. I think probably those caster wheels are lifted so that it is on a channel iron or frame.

MR. KNIGHT: In thinking back, I believe one of your pictures illustrated that point. It seems as though the wheels were about four inches from the floor and that a platform dropped down. I brought the question up because I knew of a case that happened not long ago in the use of one of those lifting elevators where they had quite a weight and the whole thing slid off one side and toppled over and the injury resulting was far more severe than would have happened if they never had the elevator there.

CHAIRMAN JOHNSON: We mustn't ever overlook the fact that the introduction of a mechanical device to eliminate one accident causing conditions introduces another one, unless it is foolproof.

MR. COOK: You raise the question of hoisting that drum. I don't know whether you have all seen it or not, but downstairs in the exhibitors section there is a device for lifting drums, a cradle that picks them up and lays them over. It is a very clever device. I suggest that you look at it. It is new, something that has just been put on the market. You can empty the drum on the cradle or you can take the side bung out and empty it from the center. It has a pair of casters on the end and they throw back when they tilt the drum up, and they kick the casters forward and it is on a truck.

DR. KNAPP: This process I have in mind necessitates the raising not so much of a drum but of a barrel to its staging and then into a hopper which is also about five feet above the staging and the staging is about four feet above the floor. It would require rather a specialist for that. We haven't one as a matter of fact now that will do that.

MR. PLACE: Mr. Dearborn stated that 86 per cent of accidents were chargeable to employees and 14 to management or defective material or equipment. In putting on any accident prevention campaign, if we are going to try to eliminate a certain type of accident or a certain cause of accident, we all agree that we must first wipe out the management and defective equipment end of it. That gives us 86 per cent chargeable to the employees.

He very ably brought out that the placing of employees was of vital importance and that physical examination was almost a necessity.

Then he emphasized that the employees should be properly educated in the method of lifting, if they were going to handle material themselves, and after the education comes the proper supervision on the part of the department head, foreman or whatsoever have you.

So, with those three things in mind I think we might find that perhaps after we placed the employee and told him, tried to educate him, etc., really the most important one of all is the proper supervision.

Mr. Johnson has prepared another chart which I think illustrates the fact that perhaps we don't sometimes realize that handling materials involves somewhat the same relation to each other. We have again 2,189 compensable injuries. In other words, it is the same group of compensable injuries that were taken from falls.

If you can remember the figure of falls, you will see there were 376 compensable

injuries classified in falls and 377 handling materials. Right here we should state that this handling materials is all human handling of materials. There are no machines in it, no trucks, no lifting devices, it is human handling of material. We have again used the days lost as actual days and do not contain death, permanent total or specific awards. As we go down we see that the average cost of handling accidents is only \$115 as against \$160. That is an indication, that is all. Then we come to the heading, "Injury." Out of 377, 124 were hand injuries, 62 were foot injuries, 62 were back injuries, 40 were hernia. Those are the dominating classes with the possible exception of arms with 32.

Under the next heading of, "Hazard," the actual lifting hazard, 244 out of 366. In other words, a very large preponderance is in this classification. The others are small in number.

The next heading, "Cause," out of 377 we have 149 strains due to lifting, 76 accidents caught between objects, 69 object dropped by injured.

I think if we will bear in mind the facts as borne out we can see again that the things that Mr. Dearborn emphasized in his paper, such as the picking of the employee or the placing of the employee, are of vital importance in attacking this problem.

DR. KNAPP: Isn't the placing of the employee by far the most important?

CHAIRMAN JOHNSON: Why not use this expression, "the proper selection of the employee for the job." I rather like that. It is a stereotyped expression. In other words, our employment department may select beautiful physical specimens of humanity, but that is just half of that problem.

DR. KNAPP: I believe if there was a standard of acceptance on these men who showed a tendency to hernia, those 40 could almost be entirely eliminated.

CHAIRMAN JOHNSON: I was rather interested right there, Dr. Knapp, in the fact that there were forty hernias while handling material and only some seven or eight due to falls. I have heard doctor after doctor try to explain that hernias were apt to be more prevalent when slipping on a floor or a fall injury, and that back strain, muscular strain while lifting would predominate far ahead of hernia injuries. Here we see 62 back injuries and 40 hernia cases.

DR. KNAPP: I think this is what you expect, because with a fall you haven't usually any increase in pressure inside your abdomen. That is the condition that causes hernia. A fall doesn't usually give you that condition, while lifting most certainly does.

Not only that, but these men who were selected for this lifting, if they had been tested out probably the great majority of these 40 would have shown some tendency toward hernia. Either they were going to or actually did have incipient hernia. If they had been excluded you wouldn't have any of these 40 at all. We have reduced ours by examination down to virtually none in the way of hernia. We don't put men who have a tendency to hernia on lifting jobs. We don't employ them as a matter of fact.

I. MacNulty (American Woolen Co., Boston, Mass.): I was a little surprised to hear Mr. Dearborn's statement. I was wondering how he based that 86 per cent of the injuries on the employees themselves and so I was looking over under the heading of "Hazard," and 244 of the hazards under this heading were due to lifting. I wonder how much of that 244 was due to lack of supervision or wrong instruction to the people, or indifference as to how the men or women, whoever they were, were lifting.

I wonder if he included in his heading that 14 per cent against the supervision or management, or did he leave out in his classification some higglerly-pigglerly system with which the injured operator had very little to do. I say that because I have not found that 86 per cent of any accidents are due to injured parties.

I find that he gives us 35 cases working on machines. The machine itself is very

largely something that is out of the control of the employee. He has nothing to do with the construction of the machine, nor the speed of the machine. He has nothing to do with the defective machine. A machine may be running and some defect occur over which the employee has no control. I was wondering if 86 per cent of those accidents were due to carelessness or to any accident of the employees themselves. I have a suspicion that the 86 per cent has not been thoroughly analyzed.

On the question of piling, I think most of you men who have factory experience will admit that if you go through places where there is a great deal of storing and piling, there is very little supervision. It is very largely left to the people themselves and a great many elements may enter into why the men are careless or indifferent or in a hurry.

Of the 14 cases due to piling I would suggest that less than 86 per cent are due to the failing of the injured party there. I notice that there were 30 "other causes." What other causes? There are 30 causes not explained while there are only 24 to pushing or skidding and only 14 to piling. There are 30 other different ways in which men were injured handling material for which there is no definite heading, and in how many of those unknown causes was the operator the cause of his own injury? I think 30 is too large a number out of the small number there, and then say 86 per cent of them are due to carelessness on the part of the injured party himself.

Your skidding came up under the heading of your "falls." What control would he, the injured party, have over the skidding portion of any place that he was handling material? How little would he have to do with it? I think further analysis from those that compiled those figures would reduce the 86. I don't think a statement like that will help us a great deal in solving the problem of accidents unless we go very thoroughly into the basic cause of the thing itself.

Earlier in the forenoon the question of falls came in and I noticed that whoever drew up this drew up one item under "Loose objects," which was a definite cause of 26 falls, but there was no heading here on how many accidents were caused by permanent fixtures on floors, not loose but permanent. I think there are more permanent things on floors than there are loose things on floors. You are constantly looking after the loose things on floors, but the permanent obstacles on floors you are not looking after because they are something outside of your province.

CHAIRMAN JOHNSON: Mr. McNulty, I am going to start at the back end and work up to answer your questions relative to the charts. Look at your "Falls" chart, falling over fixed objects. At the bottom are labeled 61, "All Others." There was no one item of more than six or at least no other item of as many as six which went to make up the "All Others." In other words, all others was the grouping of some of one cause, two of some other cause, three of some other cause, one of another, etc., to total the 61. Falling over fixed objects is in there and for this group of figures it did not total six or else it would have been an item by itself. I arbitrarily took six as a number for a heading.

As far as this analysis goes, it does not go into the question of responsibility by the employee. So that these lifting accidents, these working on machine accidents, these loading accidents, these pushing or skidding materials accidents, etc., were from a variety of causes and far be it from me to attempt to guess whether the employee was responsible for six or 86 or any other percentage of responsibility.

Notice that working on machines under handling materials means that the person was injured while placing stock in a machine or tool in a machine and a good many (not all) of those injuries while handling material at a machine would be classed as caught between objects. That is, slamming the heavy material against the hand and the frame of the machine, and other similar ways of being injured while handling material at the machines.

Mr. McNulty: You realize that a good many aisles in mills are very narrow.

especially old-time mills. Men have to go in and lift heavy objects like beams, and parts of those machines are very heavy. Would it be just to say that if he was injured under conditions which he did not make and conditions which are not safe but have been the handing over of an old-time method of constructing textile rooms, almost under any circumstances would it be just to blame the man who was injured?

CHAIRMAN JOHNSON: No.

Mr. McNulty: I think your 86 will begin to simmer down a little.

Mr. Cook: In reading your chart there are certain things that I don't quite understand. You use an expression, "Hazard," and then you use the expression "Cause" and under "Cause" you give the words, "Strains due to lifting." I would feel that a strain was a type of injury. You already use the word "lifting" above and you call this a hazard, which is really a type of accident.

CHAIRMAN JOHNSON: Let me use some other word which may be synonymous. Suppose we change the word "Hazard" to the operation that the workingman was performing, such as he was lifting or he was working on machines or he was loading vehicles or he was pushing or skidding material, and it was while he was performing those operations that these injuries occurred.

Now, under "Cause" I am contented to use the word "classification," but I wouldn't like to say "type" because I think this type of injury to the hand or foot, etc., comes in the first group.

Mr. Cook: Not type of injury but type of accident.

CHAIRMAN JOHNSON: All right, type of accident and cause of injury are very similar to me, because the cause of an injury is the result of an accident.

As far as lifting, under the "Hazard" group, the man who is lifting material received an injury. It may have been a strain. He may have got caught between objects.

Mr. Cook: But you call a strain a cause.

CHAIRMAN JOHNSON: Of injury, yes. The injury is ruptured muscles or ruptured belly wall.

Mr. Cook: Or a strain. Is that proper, doctor?

Dr. Knapp: A strain is the type of injury then and you include under strain hernia?

CHAIRMAN JOHNSON: At the top I have got them separated as hernia in a separate classification. Some of the foot injuries were strains and some of the back injuries were strains. A sprain of a foot is a strain and a sprain of a back muscle is also a strain. They are grouped there under the various parts of the body.

I am very frank to admit that there is easily a little confusion by the fact that the classification nomenclature uses lifting as a hazard and then again as a cause of injury.

Dr. Knapp: Wouldn't it make it clearer just to leave the word "strain" out and say "due to lifting?"

CHAIRMAN JOHNSON: Surely, I think it would take away all the difficulty.

Mr. Cook: I want to agree with Mr. McNulty on his statement regarding the 86 per cent of accidents chargeable to the employee. If we could educate supervisors, safety supervisors, to eliminate the employees as an accident cause, it would improve the efficiency of the supervisor 100 per cent, first because we remove from his chart a convenient alibi and, second, that almost invariably if we take the cause of an injury which has been charged to the employee, we can go one step farther and charge it to supervision. An injury which is due to failure to obey instructions can also be charged to, if not a lack of instructions, failure of the supervisor to follow through on his instructions, and I agree with Mr. McNulty that that percentage seems somewhat too high.

Dr. Knapp: I have never gone into it thoroughly, but the evidence that we have had doesn't bear that out. Severe accidents are very few, fortunately for us, but I do recall four very bad accidents which entailed the loss of much time. In all these cases it was distinctly, I should say, the fault of the operator and not the supervisor.

Mr. COOK: Would you mind taking one of those cases and illustrate it for us?

Dr. KNAPP: A man who acted as a janitor and clean-up man in our dressing mill had the elevator upstairs on the floor he was working and he wanted to send it down. He rushed into the elevator, pulled the cord, sent the elevator down and attempted to rush off. He broke his back. The gate struck him as he was getting off. He fortunately got off the elevator without causing his death. He was never instructed to operate the elevator that way.

Mr. COOK: Was he instructed otherwise?

Dr. KNAPP: When he came on the job. He knew how to run the elevator, was told how it worked. I don't think a supervisor would ever take into consideration that a man would ever do that. There was no cause for him doing that. There was no haste. The day's work was over and he was cleaning up that particular room. He wanted to send the elevator downstairs. He didn't want to climb the stairs.

Mr. COOK: Did you ever check up to see whether he did that before or not?

Dr. KNAPP: I suppose he probably had done it before. There was no one there to witness it; it was after hours. Naturally he was laid up three or four months.

Mr. COOK: Wasn't the supervisor responsible for him after hours as before?

Dr. KNAPP: How could he be responsible for a man working after hours if you give a man instructions?

Another accident we had—a man attempted to clean his machine while it was in action. It was a combing operation in the velvet department and he combed out most of the tendons in the back of his right hand. He was distinctly instructed not to clean that machine while it was in motion, yet to save time he did it. He operated that machine 20 years and had never been hurt before.

Mr. COOK: Was this the first time he had done it that way?

Dr. KNAPP: I don't suppose it was. A similar accident occurred in a spinning mill. A woman tried to clean a machine with a brush while in motion. The brush was caught and pulled her hand in and severed all the tendons on the back of her right hand.

This same man who broke his back with the elevator just last spring attempted to oil some gears while they were in motion and it took off three fingers on his right hand. A piece of rag caught in this machine and dragged his hand in and took off three fingers. That is the same man who broke his back. To me that man illustrated an unsafe employee. The man was sober and industrious. He never smoke or drank in his life. I don't think his judgment is good. We removed him now to something where he can't possibly hurt himself and is still able to work.

CHAIRMAN JOHNSON: Dr. Knapp, I agree with Mr. McNulty and Mr. Cook that it is a dangerous thing, to say that 80 per cent or any other specific per cent of injuries are due to the workman himself, but I am going to agree with you in this way: We are stressing supervision because that is a very important item of accident prevention, but I have a rather distinct feeling that the swing of the pendulum in that direction is a little too far. Now there are very definite responsibilities for accident cause and we know that the human factors, the management, the supervision and the employee, comprise the entire three divisions of personal responsibility. We can fail by putting into the supervision group some of those elements which rightfully belong in the employee group. We might express ourselves to the extent of finding some partial responsibility by the supervisor, but I think that it is carrying the thing much too far to in your first instance try to find a responsibility on the part of the foreman of the department when his department comprised one man working by himself at night, unless you analyze the accident which that foreman has in his department and find by studying all of the accidents which come to employees who come under his charge that he as a foreman allowed his employees to contribute a large percentage of the accidents in the mill.

Then it is reasonable to find that he is rather lax in his supervision and you might

find that the man who ran the elevator down and jumped off was not responsible for it but that his foreman was.

So that you cannot, from the amount of evidence available, absolutely exclude the foreman and neither can you blame him for it without using a good deal of imagination.

Mr. McNULTY: Speaking for myself, I was trying to remove a cause of blame and not bring in a new one. For instance, in the cases I gave the foreman was not to blame for the accident. There is a narrow aisle; there is very little room to handle a beam; the foreman is not to blame but I was trying to remove blame from an injured man because we will not get anywhere in our safety work if the problem of condemnation is controlling us and blaming people that are not in a position to be blamed.

Foremen have nothing to do with defective flooring and defective stairways. They are the cause of a good many accidents. If we go on shifting the blame from the shoulders of the foreman to the shoulders of an operator, we will never get near the cause of our accidents. So I had no intentions and, of course, I didn't say so, but I was afraid I was getting that way under the discussion that we were blaming some one; no, nor condemning any one.

There are permanent conditions of hazard in industry, I suppose in other industries as well as textiles, over which neither the injured party nor his foreman have any control. Those permanent conditions are the cause of accidents. How long are we going to be changing our stand by introducing the question of responsibility or blame or condemnation and the condition that causes it still remains permanently? I wanted that cleared up so there wouldn't be any mistake of introducing a new blame by removing an old one.

Mr. COOK: I didn't want to introduce the foreman into the discussion. I tried to use the word, "supervision", meaning only two classes: the workman himself and those from whom he took orders and who are responsible for the conditions under which he works, which includes the entire supervisory personnel, including the management and ownership of a mill, and the permanent conditions which Mr. McNulty speaks about certainly are responsible and the responsibility of the owners of the mill or the management.

Just to bring out the idea a little farther in that discussion which I tried to raise with you, doctor, in the four cases which you mentioned, after the accident was nothing done by the management to stop that cause or prevent a repetition of those types of accidents?

Dr. KNAPP: Extra instructions were issued.

Mr. COOK: Then we admit that something could have been done before the accident?

Dr. KNAPP: They could have been doubly warned. Having been warned once, they could have been warned again. That could be carried out indefinitely, but that was done.

Mr. COOK: The thought is this: The very fact that you did try or took steps to stop a repetition of the accident indicates very clearly that in the hands of supervision there is a responsibility for that accident. I don't mean a blame; I don't mean by responsibility a criminal negligence or anything like that; I mean a responsibility for a cause of that type.

Dr. KNAPP: We had no more assurance that that accident wouldn't take place again; that the employee wouldn't commit just as poor judgment on other times and attempt to clean his machine while it is in action. You can warn them the third or fourth time not to do it, but I don't know how you are going to stop them doing it unless you fire all the men who do it. I don't doubt but that this will happen again even with these repeated warnings. I think that type of accident is up to the employee, but we don't blame the employee openly. We never accuse him, certainly not at the time of his accident. I do think, though, the type of accident that is due to a cause, as Mr. McNulty just mentioned—defective flooring in one department—should be put

up to the supervisory force. I think the supervisor should report those things. That is what I have been trying to achieve in our plant. The supervisor reports those things; reports within his own domain all the defective flooring, all scrubbing that is done during hours and things of that kind that hazard the life of the employees. I think that is distinctly up to the supervisor. The management is not there to see, but the supervisor is every day.

CHAIRMAN JOHNSON: I was going to bring that point up as a direct question, Mr. Cook, in this way: Don't you think that you would improve greatly your viewpoint in the question if you would make a distinct separation between management, executive control and your supervisory department which controls the actions of the employees directly? For example, the textile code has an item in it which comes under Mr. McNulty's question, namely, the clearance between the cargo, a mule, and a fixed structure of the building, to permit sufficient passage clearance for the operation of the mule. Now, the placing of the mules or any other machinery comes under the design of the factory or mill and is surely a management problem and has nothing whatever to do with the overseer of the spinning room who takes the machines as he finds them and gets the work off them by the operatives. I am not criticizing you; I am merely trying to stress that I like to make a distinct separation between management which controls the materials furnished, the machines furnished, and the process by which they work, and the supervision, on the other hand, which selects the employees, trains the employees, supervises the employees and is responsible for the maintenance of the machines after they get them.

MR. COOK: It may be splitting hairs. You will notice in Mr. Dearborn's paper he made no subdivision. The employees on one side and management on the other. If we are going to subdivide, separate classes, I think it is better to subdivide management, but still keep management and employees responsible as the two separate ideas. If we wish to subdivide the active handling of employees from the type and manner in which equipment is installed, etc., that is all right to subdivide it within the group of management.

CHAIRMAN JOHNSON: I always want to keep in my mind a separation between those things over which the management has direct control, which include the selection, training and supervision of supervisors.

MR. COOK: And also the installation and engineering equipment of the mill.

CHAIRMAN JOHNSON: If you are going to change your process to eliminate a hazard, you don't bother with your officers, you go to the manager, etc. That is beside the point on falls or handling material. We always drift into the subject, the general subject of accident prevention, which is absolutely no harm and thoroughly beneficial.

DR. KNAPP: The answer in our place apparently, to make the foreman responsible for accidents so far as possible, is that if you do make him responsible, he won't report half these accidents that occur; these small accidents that might grow serious.

CHAIRMAN JOHNSON: The answer to that is the supervision of supervisors.

A. BARLOW (Armstrong Cork Co., Lancaster, Pa.): We have been recognizing the responsibility of the foreman for quite some time and with that end in view have gotten the foreman so educated to his duties that a reduction in the cause of accidents in employment has been effected. We offer some form of encouragement by bringing the one who has been most successful in reducing the number of accidents in his department to this National Safety Council. It is worked out very beneficially and we can see a very encouraging diminution in accidents.

ADJOURNMENT

Wednesday Afternoon Session October 1, 1930

E. E. PLACE, Chairman

American Mutual Liability Insurance Company, Boston, Mass.

The second session of the Textile Section convened with Chairman E. E. Place, presiding.

CHAIRMAN PLACE: We have three speakers on the program and I am going to call upon the last one first for his convenience and ours. Mr. Glenn W. Cook, supervising engineer of the Travelers Insurance Company.

Accident Experience of the Textile Section During 1929

By G. W. COOK

Supervising Engineer, The Travelers Insurance Company, Hartford, Conn.

For a number of years we have been collecting accident statistics from the members of the Textile Section. These have in turn been analyzed and published by the National Safety Council. It is gratifying to note that each year more and more firms report and we can now analyze results to these annual reports, examine what progress has been made and draw some conclusions.

The value of keeping accident records in the textile industry is reflected in the increasing number of reports sent to Council headquarters each year by members of the section. Our accident experience during 1929 was the most representative ever reported. Records were received from 153 establishments which represents an increase of 76 per cent over 1928. These plants reported an exposure of almost 200,000,000 man-hours in comparison to 153,000,000 for 1928 and 110,000,000 for 1926. The development of accident statistics among members of the textile industry is in line with the increase in reporting establishments of all industries from 1,725 in 1926 to 3,600 in 1929 and from 3,000,000,000 to over 5,000,000,000 hours of exposure.

The accident experience of textile mills is decidedly better than for most industries. All sections representing industry as a whole, had an average of 25.53 lost-time accidents for every 1,000,000 hours worked by their employees during 1929, in comparison to only 11.82 for our section. The only group to show a lower frequency rate than we, out of 27 listed in "Industrial Accident Statistics," 1930 edition, was the cement industry, with a rate of 9.55. The severity of accidental injuries was likewise far better than the average; we had only 0.58 days of lost time for every 1,000 hours worked in our mills in comparison with 2.23 for all sections. Our 1929 severity rate gave us the best record among the previously mentioned 27 industrial groups.

Serious accidents do not occur as often in ours as in most industries. One employee out of every 1,888 was a fatality in industry as a whole during 1929 whereas we only had one to about every 12,000 people. This record was not beaten by any other industrial group. Although we had only one permanent partial disability accident to every 1,250 employees in comparison to one for every 430 in all sections combined, about five groups, public utilities, refrigeration, electric railways, laundries and some miscellaneous plants had better experience than we with this type of accident. We can, nevertheless, regard our experience with serious accidents with considerable satisfaction.

The most reliable measure of improvement is based on a comparison of records of plants that have reported in each of a period of years. We have 51 mills with

an exposure of about 84,000,000 man-hours that have reported to the Council in each of the last three years. This group does not include mills that reported for 1927 and failed to report for 1928, nor those that reported for the first time in 1929. Let me emphasize, right now, the importance of reporting your accident records every year. Do not report intermittently but consistently!

The experience of our three year identical plants show that we have made a consistent reduction in the frequency of lost-time accidents, but that the severity of accidental injuries has gone up. Our 1929 frequency rate was 16 per cent less than for 1927, which is a slightly larger decrease than the reduction of 11 per cent made by industry as a whole. On the other hand, our 1929 severity rate was 25 per cent higher than for 1927 in comparison with an increase of only 5 per cent for all sections.

The tendency toward lower frequency rates but higher severity rates was likewise shown by mills in our section that reported for both 1928 and 1929. Out of this larger group of 79 two year identical mills, 40 had lower frequency rates in 1929 than in 1928, 36 higher ones, and three had no accident records for two years. But, on the other hand, only 34 mills had lower severity rates in 1929 against 42 with higher rates.

The experience of identical plants in all industries, including our own two and three year identical mills, requires that we focus our attention on where and why this increase in severity occurred. The records of about 1,100 three year identical plants in all sections show that the frequency of fatalities increased during 1928, remained constant during 1929, but, though the frequency of partial disability cases declined slightly in 1928 in comparison with 1927, a sharp increase occurred in 1929. Our experience with fatalities has been similar, but, in spite of a slight decline in the frequency of permanent partial disabilities during the last three years, their severity during 1929 was higher than in 1928. The reduction in frequency has therefore, been achieved by reducing temporary disability accidents. What explanations can be offered to account for this increase in serious accidents? It has been suggested that industry may be directing too much attention to the elimination of minor accidents and overlooking some major hazards. The careful training and supervision of new employees during periods of expanding production schedules, such as occurred particularly during the first part of 1929 in many industries, is apt to receive less attention. Do more liberal allowances by state compensation boards increase our permanent partial disability cases? Whatever may be the reason, however, we need to give this situation careful thought.

We have many excellent records demonstrating that effective safety work has been carried on among our members. A mill spinning silk yard reported a frequency rate of 11.6 for 1926 which has steadily been reduced to 3.01 for 1929. Its severity rate has also dropped from 1.01 to the low figure of .17. Another notable reduction is that of a plant manufacturing fibrous floor coverings with a reduction in accident frequency from 40 plus in 1926 to 26 plus in 1929; their severity rate, too, has improved. A manufacturer of cotton cloth had over nine lost-time accidents per million hours worked during 1927, but for 1929, the rate was only 3.7. This mill established the unusually low severity rate of .07 during 1929.

I could cite other examples of good results among our members, but these will suffice to indicate the progress of individual efforts in the section. Records in various textile branches show that, though excellent progress has been made, there is still considerable room for improvement. Many cotton mills with a frequency rate higher than the average of 11.53 for the entire group can undoubtedly do better, particularly when 20 per cent of the mills can achieve rates less than 6.0. This possibility is open to mills of all sizes because those with these low rates employ from 300 to almost 3,000 people. This is likewise true among our finishing mills where some frequency rates range from 18 to over 70 in comparison to an average for the group of 14.5.

Furthermore, irrespective of the varying hazards in different branches of the industry, 72 establishments out of the 173 reporting had frequency rates less than the average of 11.82 for the entire section.

Very favorable severity experience was commonly experienced by our members during 1929, for 75 per cent of those reporting had rates less than the average of .58 for the entire section. Most mills in every branch, except cord and cordage manufacturing, had rates lower than .50. Serious accidents, therefore, were confined to a small portion of the section.

Although some excellent work was done during 1929, I believe that it will be surpassed during 1930. However, whether your records show better or worse experience this year, be sure to report it some time during January of 1931. As I have previously indicated, we are getting a clearer picture of the accident experience of the section each year. The response to requests for 1929 records was excellent—your sectional officers appreciate that kind of cooperation. It is for our mutual benefit that you contribute your experience, so make a special note on your calendar to furnish the Council with your 1930 record.

A. S. JOHNSON (American Mutual Liability Insurance Co., Boston): It is significant that the accident frequency and severity figures show that the textile industry is among the safest industries. You may recall that cotton manufacturing associations have laid great stress on that particular point, which stress I have interpreted to be a complacency or an alibi for not working diligently to reduce their accident conditions. The Council members show some reduction as those figures show, but in studies of other groups of accident figures which include many, many mills which are not members of the Council and which give a much broader exposure usually than those reported by Council members, we see that the frequency rate in the textile industry remains pretty constant.

In other words, a few mills are improving conditions; others are going sour. I merely want to point out that success in this small group proves that there is an opportunity to improve the accident conditions in the textile industry and what one mill can do, the rest can do, and the industry should slough off its complacent attitude and do good accident work.

J. MACNULTY (American Woolen Co., Boston): I think that the fact that it was established on two occasions, by the Commissioner of Labor Statistics in Washington at this National Safety Congress and by Mr. Cook today, that the textile industry is a reasonably safe industry, I think should be advertised in a very frank way. It should get strong publicity so that any feeling that might exist that the textile industry is a hazardous industry might be removed.

I think our industry can be congratulated that it can show to the public that it gives not only capable management but a great degree of protection to the thousands of employees working for it.

ARTHUR BARLOW (Armstrong Cork Co., Lancaster, Pa.): There are not many features of the textile industry which might be incorporated in what we regard as the safety record, other than those covered by Mr. Cook today. Should there be a complacency among the manufacturers of textile in this country so long as they are exposed to conditions which mean a lesser enjoyment of life or the shortening of life, things that might be remedied by associating themselves with the National Safety Council and taking advantage of the trend of progress to make conditions of workers not only safer but healthier? Is that not a point that the Textile Section might stress in its future activities?

CHAIRMAN PLACE: Mr. Barlow has brought out a point which we might stress in our news letters.

Mr. MacNulty's point of saying that the textile industry has improved and is enjoying a better accident prevention record than it did formerly is well taken. If we could get our members and other prospective members to feel that by joining the

Textile Section and taking part in the sessions they too, would enjoy a lower accident frequency and severity, then we would build our Section up to a larger number.

MR. COOK: There is a certain disadvantage in comparing our Section to any other section, particularly when we are better than the other sections. I don't think it is fair to compare sections. Perhaps the Textile industry is a less hazardous industry than any other. The comparison should be made among ourselves and in the industry.

CHAIRMAN PLACE: There is no doubt but what the Cement Section has shown the biggest improvement besides showing the lowest frequency. You are absolutely right that we should compare this Section with its past years inside the industry.

The next paper was to have been by Mr. Sidney Ingham of the Ludlow Manufacturing Associates. He is probably one of the pioneers on job analysis and the work that he has done in his plant speaks for itself. Unfortunately he was disappointed in not being able to attend. At the last moment Mr. Johnson received a telegram from him asking him to read his paper for him. Therefore Mr. Arthur Johnson of the American Mutual Liability will read Mr. Ingham's paper.

Sample of form used filed JS7a job analysis

Plant Hazards Taken Apart

By SYDNEY INGHAM

Safety Engineer, Ludlow Manufacturing Associates, Ludlow, Mass.

There is nothing original in the idea expressed in the subject of this paper. It is simply an adaptation of the job analysis of the efficiency engineer. Just an extension of the instinct of curiosity exemplified by our childhood desire to take things apart to find out what made them tick, but, I hope, without such disaster to the subject of our study as occurred to an accordion I once took apart to see what made the music.

In the textile world when we wish to learn the composition of a fabric, of a thread, or of a yarn we take it apart and study it under the microscope and in the laboratory. We do not always learn all that there is to know about our subject but we do get better acquainted with it than is possible from mere outward examination.

So it is with accident hazards in the textile, or any other, industry. If we analyze the jobs in the plant we shall discover that most of the accident hazards are a part of the routine work of the job. But first we must know the job, and a competent knowledge of the job requires that we know what kind of person is suited to the job.

First we look at the essential operations of the job. As we observe we learn that the work is heavy, medium, or light; that the operator stands, sits, or moves about; that there is much or little bending, reaching, lifting, pulling, pushing; that one's movements must be quick, slow, or moderate; that the work is varied or monotonous; that it is clean, dirty, dusty, oily, dry, wet, or odorous; that most of the work is done on the floor, at a machine, or at a bench; that the operator must speak or understand English; that he must or need not read or write; that he must not be color blind, or that it does not matter.

Having made these observations accurately we reach certain conclusions as to the type of person who should be employed for various kinds of work. So we say to our doctor—we have one for one hour a day only—we can use three types of people in the mills and we want them rated physically A, B, and C.

The A. type man or woman, boy or girl, must be in good physical condition. They must have no physical deformities of trunk or limbs; they must have good eyesight, good teeth, and good feet; they must not be underweight and they may be taller

than average. They must be free from a clinical history of rheumatism, tuberculosis, hernia, goiter, and heart trouble.

The type B. person must be in good physical condition but he or she may have minor physical defects or deformities; may be slightly under or overweight and may suffer slight defects of seeing, hearing, teeth, hands and feet without disqualifying. Our B. type is the average worker in industry.

The type C. person is anyone who cannot qualify in the A. or B. classification.

Now that we have analyzed all of our jobs and we have three kinds of people to put to work; we have now to fit the job and the worker together and our problem is solved—just like that. Unfortunately for everybody, it is not so simple. Occasionally our perfect type does not react to specifications. We have standards but they must be flexible. However, our experience has proved to us that jobs requiring the type A. worker can never be filled satisfactorily by the less physically fit. Occasionally a C. type worker will fit well into B. type work and a B. type worker can always do class C. work.

Let's analyze a job together to see if we can understand what I am driving at. We'll take the operation of spinning in a jute mill. The frame used has overdriven flyers turning upwards of three thousand revolutions a minute. There are seventy-two spindles to a side and the spinner tends from two to four sides depending on the count being spun.

For a woman or girl we classify this work as heavy. The rove must be placed on a creel over the frame and if the yarn is being spun from double rove at least two bobbins of rove must be on the creel for each spindle. The frame doffs every forty minutes and the rove runs out in five to six hours. The creel must be filled at least once every day and usually on alternate days it must be filled twice. To take care of four creels requires that a ton and a half of rove in five pound packages be lifted from a truck to a height of six or seven feet from the floor. To enable the spinner to reach this height a step is placed across the front of the frame at a distance of sixteen inches from the floor. The spinner must step up and down at least a hundred times a day with from twenty to thirty pounds of rove in her arms. This is heavy work. What kind of woman can do this work? We prefer the type A. but can use the cream of the type B. The spinner must be mature physically and in good health. An ideal type would be a girl about twenty years old, about five feet six inches tall, and weighing about one hundred thirty pounds, with good eyesight, good feet, and dexterous hands.

We continue our analysis. We find that the spinner has about 15 per cent idle time spread over eight hours. This gives practically no time for sitting. The job is one that only an active person can do. Being on her feet so much, it is essential that she must have good feet. Obviously the feet must be properly shod. Felt slippers without heels and shoes with high French heels cannot be worn on this job without serious results to the wearer. The former will result in fallen arches and flat feet and the latter in fallen bodies and bruises and fractures.

Across the front of the spinning frame are a series of drawing rolls, innumerable, and because of the nature of the operation impossible to guard by enclosing the nip. If a spinner is dressed in the modern mode—and she will be if she is like the spinners I know—she has on a skirt that hangs to the knee or thereabouts. Such a skirt, when the spinner reaches to the top row of pins on the rove creel, will have its hem about on a level with the drawing roll and, if the skirt is of light material, the slightest breeze will blow it into the roll and my lady will be bereft of clothes and suffering from contusions about the lower anatomy in the twinkling of an eye. To eliminate the possibility of such a painful physical experience and shock to the inherent sense of modesty we insist that every spinner must wear a garment that is called a union-all but is a feminine version of the well known male garment of

that name. To prevent sleeves being caught in the machinery the garment is made sleeveless.

The prevailing fashions in bobbed hair have eliminated most of the danger of girls having their hair caught in the machinery. However, they let the hair grow, and now and then there is a girl who never bobbed it; these girls must confine their hair in nets during working hours.

The point of operation on a flyer frame, has been, in the past, the most hazardous part of the spinner's job. To piece an end it is necessary to stop the flyer, draw the broken end from the bobbin and piece the yarn by releasing the flyer and allowing the rove and yarn to twist together. On the old type frame it was necessary to stop the flyer by bringing the heel of the hand into contact with the top of the rapidly revolving flyer, then the flyer was grasped by the little finger of the left hand and held while the yarn was brought into piecing position. Operators were furnished hand leathers to take the shock of the flyer and prevent callous formation, but in spite of this protection painful contusions and frequent fractures of the fingers were common, with no adequate provision for preventing these accidents. Deformed fingers were more common among spinners than among base-ball catchers. The adoption of the overdriven flyer has eliminated all of these accidents. Since this type of flyer frame has been in use we have not had a single broken bone as the result of an accident at the point of operation, formerly they were of very frequent occurrence. The flyer is now stopped by friction of the hand on the top of a half round wharf above the whirling flyer and out of danger. Incidentally the frame is speeded up half again as fast as the old underdriven type.

The raw stock for the spinner is rove and the finished product is yarn, both of these commodities are handled on wooden bobbins. In the past these bobbins were subjected to very hard usage. They were thrown into box trucks with anything but tender care. As a result of this treatment both the bobbins and the box trucks became splintery and the girls and women who handled them suffered from innumerable splinters, many of which were reported for first aid treatment, but more of them were not so reported. They were removed on the spot with the aid of pins, needles, and knives. As a consequence infections were frequent. To prevent infections from this cause required a long programme of education in the necessity for prompt reporting and treatment for sliver wounds. A better and more efficacious remedy would be to remove the cause of the slivers.

This was accomplished by painting the bobbins with lacquer and eliminating the box truck by substituting in its stead a truck with an iron frame and a creel on it. The bobbins instead of being thrown into a box truck and ruined in a short time are put on spindles. Now they are never splintered, their life is increased about ten fold, and yarn is not spoiled by being frayed on rough bobbin heads. There are no splinters in the trucks for there is nothing to splinter. The tiresome bending to remove bobbins from the bottom of a box truck is eliminated and the spinning and subsequent winding or reeling operation is speeded up, but most important from the accident prevention point of view slivers are practically eliminated and infections never occur.

It is of more than passing interest to note that the study of the job with a view to eliminate accidents led to a new organization of the work for the spinner and her helper; so that the more valuable time of the spinner is spent in the performance of the more skillful operations on a larger number of sides and the less valuable time of the helper is spent on the less skilled operations, with a considerable saving in labor cost and the almost complete elimination of accidents on this job.

The spinning frame must be cleaned, oiled, and greased. It occasionally requires mechanical adjustments, and has frequent gear changes as the counts spun are changed from time to time. Some of the most serious accidents—amputations of fingers, hands, and arms—in the textile industry have been the result of cleaning

machinery in motion, particularly accidents relating to women. To eliminate these infrequent but tragic accidents machinery must be cleaned only when it is stopped or the cleaning must be done by a trained crew of cleaning specialists. It has been our experience that the specialist is the best cleaner and least prone to injury from the operation.

Obviously if the operator does not clean the machine she cannot be injured doing that operation. A properly organized cleaning crew of two or three men equipped with vacuum or blowing apparatus, working after the production departments have stopped for the day, will do more and better cleaning with beneficial results to the manufactured product and to the life of the machine. Thus cleaning accidents are eliminated and the time of the machine operator is not diverted from production. There is a reduction in waste of material in process and the consumption of brooms is reduced to a reasonable figure.

Modern lubrication methods have made it possible and very desirable to substitute high pressure greasing for much of the wasteful and indifferent oiling of the past. By the use of grease guns and central oiling reservoirs all of the accident hazard and most of the waste in lubrication may be prevented. With modern systems of lubrication all except a very few places may be lubricated while the machinery is still.

Along with the studies and changes that have been inaugurated in this job of spinning which we have been analyzing the spinner has not been neglected. She has been educated in accident prevention by having pointed out to her the reasons for the changes and how they affect the accident hazard of the job. She has been educated to appreciate the necessity for correct footwear on the job and the desirability of being clothed so as to eliminate accident hazard. She has a better job, is better paid, and does less laborious work than under the old hazardous system of working.

The second-hand, section-hand, and the fixer usually make the gear changes and minor adjustments on operating machinery. It is necessary to study each machine and all of its peculiarities very carefully to discover the latent accident possibilities contained in it. When changes are made gear cages are open and the hazard is open too.

To change a drest gear on a drawing frame, for instance; where does the second-hand stand when he loosens and tightens the stud nut? Does he hold the intermediate gear—which is always in mesh—with his left hand while he pulls on the wrench with his right hand? And if he does, what would happen if the machine were to start accidentally? Is the belt shipper locked so that the belt cannot creep onto the tight pulley? Or is it left to the man to divide his own safety guard and lock the belt shipper with a hammer handle or another wrench? Could the thrust of his shoulder start the frame if the wrench should slip off the nut while he was pulling or pushing? Could a passing truck strike the shifter and start the frame? Could a careless or ignorant operator start the frame? Is there sufficient clearance between the belt shipper and the machine, at the back of the frame where the man is standing, so that if it were accidentally shifted the man would not be caught in a trap? Does the man have to reach around a belt shifter in such a way that he might pull the belt on to the tight pulley if he should slip? Does he stand where tension weights may fall and injure his feet?

These and kindred questions the safety engineer must answer from his personal knowledge. This knowledge he must acquire from an analysis of the various jobs in his plant. He cannot take anything for granted. He cannot assume that because things are done in a certain manner and that they have been done that way from time immemorial that, ipso facto, there is no accident hazard there. He must take the job apart and see what makes it tick. And the interesting thing about taking

plant hazards apart is, that, in almost every instance, when the job is put back together there will have been not only the elimination of an accident hazard but the elimination of some form of waste.

This taking the hazard apart is a never ending job. Production operations in the factory are changing constantly. The industrial world of twenty-five years ago is as dead as the civilization of Egypt and Babylon. This is a new world we are at work in. Competition is scientific. Silk and cotton are battling with rayon. Railroads are battling Bus, Truck, and Air travel. Concrete and steel with lumber, brick and plaster.

"Manufacturing is scientific, in its mass production and new machinery. Business today demands knowledge, resourcefulness, and sincerity which the proudest or deepest science exacts."

The price of survival is initiative. The man or business who waits to be told what to do may not be there long enough to do it.

In accident prevention we are but a step behind scientific business. This technological and scientific upheaval in the realm of industry must find safety engineers doing things,—not waiting to be told what to do. We must bring to our task initiative and imagination.

What are the electricians, the chemists, and the mechanical engineers doing to your business? Find out and show them how they can do it without creating a new accident hazard.

This business of taking the plant hazards apart will keep you in step with the times in your industry.

Napoleon once said something like this, "There are no bad regiments, there are only poor colonels." So I paraphrase Napoleon and say, There are no bad plant hazards, there are only poor safety engineers.

MR. BARLOW: It might be well to say to Mr. Ingham that he has not only succeeded in giving a most interesting account of how he regards his work and fulfills his duty, but to my mind I think he has established a text-book for safety engineers in the textile industry.

MR. JOHNSON: The Executive Committee this winter decided that the safe practice pamphlets which the Section hopes to develop soon will be built on the line of job analysis and the first division is now in rough draft. Mr. Ingham was chairman of the committee that wrote it so that that is the text-book rather than his paper.

MR. BARLOW: Personally, I am very, very much disappointed in not meeting Mr. Ingham here as I expected. I should like our secretary to say that we highly appreciate this paper and regret that he was not here to present it himself.

CHAIRMAN PLACE: Do you make that as a motion?

MR. BARLOW: Yes.

(The motion was seconded and carried unanimously.)

V. W. CONOVER (Western Electric Co., Kearny, N. J.): I don't happen to be in the textile industry but we do a great amount of textile insulating using spindles running as high as 4100 so we have a problem similar. I might say that we are working along the same line and are highly gratified to know that other firms are doing it. Sometimes if you don't know it is successful in other plants you are not sure whether you get results or not. We make the analyses ourselves. We also require the immediate supervisor on the job to turn in job analysis of that operation in which he is to list all the hazards in one column; the next column, the probable extent of the hazard or injury, and the next, what to do to prevent them. Much to our surprise our supervisors have found hazards that we have missed and have missed some that we have found. When we put that together there isn't much left of the operation that we don't know. We have virtually eliminated what we call hazards in line of operation. We consider it a crime for one of those to be caused. In our accidents for the last two years each one has been pretty much a story in

itself. It has not been caused before. The chances of its being caused again are about one in two hundred thousand. Sometimes we don't know how in thunder it did happen.

I assure you that job analysis does help. It is a whale of a lot of hard work but it is worth it if you spend enough time on it.

CHAIRMAN PLACE: Mr. Johnson in making up the program, after having the plant hazards taken apart, thought it would be interesting to take five injuries and have them discussed. I take pleasure in introducing to you Mr. Elliott Knight of the Employers' Liability Assurance Corporation, Boston, who will talk on "Five Injuries and their Story."

Five Injuries and Their Stories

By E. P. KNIGHT

Engineering Department, The Employers' Fidelity Assurance Corporation,
Boston, Mass.

One of the most difficult and yet the most needed method of attack in safety work is a proper study and analysis of the conditions leading up to an accident. It is difficult because of the many and various factors involved, and it is necessary because if there can be any value attached to an accident it is the lesson of prevention and the warning against repetition.

It is not enough to say that a particular machine was not guarded or that a man removed a guard, or that he failed to obey instructions, or that he was unskilled in his work, or that he was not properly supervised. It may be the case that the cause of the accident was centered around one of these reasons, but it is more likely to be a combination of them, all working up to one point. I doubt that a literally foolproof machine has as yet been devised, and I also doubt that there is any supervisor of labor so far-seeing that he in his instructions to an employee can warn against all practices and all hazards that might be harmful. When we say that to properly conduct safety work we need to exercise constant vigilance, we mean it in every single sense of this expression. Proper accident study and analysis indicate to us how this constant vigilance should be exercised.

An accident occurred some time ago in a cotton mill which primarily indicates lack of proper supervision. An employee who was temporarily idle was put to work on a cotton comber, as he claimed to have had considerable experience with that particular machine and its operation. During the very first hour of work, while attempting to clean the machine, his fingers were caught in the half lap and were badly mangled. Thorough investigation showed that the man had had no experience on combers, and the second hand should have already ascertained this. Apparently no attempt was made on the part of the second hand to question the man about his experience, to accompany the man to the machine while the operation was first started, or to go back shortly after to see whether or not the man was progressing satisfactorily. Here is a case that could not rightfully have been blamed on the injured employee, for it could be claimed that he was ambitious, willing to help out and not be idle, and that he might have thought in his own mind that he knew enough about the machine to properly carry on its operation. A few minutes on the part of the second hand and the accident in question would never have happened.

Here is a case which should be of interest to psychologists. An employee of the day shift operating a crab machine in the wet finishing department of a worsted mill was straightening out the edges of cloth which was feeding into the rolls. In his apparent interest to do the work well his fingers came too close to the nip of the rolls and his right arm was pulled out at the shoulder. He died shortly after at the hospital. On the night shift of the same day this man's chum doing the same operation

on the same machine sustained the same injury and died later in the same hospital. The use of bar guards at the nip has practically prevented any possibility of a recurrence of this particular type of accident and such a method of prevention was immediately decided upon following the first accident but time was too short to permit putting in the method of prevention until the second case had occurred. There seems to be no question but what this guard should have been installed long before either accidents but it apparently was considered unnecessary by the mill people. There is also the chance that the first injured man was not thoroughly familiar with the machine and had not been properly taught as to its operation or properly supervised during the course of the work. Investigation showed that this was the case. The second accident, however, occurring with such horrible similarity seems to be an excellent example of how a person's action can be sub-consciously controlled and influenced by previous events.

Here is an accident that, while not spectacular or involved, illustrates a principal often lost sight of in the conduct of safety work, and that is, so far as possible, a man should be fitted to his job and not the reverse. In this mill a yard teamster had as part of his duties shipping back and forth around the mill yard heavy bales of cloth. He was put on this job as it was felt that his 70 years of age were too many to allow him to work in the mill proper. The result was that on the first day of work this 70 year old man, while attempting to lift a heavy bale or load lost his balance, with the result that the bale fell on him, fracturing a leg. One of the interesting things about this accident is the fact that the method of prevention is about as extreme as the cause, for where they formerly had one old man to do this work they now insist on a younger husky man and give him an assistant with similar qualifications.

Another case involved a serious accident from work with a shredder in a cotton waste mill. Barriers had been erected in front of these machines with a chute for feeding in the waste and this arrangement kept the man back about four feet from the teeth of the roll. Two or three cases had been known where employees had crawled under the barrier to push waste into the roll from the side of the chute and luckily no accidents had resulted. In this instance, however, an employee who crawled under the barrier caught his sleeve in the teeth of the roll and his arm was severely injured. The committee investigating the accident decided that the use of a long stick for pushing in any waste which might get caught in the inside of the chute would do away with the possibility of crawling under the barriers to clean the chute by hand; and the committee also felt that the overseer of the man was lax in not more closely supervising him, and in taking some definite action following the first two or three times this practice had been followed out without injury. In addition to this, any employee who is caught inside the barrier with the machine running is subject to discharge, and strict rules to this effect have been exercised and issued to each man.

The last case is interesting because for a time there was such an element of mystery about it. A number of employees in a cloth printing plant formed the habit of hanging their working clothes near barrels containing aniline oil. For some period of time a number of them during the course of their working hours would experience illness of a peculiar sort, very often necessitating their leaving work for a short period. Finally one man collapsed shortly after donning his clothes in the morning and after they had been hanging all night, and he was rushed to the hospital where it was found that he had a severe case of poisoning, from which he nearly died. It was some little while before it came to the investigating committee that the presence of the aniline oil barrels might have had some effect. The space about the barrels was then fenced off and proper space allowed for the men to hang their clothes during the time that they were not working.

None of these cases is very unusual. They are typical of the problems which you are constantly meeting and which call for study and application. A sympathetic

study of the mental hazards in the case will very often bring to light many amazing facts, which have been overlooked before, and which if properly considered in future cases will do much to help us in preventing many of these so-called unavoidable accidents.

Mr. MACNULTY: I noticed on the last case which was a question of poison entering the body of a man, it was due to lack of supervision in not providing a place for the man to hang his clothing. The system of a man hanging his clothing anywhere, anyplace, is not a good system and in this case it was proven by the man's clothing coming in contact with the oil which nearly caused his death. I think it will be agreed that notwithstanding the man's act in hanging his clothes up, it was the only place for him to hang them up and it was a dangerous place and therefore the injured man would not be held responsible for his own disability.

In the case before the last, it didn't seem to enter anyone's head that a long stick could have been used in cleaning out the chute instead of a man endangering his life. This has been the cause of many accidents and very bad ones by men cleaning out the chute with a very short stick or putting their hands in. Now the curing of that type of accident, the mere changing of the opening of the blow tip prevented any accidents taking place again. The opening was too near the rollers and the employee ran a very serious hazard of the stick and hand going in with it. That was no doubt a case of foremanship. He knew that that should not be allowed.

The case of the aged teamster, 70 years old, being changed to heavy lifting showed that again it was the fault of the supervision. The supervision was directly responsible for the disability suffered by the man.

In the first case, placing a man by the assistant foreman without any instructions again showed a lack of foremanship.

And so, with the possible exception of the second one, four of the five accidents and half of one of them was due to lack of good supervision and good foremanship. Now it is quite true that Mr. Knight could have taken five other cases showing that the foreman had nothing to do with them. Now I don't want to be in position to say that foremanship is responsible for all the accidents, but just on this premise it seems to me that supervision was responsible for these accidents.

I think if you will analyze the causes of accidents you will find that the contribution is from different sources. There is the contribution of the surroundings of the worker which may depress him, the condition of the weather and the condition of the foreman's mind on that day.

In analyzing the very large group of textile accidents I find the heavy listings on the first two hours, therefore it is better for us to find out all the contributing factors that make this so. We are too prone to blame someone. If we analyzed the conditions—the time of day, the nature of the work and the physical conditions surrounding the act itself, we would get out or at the basic cause of accidents quicker than leaving the preponderance of blame on the worker and the management.

Mr. JOHNSON: There are a couple of more interesting points in the accidents and their studies. The first and the fifth were injuries which were the result of coming in contact with hazards which the injured persons were not familiar with. In the first place, the man operating the comb was doing something for which he was not formally employed. It may be you can call it green help or improper instructions for the particular job, but my point is this: It was not his formal employment as was the case of the man operating the crab and the shred.

In the fifth accident involving the aniline oil there were several men involved with similar injuries from a hazard with which they were not familiar, something with which they never came into contact except by this chance that the aniline was stored in a place where they were hanging their garments. I should like to study that particular accident a little further, speculating with the absence of facts. The

aniline was used for a particular process either at that point in the mill or some point near it. Maybe these men had used the aniline in their work; maybe they had not; maybe some other men had. The mill must have known that aniline was one of the very dangerous chemicals. It was left in a place where Tom, Dick and Harry could come in contact with it and there was some speculation in the study of the accident that the clothes may have fallen off the nails and dropped in a puddle of aniline on the floor. There is obviously something faulty in the handling of the aniline that puddles were allowed to fall on the floor because if a man had slipped and fallen into it it probably would have killed him.

That accident was more than interesting to me because it uncovered not only the injuries to the men and to their clothes caused by hanging the clothes near the aniline, but also the processes for which the aniline was used and the manner of handling. So that the accident studies lead us deeper into accident causing conditions and so on, so that a basic study of any individual accident may uncover more than the hazards which caused the single injury on which you are paying compensation and losing time.

Mr. Cook: In my personal opinion all five of these accidents are supervision accidents. I agree with Mr. MacNulty except in the one case of the fifty per cent responsibility. If we assume that the man has to be injured on the machine first before the man is responsible for the accident, that the management is responsible for the second accident on the machine, then we leave out our job analyses. In other words, if they had had a job analysis on this machine they probably never would have had the first accident.

Mr. Knight: I consider all this a compliment. It indicates to me at least that I have come pretty near to the purpose of these meetings, to start discussion. First I want to say to Mr. MacNulty that his reaction is a perfectly proper one. One day we have a paper that seems to indicate that the poor workman is entirely to blame; the next day the paper says the supervisor is entirely to blame. Those accidents were not cases that I had any particular knowledge of. Those were the five cases picked out and sent to me the way they were given to you. I didn't attempt to go into any one of them any more, with the thought in mind that the digging should be done right here.

But to let Mr. MacNulty know that I have not lost my sense of values in accident prevention and also that I don't subscribe to the theory that there is only one cause of accidents, I should like to refer the paragraphs of my paper which cover the situation.

CHAIRMAN PLACE: I think that perhaps we have used a word here both yesterday and today which we do not mean really to use, and that is the word "blame." It is not with the idea of blaming; it is with the idea of searching out the cause and preventing accidents from recurring that we are here. It makes no difference in the analysis whether it is the supervisor or the management or the employee, if we can search down and find the primary causes of the accident and then remove either it or them so that no one else has a chance to get hurt, then we have accomplished our purpose in accident analysis.

Of course we should make a detailed study of the hazards in the operation of the plant, but the word, "blame" is perhaps in the same class as the word shibboleth.

Mr. MacNulty: The words, "blame," "carelessness" and the whole atmosphere of condemnation should be eliminated from all discussions of this kind. I think myself that the reason why accidents are permanent is because of the placing of the blame on the part of the injured party. Why isn't it a good idea that the employee should be eliminated altogether as a basic cause of accidents? The speaker said if that were done that possibly we would reach the solution of the accident problem.

Mr. Barlow: It goes without saying that carelessness is the convincing cause

of accidents. At the annual meeting which we have of this National Safety Council the main purpose that we are after is to combat carelessness. We ourselves do not believe that any one employer or supervisor or foreman or worker is responsible for an accident by himself. It is through education that we are going to bring those accidents down to the point where they will be negligible. Accidents will not be in the best regulated families.

But now you can't pick up a newspaper without finding the story of some accident. One comes to my mind. There was an uncovered, fast revolving knife and a machinist working on it. When this thing revolves it goes so fast that you can hardly see it. This machinist happened to put his arm there and away went four of his fingers before he knew what had happened. The boss came along and said, "How did this happen?" And the foreman said, "The darn fool had no more sense than to put his arm there."

I don't know whether we will ever be able to regulate accidents to that sphere of control where we won't have these freakish accidents. The queer thing is that they will and do happen in spite of all we do to prevent them. For example these accidents that we were told about today, there wasn't one of them but what it could be analyzed and regarded as something that hardly anyone could be blamed for. After it happened we could say that such a thing should have been done.

The thing which the National Safety Congress is trying to create is a subconscious sense of knowing and doing the right thing actually without thinking.

Mr. Knight: The point that Mr. Barlow brought up is the point that I want to emphasize and that is that it is very essential for us after the accident has happened to analyze it and perhaps prevent recurrence. It is of course the proper story to do that analysis before the accident happens.

Mr. MacNulty: It is very well established in the minds of industrialists that initiative counts for something in industry. We are asking that men are not machines and will not require to be told every half hour what they should do. That is a fundamental fact in industry. That is emphasized. We want initiative; we want a man or woman who can do things without being told. Now I wonder why this question of initiative has never been argued as the cause of accidents. Why have we confined ourselves to the question of carelessness? Why has the word "zealousness" not been used?

Why should a man who is left to his own resources through his mechanical skill be called freakish when the accident is due to over-zealousness and wanting to do things right, and as a result this accident happens to him? Why should that not be taken into consideration? Why has not this question of zealousness been brought up? I find these zealous men and women, anxious men and women who want to excel in a spirit of initiative and being able to do things—why do we advocate on the one platform that we want this type and then when something happens they are called careless.

Accidents may be the result of any cause. Sometimes no one immediately in the vicinity is to blame. Of course there is a definite, basic cause for everything, but I think over-care should get its place in the cause of accidents—over-thought as well as lack of care and inattention should get its place in accidents. You know yourselves that lots of things in life going not quite correctly are not due to carelessness and inattention and why do we assume that all these disasters are due to carelessness and lack of thought and instruction and all that kind of thing? I think that every reaction of man, good and bad, sometimes results in accidents.

The type of accidents given by Mr. Knight are not new to you or me or the chairman. They are the same today and were the same yesterday and will be tomorrow. Why? Because it is the same individual that lived yesterday and is living today and will probably be living tomorrow, and because of a certain set of re-

actions that we have toward objects and material and mechanism and things in general, we will have those accidents.

I realize that a good many conditions cannot be removed, that they are permanent. But we can lessen them by trying to solve the problem that surrounds us and by realizing that there will be some way of accidents occurring wherever the human element is making contacts, and because of this imperfection in the human make-up feel that human sympathy in all our relationships. That is why I emphasize at these meetings the abolition of the word "carelessness" and the substitution of "zealousness."

Mr. JOHNSON: It seems to me if my recollection is correct that we have developed a philosophy of safety which gives credit to initiative. We have junked the old negative "don't do this" attitude which makes us cowards and have made it an affirmative, positive thing which evaluates activity, and we look upon safety as the learning of hazards and accident-causing conditions in order that when we use our initiative we may be familiar with those things on which we may get hurt and thus avoid injury.

I think it is absolutely correct that the use of this word "carelessness" is a bad approach to the question, but I think that we are working all together in the direction of initiative. It was the purpose of this meeting to develop from Mr. Ingham's paper that accident prevention comes before the fact and not afterwards.

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NINETEENTH ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL



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**Tuesday Afternoon Session
September 30, 1930**

**M. C. GOODSPEED, Chairman
General Electric Company, Erie, Pa.**

The first session of the Woodworking and Lumber Manufacturing Section of the Nineteenth Annual Safety Congress convened with M. C. Goodspeed, General Electric Co., Erie, Pa., presiding.

CHAIRMAN GOODSPEED: I wish to take this opportunity to thank the members who have contributed to the success of this year's work. There has been a great deal of individual effort put forth, and the results will speak for themselves in the reports of the committees which will be presented to you.

For the chairman, I will simply call to your attention the fact that we held two meetings of the executive committee during the year. We endeavored to outline the work of the section and carry on so that the Council's service as a whole would be worth while to you as individuals during the year.

I would like to make this suggestion: Think back and see if you have utilized the service which membership in this section can bring to you and your organization. If you have not, then plan to do so in the future. Also, have you called to the attention of your friends the benefits which they can derive from membership in the section and in the Council? That will help your committees. It will also help the membership and it will help your friends in whatever they may be doing.

At this time I can announce to you the members of the Nominating Committee who were appointed by your chairman. They consist of: Mr. G. E. Sanford, chairman, Mr. E. Ross Farra and Mr. R. A. Shaw. This Nominating Committee will report at tomorrow's session.

I will ask now for the report of our Membership Committee, Mr. Pollock.

F. A. POLLOCK (Lumbermen's Mutual Casualty Co., Chicago; Chairman of the Membership Committee): I want to thank the Committee of twenty-three that worked with me. Also the other officers of the section and the members, as this has been a wonderful year as far as membership goes. There is only one regret; we lost 39 of our old standbys, but we have gained 70 new ones.

In 1927 the membership of our section was 403; 1928, 371; 1929, 375. Two weeks ago the Council gave me a record of 400 and since then we have 6 more, making to date a membership of 406 against the former high record of 403.

We have had 39 cancellations which I believe next year's committee should work on and try to bring back along with the new members that they get. One thing, we need more specific service. We should prepare a safe practice pamphlet on treating poles and ties, and others on logging, saw mills, lumber yards and pole handling. Also, next year we should endeavor to get at least a film applying to our industry.

QUESTION: What is the general reason for these 39 cancellations?

MR. POLLOCK: Hard times. About 50 per cent of these plants have shut down. Several have promised that if they go back to work they will renew their memberships.

CHAIRMAN GOODSPEED: We will now proceed with the program. Our next subject is "Care and Adjustment of Edge Tools", and the speaker is Mr. A. S. Kurkjian.

Care and Adjustment of Edge Tools

By A. S. KURKJIAN

Sales Manager, Oliver Machinery Company, Grand Rapids, Mich.

The subject assigned to me is: "Care and Adjustment of Edge Tools". I shall interpret that to mean—care and adjustment of woodcutting edge tools as related to safety. We must pay attention to edge tools because high speed, high production, and ball bearing machines are now used almost universally.

We do our best to make these small tools of themselves and in themselves safe. This, to a great extent, does away with the necessity of installing special guards on the tools.

Now, how do edge tools create hazards and casual accidents? I shall divide that into five general headings as follows: The improper choice of cutting tools; second, inadequate mounting of cutting tools; third, the wrong speed of operation for a particular cutting tool; fourth, the lack of balance in these tools; and fifth, the dullness of edge tools.

Now then, if we will analyze each and every edge tool used in woodworking under these five headings, and make them the very best that we know how, we shall have solved the problem.

There are many different kinds of woodcutting tools. We shall be concerned only with the most important ones as follows:

First, the circular saw, possibly the most generally used and also the greatest accident-producer.

Second, the band saw.

Third, jig saws.

Fourth, knives, such as used in planers and joiners.

Fifth, fly-cutters. By these I mean the pieces of knives either with shaped edge or straight edge that are bolted onto carriers, such as shapers, moulders, or milling machines.

Sixth, the milled-to-shape cutters.

Seventh, routing bits, bits which make a hole and by oscillating route the mortise.

And eighth, boring bits.

What is the most essential thing we must consider in relation to these small tools used in woodworking? I would say centrifugal force.

You all remember the formula for centrifugal force is: W , standing for weight in pounds, times N square, N standing for the revolutions per minute, times R , the radius in inches.

Now, imagine I have a string one foot long. At the end is a one-pound weight. Imagine that revolves in a frictionlessly mounted bearing. If I double the weight and make it two pounds instead of one, I merely double the centrifugal force. If I double the radius and make it two feet long instead of twelve inches, I double the centrifugal force. But if I double the revolutions per minute, I quadruple the centrifugal force.

Many people forget all about that. Here they have an old band saw. It has been running for years at 400 or 450 R. P. M. All of a sudden somebody hears about other band saws running from 600 to 900 R. P. M. He says, 900 R. P. M. is a good thing, and I will simply double the size of the pulley on my motor and I will get double the speed. He does it and then the trouble starts. The rubber tire flies off or the old wheel happens to break. Or the machine will vibrate, or the band

saw will break more often. Why? Simply because this man forgot that the minute you double the revolutions, you quadruple the centrifugal force; and after all, centrifugal force is what makes it hard for holding our cutters together.

Now, in a case of circular saws, we all know they are divided into rip-saws, cross-cut saws, combination saws, and straight-line cutoff saws. First, we must choose the proper saw. By all means, never allow rip-saws to be used for cross-cutting. That is extremely dangerous. The reverse is not quite as dangerous, but it also is bad. Never allow the combination saw to be used for anything but just fine finishing work. If you try to use it for ripping or cross-cutting, the saw will bend and cup and become dangerous.

We used to have our cutoff saws run 1800 R. P. M. Any old kind of a hook or sawtooth was considered adequate. But now with the high speed of 3,600 R. P. M. the tooth gullet must not have any hook whatever. So a new special tooth has been introduced to make the straight-line cutoff saw tooth.

Now, having chosen the proper tool, we must not run it at the wrong speed. If a saw has been tensioned by the saw manufacturer for 1,800 R. P. M., we must not put it on a motor that we know runs 3,600 R. P. M. In buying your saws you must specify the speed at which it is to be run.

Now, what about this matter of lack of balance for saws. The older man in industry still files saws by hand. Almost never does he check up to see whether that saw is perfectly round. This man must wake up. He must realize that the saw must not only be sharpened as to tooth, but when he gets through with the circumference, each and every point of those teeth must be equi-distant from the center. Therefore, it is necessary to put a saw on an arbor and make sure that the saw is perfectly round. Check up your saws in your factories and if you find any two of them exactly alike as to roundness, write me a letter and tell me I am wrong.

Then comes the matter of dullness of the saws. Circular saws are often forced to operate when they are dull, and in that condition cracks are often started at the bottom of the gullet. First very minute. You have to use a magnifying glass to find them. But they are there, and the minute they start, you might just as well forget that circular saw. The old custom of boring a round hole and putting a plug or merely boring a round hole so as to stop the crack going further is absolutely a thing of the past. If you want safety, absolutely refuse to allow your men to use saws that have cracks in them.

Then, circular saws which are now run at high speed, and which also run at the very thinnest possible gauge so as to save lumber, must have the largest possible saw collar diameter. In the past, when most saws ran with a pulley, they had about 3½ inches diameter. Bearing caps were also kept in that limit, and it was a problem to keep the saw collar small to make the saw go through the deepest cut.

Look at your motor-driven saws today. In the first place, the motor diameter itself is about 6½ inches. Put the housing around there and get the size of the ball bearings and you are confronted with 7½ inches diameter over all measurement of the carrying unit, the motor itself. Why then, use a saw collar that is only about 3 or 3½ inches diameter? By all means get that collar as large as you can consistent with the machine you are operating; and if you get it about 6 or 6½ inches diameter, you will find your saws will run straighter, they will not buckle, and they will be safer at high speeds.

The two things which are of greatest importance when ripping: first, be sure there is a splitter back of the saw to prevent the stock itself from closing up on the back teeth and kicking back at the operator. And, second, be sure that the ripping fence at the back end has a trifle more clearance than at the front so the stock being ripped will not come in contact with the teeth of the saw and be thrown back.

Now as to band saws—never let your men get so lazy as to try to cut a small cir-

cular way with a bandsaw. Never use a narrow saw for deep cutting on blocks, because if you do, the small saw can't stand the strain. It will break.

Bandsaws should be braced properly. They should be smoothly filed. Most bandsawing machines now are running at 900 R. P. M. over 36-inch bandsaw wheels. That is the medium-sized bandsaw.

At that speed it is absolutely necessary that the saw blades be examined periodically very carefully for cracks in the teeth, which cracks come about because of two causes. First, because the blade is under a heavy strain; and, second, because there is danger always of running a bandsaw dull, not sharpening it. The minute you run it dull, the teeth pull away from each other and the first thing you know the front part of the saw has become stretched farther than the back part, and there are these cracks.

Now in jig saws, there is one fundamental thing which we don't understand. You go into any shop today, most commonly you will see a piece of bandsaw cut off and two holes drilled, one at the top and one at the bottom and a couple of nails bent down, and that makes a jig saw. Gentlemen, that is very dangerous. You should have jig saws of the narrow kind, say, one-eighth inch and less, with a setback of the material at the upper and lower end, so that the pinholes can be even with the back edge of the saw. Now if you will do that, the stresses in the jig saw are more uniformly distributed and the jig saw will last about twice as long and it will not snap off dangerously.

Now we come to knives, long knives. Here is a man who says those knives are ¼ inch or ⅝ inch in thickness and 1½ inches wide, and if I just grind by measurement I am all right. You are not right. Nobody ever made steel strips that were exactly of the same density or the same weight throughout. You must balance these knives in pairs against each other, and you must absolutely see to it that each knife is also balanced in itself from the middle out. It will not do for us to merely say this was the same as its pair on the other side. We must also make sure that each one has a righthand end weighing the same as the lefthand end from the middle point out.

These thin knives should be held properly. You must apply the holding pressure as near to the cutting edge as is possible. If you do not apply pressure there, the chips get in between the knife and the chip-breaker or the head, and very soon you have a sprung head that will not run correctly. So in thin knives, be sure to balance each one end for end, and balance it for width and weight against its pair, and be sure that in clamping in the head it is squeezed tightest as near as possible to the cutting edge.

Now come the flycutters used on shapers, moulders and milling machines. The most common heads that carry such cutters are the square heads with the bolts that go through. Gentlemen, you should never order those knife bolts on a price basis. You should order them on specifications as to toughness, hardness, and ability to withstand certain weights under test. Periodically you should carry out those tests yourself to make sure you are getting the kind of bolts you should have. There are more wrecks of high-speed woodworking machines because of the failure of these bolts than from any other one source I know of.

These flycutters are usually ¾ inch thick, either solid high-speed steel or steel welded on to more common steel, and they have projections because of the shape and kind of cut. Remember one thing—taken on the basis of 3,600 R. P. M., and 6¼ inch cutting diameter, the centrifugal force is about 976 pounds. But the minute you force that up to 7,200 R. P. M., like most shapers and moulders today are running, that centrifugal force comes to 3,904 pounds.

You must watch the cutting diameter. Put the cutter as close to the center as possible consistent with the work to be done. And you must watch the correct

holding tables, bolts and backcaps that are there to prevent accidents because of this centrifugal force.

Next, as to routing bits. The routing bits should never be forced to operate any faster sideways than the edges of the tool will actually cut the material away; otherwise you will go against the dead end of stock.

Boring bits of all kinds must be selected with care. If you have a $\frac{3}{4}$ inch hole to bore and nice clear average stock, it is one thing. The minute you go to a 2-inch hole, it is altogether another thing. If you go to a 4-inch hole, it is still different. It isn't a question of merely increasing the diameter of your cutting part. You must also increase the diameter of the shank proportionately; you must have the larger spindle back of it, and you must have a stronger driving force back of it.

Often mistakes have been made of boring different sizes of holes with the same diameter of shank. That is absolutely wrong.

Coming to shapers again, the slots in the collars that hold the bevel edge knives must be exactly made. If you turn those collars around they should match.

The high-speed machines have brought on what is known as the high frequency operation, especially of moulders, and one knife finish. Some men have interpreted that to mean one-knife cutting. The result is they will make only one knife and bolt it on the one side of the square head and on the other side they will bolt a piece of steel, thinking that is the same as the knife. The steel, however, does not project out as far as the knife. The minute that occurs that head is out of balance because, remember, although the weight is the same, the radius or the distance from the center out is not the same.

Some people make this other mistake. On a 12-inch moulder head they will put a knife on the righthand edge. To balance that they will put a piece of steel on the very lefthand end on the opposite side or have a knife of equal size away out but not opposite this one, thinking that only one knife cutting will give them smoother work. A cutterhead not balanced endwise is just as bad as a cutterhead not balanced in the vertical plane.

All tools should be kept sharp and should be so fed that no one cutter has an excessive bite. With the faster machines, faster feed has come into effect. We used to run a planer feed about 30 feet per minute. Now 90 feet, 120 feet, and in some lumbering quarters a feed of 240 feet per minute has been used.

The minute you have this faster feed you must have enough knives and the speed of the knives must be so proportioned that each knife will take but a small proportion of the material away. If you don't do that the machine will block, because each knife has to take a bigger bite.

On the other hand, the opposite is dangerous also. In other words, you must not have your feed too slow. If you do, the knives won't be cutting. There will just be a scraping. They will get dull twice as fast, and they will not give the efficiency you deserve and will be just as dangerous.

We must insist on methodical and periodical inspection of all tools. Every time a man takes a bandsaw off the reel, that bandsaw ought to be examined for cracks not only by the human eye, but by a magnifying glass, as well as for other defects. Every time a man takes a cutterhead out of a machine, it must be thoroughly cleaned. No dirt must appear between the knife and the head itself, and it must be bolted with the greatest of care, with a wrench that has a round head and fits on all sides of the bolt.

Then we must set a high standard in our own shops, and insist that edge tools must be properly chosen for the work at hand, properly mounted in an adequate holder, run at a safe speed, and be in proper balance. And above all, each tool should be properly sharpened, set and conditioned to be safe when revolving. The modern high speeds that are attained to perform the work properly for which they are designed.

Mr. MURRAY (Bell Lumber Corporation of Chicago): I would like to ask the speaker to touch on the selection, maintenance and setup of inserted tools, such as on a 10-inch saw or slicing machine.

Mr. KUREKJIAN: The subject is a very wide one and without a definite problem it is difficult to answer shortly. But in general the matter of clearance is the biggest problem. There must be a sharp knife cut edge on both the righthand side and on the opposite side of your cut, and something that removes the stock from the middle.

You must make sure that the teeth are in correct planes and then they must be sharpened and jointed as to faces as well as cutting edges on the holder itself. Otherwise they are not so good.

R. C. BARR (Chief Engineer, Lumbermen's Mutual Casualty Co., Chicago): Is it true economy to use cutting knives that are ground down to extreme minimum in width?

Mr. KUREKJIAN: It is very poor economy and a great source of danger. I have had knives come back to our shop for sharpening that are down to less than three-eighths of an inch in width. That is all foolishness to think of holding such a narrow knife. You haven't anything to hold. And my suggestion would be that no knives be used that are narrower than $\frac{1}{4}$ inch. Five-eighths of an inch is preferable.

Mr. BARR: What causes shaper knives to fly out of the head? I believe you mentioned dirt.

Mr. KUREKJIAN: There are only three things that can cause that. The one you mentioned—dirt in between so that adequate contact has not been made. Second, a poor bolt. Third, too long a cutting radius without a backing plate back of the knife.

Mr. BARR: What distance should the rip-saw tooth extend through the stock being cut? I find them all the way from $2\frac{1}{4}$ inches to $\frac{3}{4}$ inch.

Mr. KUREKJIAN: From a safety angle I should always recommend that the saw teeth project through the stock only approximately $\frac{3}{4}$ inch or so and no more.

JOHN HELLER (Peoria): The speaker touched on the danger of using cracked circular saws. I understand of late there is a process of welding saws with acetylene torches and even welding teeth in the saws. Do you regard this as safe practice?

Mr. KUREKJIAN: Whether you get a perfect weld which will not set up undue stresses in your saw itself is a question. If you can do it, which in my opinion is extremely doubtful, all right. But in general it isn't worth while. Human life is worth a whole lot more than a few cents trying to be saved on a circular saw that is cracked.

E. ROSS FARRA (Manager, Grand Rapids Safety Council): I am wondering if the speaker won't emphasize the splitter. I know many industries who do not use splitters yet, and they laugh at you when you urge their use.

Mr. KUREKJIAN: Wood is a fibrous material. It may or may not be properly seasoned. It may or may not have stresses in the lumber itself. The very minute you rip it, it might have a tendency to close up on the saw particularly if it has been bone-dry kilned.

The closing up on these back teeth throws the stock towards the operator. How can you prevent it? By merely having a splitter which must be a trifle less in thickness than the saw kerf. The trouble is that many men use one splitter for all sizes of saws. Give me a well-regulated shop with splitter thicknesses properly cared for and matched up with the saws, and I will show you a safe shop without any saw-guards in it at all. There is no use trying to fool ourselves. All this paraphernalia that we put on the top doesn't help a bit. First have the correct saw; then have the correct splitter, and you have eliminated 99 per cent of the hazard.

Mr. BARR: The variety saw seems to produce a great number of accidents. In our effort to reduce accidents in places we insure, we attempt to get the co-operation in using rip-saws for rip-saw work, and variety saws for cross-cutting and the other variety work, but without much success.

CHAIRMAN GOODSPED: Our next speaker is Mr. Harry D. Immel, director of the Bureau of Inspection, Pennsylvania Department of Labor and Industry, Harrisburg, Pa.

Small Plant Safety Committee Problems as Applied to Woodworking Shops

By HARRY D. IMMEL

Director, Bureau of Inspection, Pennsylvania Department of Labor and Industry, Harrisburg, Pa.

I suspect that your Section Committee is determining upon this topic, "Small Plant Safety Committee Problems as Applied to Woodworking Shops," was quite aware that it was a subject far more complex than at first appears. At any rate, it did not take me long to make that discovery.

In the period of my association with the National Safety Council I have found the small plant safety problem to be a matter of perennial concern with the Council, just as I know it to be of constant concern to the Pennsylvania Department of Labor and Industry. Fundamentally the problem is the same whether the small plant is a woodworking shop or some other kind of a shop. The details, of course, vary.

From the fact that my topic calls for a discussion of the problems of the safety committee in a small woodworking shop, I am led to infer that your committee did not have in mind a concern quite as small as I have in mind when I speak of a small shop. And because the small shop safety problem in its broader aspect seems so much more important, I trust that you will hear with me when I treat the small shop safety committee problems as only a part of the picture.

Would it not be well to consider first of all how large a small shop must be before the safety committee plan can be applied to advantage? If I give anything like a satisfactory answer to that question, I feel that I shall have done a good day's work.

We believe, in the Bureau of Inspection of the Pennsylvania Department of Labor and Industry, that unless your number of employees is sufficiently large that safety or lack of it is readily reflected, there does not exist sufficient incentive to keep safety committee interest alive. You will note that I say "readily reflected."

Those of us who study industrial accident costs on a state-wide basis know that the most insidious influence for total economic cost of industrial accidents is the accumulation from those concerns, so small that individually their contribution of accidents appears inconsiderable. It is the old story of the small shop with lost-time accidents so far apart that one is forgotten before the next occurs, yet with a record that would be fairly appalling if applied in the same ratio to a larger plant.

But a safety committee must get its chief impulse from pride of accomplishment and the smaller the shop the more difficult it is to supply this incentive conspicuously. Unless, of course, your shop is a department of a larger plant, in which case inter-departmental safety competition is possible.

I believe that more plant safety committees fail because of an honest belief that there is not sufficient need for their existence than from any other cause. This is just as true when all of their activities are conducted on company time. And it is significant, in our observation in the Bureau of Inspection, that most of these failures occur in the smaller shops, bearing out the theory that a safety committee thrives best where there is the most for it to do.

The Pennsylvania Rating and Inspection Bureau allows for shop safety committees a 10 per cent credit upon compensation insurance premiums to all concerns that come under schedule rating. Premiums of \$200 and upwards carry schedule rating and the minimum number of employees represented by a \$200 premium is about 30.

So it may be said that from an insurance company point of view the practical value of an individual shop safety committee begins at a minimum of about 30 employees. This may not be an altogether fair assumption. Just the same it comes pretty close to our idea in the Pennsylvania Department of Labor and Industry. Although we recognize that there are plenty of cases in which smaller shops could accomplish considerable under the safety committee plan, and we have knowledge of some larger plants in which highly creditable safety records are achieved with no safety organization at all, we feel that a minimum of 30 to 50 employees is the right average. Our special department bulletin on safety organization outlines plans of organization for plants employing from 50 upwards.

An intensive educational safety campaign begun by our Bureau of Inspection last year had as one of its chief objectives the encouragement of plant safety committee organizations. Hundreds of committees were organized under the inspiration of the campaign. We were extremely careful, however, to urge the organization of safety committees only in those works where we thought they would succeed.

Assignment of supervisory responsibility for safety was our prescription for the smaller concerns. It is my strongest conviction that with or without a safety committee no concern can obtain anything like a maximum degree of freedom from accidents unless there is a definite application of supervisory responsibility.

Let us assume that we have to deal with a small woodworking shop but of sufficient size to warrant operation of a safety committee, and let us further assume that there exists that happy situation in which management is solidly and unequivocally back of the safety program; and safety discipline, and supervisory responsibility for safety are fully developed.

The work left for the safety committee to do in this shop is largely that of education and stimulation of interest, although there is, of course, its obligation to further develop safety regulations as the need appears, and to recommend such physical improvements as may be required.

I would say that the problem of first importance for this or any other safety committee is to create and maintain among the workers that safety interest which is so important a supplement to safety discipline. How can the spirit of competition and pride of achievement be fostered? These are the inspirations of our best industrial safety records. Here is an opportunity for exercise of considerable ingenuity.

My advice to this committee would be to look about and see what others are doing and how they are doing it. This is good advice for any plant safety committee, but it is particularly applicable to the committee in the small shop which has only a limited fund of its own experience for guidance. But in borrowing ideas always be sure that they are suitable for your conditions.

In the records of other plants of comparable size in your own line you will find plenty of incentive for your own improvement.

Plant safety competitions on a community scale are often quite successful. The difficulties of fairly balancing inequalities have kept us in Pennsylvania from undertaking a state-wide industrial safety contest, but we are preparing to grant recognition next year to those concerns which can show accident rates per 100 employees below the state average for industry as a whole. For example, our records in the Pennsylvania Department of Labor and Industry show that lost-time accidents were sustained by workers in Pennsylvania industry in 1929 at a rate of 6.2 per hundred employees. Under our plan to encourage improvement, plants which at the end of 1930 show records better than the state average for this year, whatever it may be, will receive either a certificate or a letter of commendation containing a challenge to improve this record in 1931. While this is not an altogether fair basis of comparison, we feel that it does promote that spirit of competition which is so important in bringing out the best in every American citizen, whether in work or in play.

In industry generally today we find the machine forced somewhat into the background of consideration as a hazard. Our better analysis of industrial accidents explains this. Machinery is not responsible for nearly as many personal injuries in industry as once popularly was supposed. But there is no discounting the fact that woodworking machinery continues to demand the most profound respect of every student of industrial accidents. Its sharp, high-speed points of operation produce the type of injury that is the nightmare of every safety man—the dismemberment, the permanent disability—the type of injury that plays havoc with the safety record.

At first glance it may appear logical to assume that if the machine rates high as an accident producer in the woodworking industry, then the exposure reduces with reducing sizes of shops. But does it? Something else enters here. In the larger woodworking plants machines are most apt to be set up and adjusted and retained for one operation continuously. In the smaller shops fewer machines are available and changes of work are more frequent. Hence there is likely to be more frequent adjustment of machinery and removal of guards, and a higher exposure to machine hazards.

A tilting saw table, for example, can be used for cross cutting and ripping when in the normal position. By tilting the table it can be used for mitering, rabbeting and other operations. For cross cutting and ripping an approved hood and splitter can be used. Operations in the tilted positions usually are performed without any guard at all. There is every chance that if this machine is used for all of these classes of work it will never be found with a guard in position. It is difficult to convince the small shop owner that making one machine do the work of several is of doubtful economy.

Again in the small shop there is most likelihood that machine operation will not be closely restricted. Here is a potent source of accidents in woodworking establishments. The small shop safety committee should bend its energies to restriction of machine operation to competent machine operators. Just the other day I was in one of the larger woodworking plants in Philadelphia where signs were posted warning bench workers that dismissal would be the penalty for their operation of machines. Recent serious injury of a cabinet maker by a circular saw was the costly experience which brought the enforcement of this rule.

Given fully trained workers, the dependable sustained speed of modern cutting tools with individual drive, cutting edges kept in perfect condition, safeguards provided where the character of the work will permit, the woodworking machine loses most of its terrors as an accident producer. This item of well-kept tools is as important as anything for accident prevention on woodworking machinery. It is in the small shop that, for some reason, probably because there is not enough saw filing to keep anyone steadily at this work, saws are most likely to be neglected until they become dull enough to cause accidents.

I always have felt that the job of the safety committee in obtaining sanction for guards on woodworking machinery from the management should be particularly easy. In states like Pennsylvania, where high penalties are exacted for unguarded woodworking machinery in compensation insurance rates, the woodworking machine guard pays dividends from the day it is installed. One of our inspectors recently issued an order on a small woodworking establishment to guard three circular saws. These guards were installed at a cost of \$90. After complying with the order the owner of the shop found that by his action he had been relieved of payment of compensation insurance penalties of \$80 per year on this equipment. A \$25 insurance penalty made it mighty easy for our state inspection service to obtain the elimination of squarehead jointers a few years ago.

A much bigger problem is to get machine operators to use the guards after they are installed. Our Pennsylvania factory act imposes upon the individual worker a legal obligation to keep in place the machine guard that his employer must provide.

With a few such lessons as our recent prosecution of a worker who was injured after he himself, had removed a saw guard, it should not be difficult for shop safety committees to obtain respect for this most elementary and important requirement.

Let the small plant safety committee never forget that the two things of most importance for reduction of personal injuries from machinery or from any other source are the two things easiest to obtain, yet almost invariably most neglected. These things are cleanliness and light. In the small woodworking shop there seems to be a particular tendency to accumulate all sorts of odds and ends under the impression that use will be found for them sometime. The result is a shop in such condition that there is something to trip over or bump into on every hand. Adequate lighting may require some effort to obtain, but it always is cheap at any price.

Teaching safety and the reasons for safe working constitutes the most important job of the safety committee in the big shop or the little shop. Without education, the best supervision, the most perfect discipline will fall short of producing the maximum of safety. That possibly is why the shop too small for a safety committee is at a disadvantage, unless there is someone to first tell the worker why, then show him how and only after that, see that he does things in the right way at all times.

Take a leaf from the book of the Bureau of Inspection of the Pennsylvania Department of Labor and Industry which with more safety laws and regulations at its disposal and more power to enforce them than any plant safety committee ever will have, nevertheless has turned to education as the most important of all influences for elimination of industrial accidents.

Today the Pennsylvania Plan, as our two year old educational policy of factory inspection in this State is known, is attracting attention throughout the nation and is being widely copied.

One thing, in conclusion, I wish I might address to members of safety committees and to individual workers rather than to employers. It is this—whoever looks far enough and clearly enough for the causes of failure of plant safety committees will discover that right within the committee itself, in its wrong conception of its job, lies a potent source of the type of failure so frequently and so unfairly charged to lack of interest and support from management. I am not at all discharging management from the blame it often deserves, for its frequent resort to "paper safety committees" to obtain insurance credits, a subterfuge which invariably cheats no one so much as the employer himself, who resorts to it. If you, members of the plant safety committee, and you, workers from whom the committee operates, devote all your attention to arbitrary demands for physical improvements, and do nothing to correct your own careless habits, which are far more productive of accidents than any mechanical conditions, don't be surprised if the boss fails to take your suggestions as seriously as you would like them to be taken. Don't consider it strange if he appears less and less frequently at your meetings, and you are deprived of the pleasure of noting his discomfiture under your criticisms. And finally, another safety committee has gone onto the rocks—"because management wasn't interested."

We don't hear enough about this most important of the problems of the safety committee, the development of its own right attitude toward its work. We ought to hear more. The shop safety committee can be the best of all mediums for promotion of better relations between men and management, at the same time it is performing its function of safety advancement. Its failure to measure up to its responsibilities and possibilities where so much service could be rendered, is nothing short of tragic.

H. L. SMITH (Duquesne Light Company, Pittsburgh): My question may not be fair after that very interesting paper, but since Mr. Inmel placed such a definite limit on the shops which might reasonably maintain Safety Committees, I would like to ask what he would suggest to take their place in the smaller shops of which we have so many hundreds?

Mr. IMMEL: I did answer that question to some extent when I said adequate supervision was our prescription for the smaller concerns. I think that supervisory responsibility in the smaller concerns coupled with education, applied with enough punch to put it across and with enough consideration of the fact that American workmen always do things better when they are told why—I think that is your answer in the small shop, together with attention to every physical requirement.

CHAIRMAN GOODSPEED: By defining the small shop as a shop of 50 employees or more, Mr. Immel has opened the way for another paper next year on the small shop of 50 employees and less.

Our next speaker is Mr. W. H. Greenwalt, vice-president and general manager, Murray Wood Products Co., Memphis, Tenn.

Minimizing Woodworking Plant Accidents

By W. H. GREENWALT

Vice-President and General Manager, Murray Wood Products Company,
Memphis, Tenn.

The minimizing of woodworking plant accidents is a problem serious enough to warrant a greater interest on the part of management than has been displayed heretofore. It is through the realization on the part of management of the very important part safety plays in the economic operation of their factories and its ultimate effect on cost and profit that we may expect intensive interest to the end that manufacturing may be carried on safely.

Compensation insurance premiums are a part of plant overhead and must necessarily find their way into cost. Unsafe working conditions brought about by failure to provide practical and sensible machine guards and neglect on the part of the management to properly educate its workmen in safe methods of operation, can only result in a reduced speed of operation; resulting in an increase in labor cost. Therefore, the manufacturer, aside from the humanitarian standpoint, has a two-fold return on his safety investment.

Safety Methods—The problem confronting us and other manufacturers, whether woodworking, mining, steel or chemistry, is the best and most effective methods of getting across to our supervisory force and workmen the necessity of their thinking and working safely, and that doing so is as much a part of their work as performing the operation for which they are employed. I mention the supervisory force in particular, because it is through them that safety suggestions generally originate, and it is likewise through them that we may expect to enforce safety rules and regulations among the workmen. Sensible and practical guarding of machines is a very important factor in reducing accidents, but more important is an extensive educational campaign. Personally, I cannot help feeling that education of the employees, from the executive in charge, down through the ranks, is the most effective means of reducing accidents.

Education of Employees—Education of workmen may be accomplished in various ways. National Safety Council "Safety Posters" are familiar to most of us. Home-made posters have been used on numerous occasions. Competition between groups, departments or plants, with the departments or plants represented by horses, or swimmers in a race, being advanced or retarded in accordance with the representative departments' ability to operate without a time losing accident. Some companies have resorted to a money bonus to the foremen of departments operating within certain limits of their safety budget. Any number of ideas may be used effectively, all with the object of stimulating competitive interest in safe operation; eventually, resulting in the reduction of accidents, cost of the article manufactured and suffering and pain to the workmen.

Experience of Murray Corp.—Feeling that the purpose of the convention and this particular meeting is for the exchange of safety ideas and experiences, may I recite to you briefly the experience of the woodworking plants of the Murray Corporation of America? In doing so, I do not wish to create the impression that our plants are models to pattern after, but I do believe the reciting of our experience in organizing to reduce accident expense and improve our safety standing in relation to the rest of the plants, will be productive of ideas which may prove beneficial.

Bay City Plant—Our Bay City plant has been in operation about fifteen years and previous to 1924 was known as the Wood Mill of C. R. Wilson Body Company. It has a capacity of approximately 1,000 four door sedan bodies per day, employing from twelve to fifteen hundred men at the peak of production on a night and day shift. Our supply of labor was drawn from Bay City and surrounding towns. All our workmen were sufficiently experienced to enable each one to set up and operate his own machine. They were likewise familiar, to a certain extent, with the hazards of the machine and operation for which they had been employed.

Safety Contest—During the latter part of 1927 there was organized by the general safety engineer of the Murray organization, a safety contest among the various divisions of our company. The contest based on a budget allowance for accidents in accordance with the hazardousness of the operations and machines in the various divisions and the amount of factory labor. It developed that our division was fifteenth in the standing with relation to the other divisions. We were far exceeding the estimate of our accident cost. We had felt that we were taking an active interest in safety—we, apparently were seriously investigating each accident and taking steps to prevent a recurrence—guards had been provided for machines where considered necessary and practicable, but it was plain to us that we were not getting the proper results.

Central Safety Committee—We organized a Central Safety Committee, composed of the superintendent, general foreman of productive departments, plant engineer, the production engineer, and the employment and welfare manager, with myself as chairman. This, you can readily see, was a well balanced organization with the superintendent and general foreman interested in production, the production engineer, who was in charge of all shaper forms, assembling jigs and the routing of material in the mill, who was naturally interested in supplying this equipment so that it would be safe to operate, the plant engineer in charge of maintenance, who would be familiar with the various machines and possibilities of guarding them, the employment and welfare man, acting in the capacity of a safety man and interested in the welfare of the employees, and myself, to immediately pass upon suggestions as they arose. We also organized a Sub-Safety Committee consisting of group leaders as they were known to us, or perhaps you would know them better as assistant foremen or straw bosses, and certain workmen picked at random in the plant. The Central Safety Committee served for a period of one year—the Sub-Committee for a period of two months. Both the Central Safety Committee and the Sub-Committee met twice a month on separate dates. Accident reports covering in detail all particulars in connection with the accidents were carefully gone over. Suggestions were made with reference to guards or practices, and old safety rules were discussed and new ones inaugurated. Minutes of the Sub-Safety Committee were reviewed and their suggestions discussed and acted upon. The results obtained showed a considerable improvement, but our standing, in comparison with the other divisions, was very unsatisfactory. The Safety Committee decided that if we were to improve our conditions we would be compelled to resort to different tactics than heretofore employed.

Accidents Preventable—At a safety banquet attended by foremen and group leaders we were addressed by a speaker who stated that all accidents were preventable, and

that 80 per cent were caused through lack of safety education on the part of the workmen. Both statements made a lasting impression. Our accident reports had shown us that many of our compensable accidents were caused by carelessness and thoughtlessness on the part of the workmen. Many were caused by neglect to report to the first aid after receiving what apparently was only a minor injury, or where wood splinters had entered the fingers or hands, small particles of dust in the eyes, or bruises on the arms or legs.

Educational Campaign—We decided on a program of extensive education and determination to back up to the limit our safety men and foremen in seeing that the safety instructions and rules were properly observed. We had been using the National Safety Council posters at various points in the plant. These were attractive and effectively illustrated the results of carelessness and inattention to safety. It occurred to us, however, that it was quite possible that while the men were reading these safety posters, they were not actually remembering the significance of the story the posters told. We determined to find out, so we inaugurated a simple, workable plan of what we called the "Safety Message." This safety message, in the opinion of the entire Safety Committee, had more to do with the results obtained in our plant from a Safety standpoint than anything we had been able to do theretofore.

Safety Message—This safety message consisted simply of a miniature safety poster which was attached to the men's pay checks each pay day. We had previously notified the employees of our intention and informed them that a committee consisting of three members of the Safety Committee would call upon them at random three days after pay day, and they would be expected to recite the safety message. To the first man that could recite the safety message we would present him with a two dollar and a half gold piece, and his name would be posted on our factory bulletin board. We determined the men to call on to recite the message by drawing numbers indiscriminately from a hat corresponding with the men's clock card numbers. As a general rule, we would draw some twenty-five names from the hat and then call on the men in order of the drawing. If the first man could not recite the safety message correctly to the committee, they would pass on to the next man, and so on until they found a man who could actually recite the safety message. The thought behind the safety message was, that if a man was interested enough to learn this message, he would remember it, and remembering it, he would naturally put it into practice in his every-day work.

This safety message, naturally, caused a great deal of enthusiasm among the employees, and a desire on their part, not only to be able to learn and repeat the message from a standpoint of the reward offered, but the honor of having their name placed on the bulletin board where their fellow employees could see it. The employees in this plant were only average workmen, and you might imagine it would be a rather difficult thing for them to learn the safety messages such as we distributed. On the contrary, men who were unable to read English were often able to recite the safety message just as well as men who were more educated and who had had an opportunity of attending our public schools. In all probability, these workmen took the safety message home with them and had their sons or daughters read it to them, and in this way memorized it. Competition became very keen among the various workmen throughout the factory, and among the foremen of the different departments and groups. A great deal of good natured rivalry resulted. In many instances, if a man could not recite the safety message when called upon by the Safety Committee, the foreman felt that it was not only a reflection upon the man, but also himself and his department, and he would insist that this man learn the safety message and repeat it to him.

The first Safety Message attached to our pay checks read as follows: "The Safety

Committee Works for your Protection. Will you help by avoiding reckless acts?" This was followed up with a second message reading, "Shorty says it is easier to do a job safely than to explain why you took a chance." The third was a miniature poster showing two hands with this simple message: "Keep Them—Your Ten Fingers Are Valuable." We attempted, of course, to pick out safety messages which would be interesting, quite easy to learn and bring home to the workmen the particular point of safety which we wished to stress. The committee was originally required to call on an average of fifteen to twenty men before one was found who could correctly repeat the message. This has now been reduced to approximately four.

Interdepartmental Safety Contest—In addition to the safety messages we organized in the plant a monthly Interdepartmental Safety Contest, budgeting the various productive and non-productive departments in dollars and cents in proportion to the amount of the payroll of that department and the hazardousness of the occupations. At the end of a three month's period the department which had shown the greatest saving in proportion to their budget was awarded the Plant Safety Banner to be displayed in their department until the end of the three month's period, or until some other department was able to win it. This banner was presented to the foreman of the winning department at a banquet to which were invited the foremen and group leaders of the winning department, as well as the foreman and group leaders of the losing departments.

Safety Boards—Along with the safety messages and safety contest we had what we called the Safety Board on which was posted each individual, as well as a summary, of all time losing accidents in the plant. We also posted the name of the man who had the time losing accident, the department in which he worked, the nature of the accident, probable length of time he would lose, the reason for the accident, whether disregard of instructions on the part of the man, carelessness of fellow employees, lack of instructions on the part of the foreman to the man, failure to use safety device or tools furnished, or failure to report to first aid after receiving an apparent minor injury. No man, in our estimation, had any desire to see his name posted on a board of this nature where his fellow workmen could observe it daily, stating that his injury and loss of time were caused by disregard of instructions which had been given him, or his own carelessness. Likewise, a foreman or group leader, would be reluctant to see the statement on the board that he had failed to instruct the man in the proper use of the machine or guards, or the safe method of operating. It also acted as a reminder to the workmen that one of their fellow employees had been injured, and gave the reason, which, we felt, served to make them more careful.

It was only a short time before everyone in the plant seemed to be worked up to a greater degree of enthusiasm in the matter of safety, and we attributed the success which we attained with relation to the other divisions mostly to the education of our workmen through the safety message and the interest in safety which this message revived. From the fifteenth place in the safety standing with relation to the other divisions in our company, we finished the year in fourth place and we were heartily commended by our vice-president in charge of manufacture. He addressed to us a letter in this connection which reads as follows: "Report of accident cost for the last half of the year shows that the Bay City Plant used but 53 per cent of their allowance, thereby winning fourth place in the contest. This showing reflects great credit on you and your supervisory force, and I desire to offer my congratulations and suggest that you convey this appreciation to your associates. It is hoped that this good record will be continued." Needless to say, we were extremely proud of our results, not only because we had been able to reduce Accident Cost to ourselves and improve our standing among the various divisions, but also because we had been able to interest our workmen in a safe way to do their job.

Memphis Plant—During the latter part of 1928 it was apparent that to take care of increased business it would be necessary to expand our woodworking facilities. Because of the possibility of a more economical operation, and after a great deal of investigation we decided to locate in Memphis, Tennessee. Ground was broken for the Memphis Plant in January, 1929, steel for the plant was on the ground the latter part of February, and the erection of steel began the first week in March. In May we were operating machines with temporary power and had temporary boilers to supply steam to those machines requiring it. In June and July we had a full night and day force, and you can readily imagine the confusion through lack of training in our method on the part of not only the workmen, but also the supervisory force. Our plant in Memphis is sufficiently large to permit the cutting up of 500,000 feet of lumber per day. At our peak in July, 1929, we were employing approximately 1,500 men. These workmen for the most part are negroes. In fact, we use negroes on every machine in the plant, having white set-up men and white group leaders and foremen. We hired these uneducated negroes from the cotton fields and the streets of Memphis. In 80 per cent of the cases they had no previous factory or machine experience. It is not hard to imagine how ignorant these men were of the hazardousness of the machines on which they were working, and naturally, our accident experience was high.

Machine Guards—Being somewhat familiar with the experience of other manufacturers in the South, we immediately started in to guard every machine which might appear to be hazardous. We provided guards on stock saws, rip saws, band saws, double end tenoners, single end tenoners, mitre saws, detail shapers, screw machines and boring machines, but it was apparent to us that an extensive educational campaign was very urgent.

Educational Campaign—We again inaugurated the large safety posters, safety messages, department safety budget, safety banners and the safety board. The majority of the negroes have difficulty in writing anything but their names, and a considerable number cannot read. You can, therefore, well imagine our problem of education through the safety messages, yet, somehow they manage to learn and recite the message. We offer three prizes at Memphis for the reciting of the safety message—First prize, \$2.50; second, \$1.50; third, \$1.00, and because of the greater interest which is stimulated we put the same plan into effect at Bay City. It was necessary for the committee to call on twenty-five to thirty workmen before the message could be recited correctly. Now, the average is six to eight, depending on the length and the nature of the message. We found, through costly experience, that it was necessary to guard every point of contact possible on the machines to avoid accidents. It was necessary on the square shaper to increase the height of the collar from $\frac{3}{4}$ to $1\frac{3}{4}$ inches above the table, and to extend the shaper forms from $4\frac{1}{4}$ to 11 inches beyond the extreme end of the stock to be shaped, and even though we had steel table extensions, these had to be increased an overall length of $5\frac{1}{4}$ inches from the edge of the table and made 20 inches wide. We also found it necessary to clamp a block to the shaper table on the outside of the shaper collar to prevent the operator allowing the shaper form to go into the head before the form had reached the center line of the collar. The mitre saws had been completely enclosed with a box guard; detail shapers were almost completely enclosed with guards to prevent the operators getting their fingers into the heads. Pedals of screw machines were so divided as to make it impossible for the operator to press both the drill and screw pedal at the same time. The band saw guide wheel was guarded to prevent the operator's hand from coming in contact with the sharp edge of the wheel when pushing his stock through the saw. Many more similar precautions were taken.

Employment Department—We resorted to having the employment department hire the most intelligent type of labor possible, particularly from a standpoint of their

fitness for their particular job. Each man, upon being hired, was and is instructed by the employment department to go to the first aid in cases of cuts, bruises, dust in the eyes, or upon receiving any injury no matter how slight, under penalty of a week's lay-off. The new employee, upon being hired and turned over to his group leader, is again instructed regarding first aid requirements. If the job upon which he is working requires the wearing of goggles, our routing sheet so specifies and we insist on the instructions being carried out under a lay-off penalty. Goggles, if required, are handed out to the new workman in a clean, wax paper bag after first having been sterilized by the first aid department. The new man is instructed by his group leader in the safe manner of performing his operation and the hazardousness of his particular machine, and we expect our foremen and group leaders to take just as keen an interest in the operator working safely as in his performing the operation correctly.

The safety program is further supplemented by a general meeting of all of the negro machine operators at least once a month which is addressed by the superintendent, who points out to them the necessity of their realizing the hazardousness of the machines on which they are working, and the necessity of their avoiding careless and reckless acts. We also take the opportunity at this meeting to present to the workmen several employees who have received serious injuries, showing them concrete examples of what might happen to them through carelessness and inattention to safety rules.

Safety First Don'ts—The Safety Committee suggested and arranged to have printed cards 6x10 inches with the heading, "SAFETY FIRST DON'TS" for the various types of machines in the plant, and these cards are placed conspicuously on the machine where the workmen can see them. As an illustration, the stock saw card reads:

- 1st. Don't change saws without first pulling line switch.
- 2nd. Don't push saw back with hand on saw guard. Cover may drop off. Use **SAW HANDLES**.
- 3rd. Don't look around while operating saws. Keep your eyes on your work and keep your fingers on your hand.
- 4th. Don't raise finger guard on saws. See your foreman.
- 5th. Go to **FIRST AID** at once with any cuts, bruises, silver or foreign matter in eyes.
- 6th. Don't pull trucks. Push them.

The rip saw card reads as follows:

- 1st. Don't change saws without first pulling line switch.
- 2nd. Don't look around while operating this machine. Keep your eyes on your work and your fingers on your hand.
- 3rd. Don't let dirt or scraps accumulate around your machine. Keep it clean at all times.
- 4th. Don't run saws if safety fingers do not work freely.
- 5th. Don't clean saw tables off with your hands. Use a stick.
- 6th. Don't feed machine with fingers under the board. Keep fingers on top.
- 7th. Don't pull trucks. Push them.

The Band Saw card reads:

- 1st. Don't change or adjust saws without first pulling line switch.
- 2nd. Don't operate saws without first seeing that book is fastened at top of upper guard.
- 3rd. Don't place thumb in line with saw when cutting to mark.
- 4th. Don't remove piece of wood or silver that drops in throat of saw while saw is running. Always stop saw and be sure that saw is stopped.

- 5th. Don't put hand in center of top wheel when adjusting saw. Always place your hand on the rim when turning wheel.
- 6th. Don't look around while operating machine. Keep your eyes on your work and your fingers on your hand.
- 7th. Don't pull trucks. Push them.

And each machine has a card with instructions as to what the operator must do to avoid an injury. If the workman cannot read the instructions, the Group Leader reads and explains them to him.

Results—As a proof of the results of the Safety Campaign our Accident Cost in proportion to factory labor was reduced to 43 per cent in the first seven months of 1930 as compared with the eight months of plant operation in 1929, and the months of April, May, June and July showed a reduction of 45 per cent as against the first three months' operation of this year.

Bad Practices—We believe in the continual necessity of following up Safety instructions and have found it necessary to have our safety man, who is in charge of employment and welfare, make a trip through the factory each day to report in writing to the foremen, superintendent and plant manager, any unsafe practices discovered on his trip. We believe that if a workman, set-up man, or foreman disregards the program of safety she should be disciplined, and we have found it necessary on several occasions to discharge a set-up man for negligence in a set-up which might have caused serious accident, and have disciplined others by giving them a three-day, week or two week's lay-off, depending upon the seriousness of the infraction of the rules or disregard of instructions. Education of workmen alone without the proper education of the foremen will not produce the desired results. The foremen and sub-foremen must be taught that safety in the mill is just as much a part of their job as getting out production, and that this is one of the major factors to be taken into consideration when promotion is being considered. In order to properly put over a safety campaign with the object of minimizing woodworking accidents as the goal, the entire personnel of the plant, including the manager, must be made to feel and show a real interest in the safety program and evidence this by the investigation of accident reports and attendance at the safety meetings, in addition to telling the personnel of the organization that they are squarely behind the safety program.

(The speaker then showed a series of slides depicting the accident prevention work in his plant.)

MR. MURRAY (Chicago): I would like to ask Mr. Greenwalt how he checks his foremen to see what knowledge they have about the occupations in which they are working.

MR. GREENWALT: The foremen upon being hired are carefully talked to by the superintendent to determine their knowledge of the machines to which they will be assigned and to impress upon them our methods of handling the safety program. In other words, we coach our foremen right off the bat upon being hired.

MR. MURRAY: I was wondering whether that would be satisfactory in my organization where we realize that conditions are changing so rapidly. What I am interested in is how do you keep the foreman's knowledge up-to-date and know that he has the last, up-to-the-minute ideas about his job? Do you use a questionnaire?

MR. GREENWALT: No, we don't. The men are rotated on the sub-safety committee and serve on the central safety committee. In these meetings we discuss many of the ideas which we have in connection with safety.

ADJOURNMENT

Wednesday Morning Session

October 1, 1930

M. C. GOODSPEED, Chairman
General Electric Company, Erie, Pa.

The second session of the Woodworking and Lumber Manufacturing Section convened with Chairman Goodspeed presiding.

CHAIRMAN GOODSPEED: The first item on the program this morning is the report from the chairman of the Nominating Committee, Mr. G. E. Sanford.

Report of the Nominating Committee

MR. G. E. SANFORD (General Electric Co., Schenectady, N. Y.): The slate recommended for election includes:

General Chairman: Mr. W. H. Greenwalt, Murray Wood Products Company of Memphis, Tenn.

Vice-Chairman of Manufacturing—we are renominating last year's incumbent—Mr. H. J. Kelley, of the American Seating Company of Grand Rapids.

Vice-Chairman: We are renominating Mr. J. G. Davis, of the Eastman-Gardiner & Co., Laurel, Miss.

Vice-Chairman for Saw Mills: Mr. J. W. Smith, Employers Insurance Association of Kansas City.

Secretary: W. P. A. Pollack, Lumbermen's Mutual Casualty Company, Chicago.

Chairman Poster and Slides Committee—renominating Mr. F. W. Braun, Employers' Mutual Liability Insurance Company of Warsaw, Wis.

Chairman of the Program Committee, your retiring Chairman, Mr. Goodspeed.

Chairman of the Membership Committee—Mr. Robert Williams, Thomasville Chair Co., Thomasville, N. C.

Chairman Publicity Committee and News Letter Editor—Mr. John B. Grier of the American Car & Foundry Co., Wilmington, Del.

Chairman of the Engineering Committee—Mr. Arthur Murray, Chicago Mill and Lumber Co., Chicago.

Associate News Letter Editor—Major H. Steere-Clark, British Columbia Loggers Association, Vancouver, B. C., Canada, renominated.

The Executive Committee includes the above-mentioned officers, committee chairmen and some additional men—Past Chairman Mr. J. M. Bissell, Laurel, Miss.; Mr. A. O. Jackson, Etna Life Insurance Company of New York City.

There is one vacancy for which we want a nomination from the floor; that is the chairman of the Statistics Committee.

MEMBER: I place in nomination Mr. O. C. Boileau of the R. C. A. Victor Company, Inc., Camden, N. J.

MEMBER: I nominate Mr. Fredericks to serve on the Executive Committee.

MEMBER: I nominate Mr. William A. Wilson.

MR. SANFORD: Are there any other nominations? If not, I will move that the Secretary cast one ballot for these nominations.

(The motion was seconded and carried unanimously.)

CHAIRMAN GOODSPEED: Without further delay, we will proceed with the program. I am pleased to introduce Mr. Robert Williams, Thomasville Chair Company, Thomasville, N. C., who will speak to us.

Industrial Accidents

By ROBERT WILLIAMS

Thomasville Chair Company, Thomasville, N. C.

Industry has traveled a long way. Each age has brought its lessons, added its improvements, and carried men further along the road of cooperative effort.

The primitive age introduced him to the forces of nature, saw him fashion his first rude tools, and taught him the way of self-preservation.

The family system discovered the principle of cooperation and applied it to individual work through a division of labor. It demonstrated the advantage of exchange.

The domestic system took the principle of cooperation and applied it to groups. It took the idea of exchange and built up a vast system of trading. It applied specialization, not only in the production of goods, but also in the production of services.

This progress represented a slow growth of thousands of years. Then, in the eighteenth century, came a series of mechanical inventions—chief among them the steam engine—and within a single generation the old order of industry was overturned. The factory was here.

So swift was this transition that the events which brought it about have been called the Industrial Revolution.

The Industrial Revolution marks the beginning of our present industrial age. It ushered in the modern organization of business. It made possible the marvelous teamwork and the increased production of the factory system.

Machinery was the new element which the Industrial Revolution brought to production work. In place of muscle power it put mechanical power. The result was an enormous increase in output and a corresponding increase in the hazard to the workman.

In the factory there are two elements of prime importance: (1) time, (2) material. Idle time and wasted material are the greatest enemies of efficient production. It is by using time and material up to the highest notch of efficiency that the rate of production is increased and the per-unit cost of production is lowered.

Production planning, cost accounting, control of inventories and waste elimination are all results of the art of management, and have made possible our industrial progress.

There is yet another element, dealing, as it does, with society as a whole; with men, money and materials. Step by step it has met the demands of industry in its development, and is ready to meet the immediate problem. This element is industrial safety.

Industrial safety came into being as a logical step in the art of industrial management. It is only about twenty-five or thirty years ago that industry began to give serious thought to the appalling wastefulness of materials and the loss of productivity of the worker as a result of Industrial Accidents.

What are industrial accidents?

An accident, according to the dictionary, is an event happening without design or intent.

Ask any executive, superintendent or foreman to define an industrial accident and in nine cases out of ten the answer will involve a case of personal injury. It is this misconception which has done so much to keep hidden the real cost of accidents.

In an efficient plant everything takes place according to schedule. An industrial accident, therefore, is an interruption of the orderly routine. In other words, we may assume that the regular process may be broken many times before a man is injured. This leads to the conclusion that there is more than one kind of accident.

Let us then divide industrial accidents into two classes; that is: major accidents and minor accidents.

Major and Minor Accidents

A major accident, let us say, is an accident in which someone is injured. It may be a serious injury or it may not. The seriousness of the injury will determine the amount of compensation. However, it takes no great stretch of imagination to see how some small scratch may, by becoming infected, result in serious complications.

A minor accident does not necessarily involve personal injury. In fact, the expression "major or minor accident" is misleading. In one sense of the word there is no such thing as a major accident. There are major and minor injuries, of course, and it may be said that a major accident is one that produces a major injury. However, the accident and the injury are distinct occurrences; one is the result of the other, and in the continued use of the expression "major accident" and in the acceptance of its definition as one that results seriously, there is a decided handicap to effective work.

In reality when we so merge the terms "accident" and "injury", we are assuming that no accident is serious unless it produces a serious injury. Yet hundreds of accidents having the potential power to produce serious injuries do not result.

There are certain types of accidents, of course, where the probability of serious injury may vary in accordance with circumstances. For example; a type of accident such as a fall if occurring on a level floor may not be potentially as serious as the falling of a steel worker from the top of a building. Yet the former may, and sometimes does, result in serious injury.

An accident does not necessarily produce an injury. It is an event that occurs without foresight. An injury is merely the result of an accident.

If a pile of material falls over, it must be rebuilt. If a truck breaks through the floor and the load is spilled, it must be picked up. Possibly every following truck is held up or forced to detour until the way is cleared.

I might name any number of instances which would interrupt the production schedule in your plants in which there is no personal injury involved. At the same time there is congestion which slows up the work and production lags.

By eliminating this type of accident, you not only save your employees from possible injury, but you also prevent the secret drain imposed upon industry by the unreported accident.

Last year more than 23,000 lost their lives in industrial accidents. In addition, about three million others were so severely injured that they had to lay off from work.

These accidents did not "just happen." They were caused by some kind of failure—machine failure, man failure, or material failure. Leaving out such accidents as have been termed "an act of God", we have three things directly responsible for accidents: (1) fault of workman, (2) fault of company, (3) fault of fellow workman.

Responsibility

Since we have assumed the employer may be partly in fault for some of the accidents which may occur in his plant, that naturally places a responsibility on management as well as man.

Now, taking for granted that the management is sold on the idea of accident prevention, how are we to get the idea over?

First, it will be necessary to determine who is the management.

Since it is the duty of superintendents and foremen to interpret the policies of the management, as far as the men are concerned, the responsibility will naturally fall on them, unless you have a regular safety director. In that event, it is only through the closest cooperation between your safety organization and your superintendents and foremen that you will get results in reducing your accidents.

Furthermore, from a less personal standpoint, you are interested as a public citizen in a movement devoted to the prevention of unnecessary deaths and injuries, bringing

added burden on charitable societies and taking from industry the strong and able-bodied heads of families.

How to Reduce Accidents

To reduce the frequency of those accidents which are caused primarily by the workmen themselves; that is, by their inherent carelessness, momentary heedlessness, inexperience and other causes, it is necessary to acquaint them with the hazards which they encounter; instruct them thoroughly in the best methods of performing their jobs; and principally, to create a safety consciousness.

An educational program of this kind involves many factors, both because of the diversified jobs which the employees perform and because of the variety of minds and temperaments.

Instruction in the safe and most efficient ways of doing the work and pointing out the specific hazards encountered is the function of the supervisory force and can be done best by the personal contact of the supervisors and by printed rules.

With reference to instructions and rules:

- (1) They must be uniform.
- (2) They must be reasonable.
- (3) They must be consistent.
- (4) They must be clear and unmistakable.
- (5) They must be easy to follow.

Accident prevention is fundamentally a production problem—the problem of lowering cost by reducing waste.

The management, in order to properly control this problem of production, should periodically have for their consideration an analysis which will show not only the total results for the period in severity and frequency, but the various causes of accidents and their relation to the total.

Intelligent, corrective measures cannot be taken to prevent recurrence of accidents without a knowledge of the causes of accidents that have occurred.

Analyses do not eliminate the necessity of immediately investigating accidents that occur. A prompt investigation is essential. This investigation should comprise a careful analysis of the cause of the accident to find out what steps the management might have taken or can take to prevent the accident, the foreman's responsibility and, also, the direct responsibility of the injured employee or fellow worker.

Mechanical safe-guarding, design and maintenance of equipment, proper layout and schedule of work, proper instructions to employees, and foreman's control, all are essential elements in the prevention of accidents.

It is necessary that we drive home to every man that a machine is always dangerous no matter how well guarded.

Much has been said and written about the cost factors of accidents.

While employers are more and more coming to a realization of the so-called "indirect costs, a better understanding of what these represent will go far toward furnishing an incentive for action on the problems of safety.

A recent comprehensive investigation by a prominent insurance company reveals the fact that the insurable costs of accidents represent but one-fourth of the total cost to the insured.

Summing up, it is obvious that safety pays handsome dividends by:

- (1) Favorably affecting insurance rates
- (2) Reducing losses not covered by insurance, and
- (3) Increasing operating efficiency.

O. F. W. CROMWELL (Central Pennsylvania Lumber Co., Ridgway, Pa.): It might be well for the speaker to explain how he investigates an accident.

MR. WILLIAMS: The way we investigate accidents in our particular factory is

through our safety organization. We have what the insurance company chooses to call a standard safety organization, and when an accident occurs, I personally write a letter to a member of the committee in the plant in which the accident occurred and ask him to personally investigate that accident. I explain who was hurt, when and how, and ask him to investigate the accident and report to me.

MR. CROMWELL: We have seven mills. When we have a serious accident, I call in everybody concerned and if necessary, call in my secretary and dictate the whole thing. Afterwards if I go out on the job I pick up a lot of things that normally the superintendent, foreman, witnesses, and even the doctors, may not learn.

ARTHUR MURRAY (Chicago Mill & Lumber Co.): We have a plant employing about 1,400 employees—DeWitt Saw Mill at Racine. The manager is the safety man, too. He has a blackboard out in the plant that has every department's name and every foreman's name on it. He has two columns, one called "Accidents" and the other "Errors". Every case, whether it is a near-accident or an accident, is chalked up.

The policy is not to get foremen on the carpet for accidents. If he fails to report, he is an ordinary workman, but if he has made a mistake and is trying to correct it, that is just good business.

CHAIRMAN GOODSPEED: Our next speaker is Mr. R. C. Barr, Chief Engineer, Lumbermen's Mutual Casualty Co., Chicago.

Insuring Safety from Log Pond to Car

By R. C. BARR

Chief Safety Engineer, Lumbermen's Mutual Casualty Company, Chicago

Someone has said that one tree will make a million matches, but it only takes one match to destroy a million trees.

It can also be said that a mill employing between forty and fifty men can operate for an indefinite period of time without the loss of a single man-hour occasioned by accident, but it only takes one second for a single man to ruin the record made by many. In other words the function of one man is felt throughout the organization.

Long ago progressive employers turned from the idea that accidents are inevitable. Today they have come to recognize an accident as an interruption of an orderly procedure; and with this new attitude has come a realization that, once order is restored in the method of thinking of each individual after a mishap, harmony and safety in the organization again prevail.

There are plenty of men in industry today who have never been injured while on duty. Why is it, then, that the names of others appear on the accident record time after time in a single year? Experience can be a most patient teacher, but all its teachings can be set at naught if the pupil permits his mind to wander to something else at a time when his duties require full concentration of thought. A bank clerk, engaged in conversation with the president of the bank, told the latter, "I have worked for this bank forty years and during all this time I have made only one little mistake." "That's good," said the president, "but don't ever let it happen again." He was instilling in that man an abhorrence for error. So should we instill in workers an abhorrence for accidents—not merely a fear of them.

The business of producing lumber naturally possesses some hazards because of the very nature and weight of the materials handled, but if you watch the progressive operations on timber from the log pond to the car, the actual handling of the log and the lumber it produces is mainly mechanical until it reaches the edger and then the sorting or grading division.

Real safety in a saw mill starts with a good grade of sharp tools. Dull tools cause many accidents that are improperly allocated to other causes. In this paper an at-

tempt will be made to take up the various causes of accidents in the course of lumber production as they are reported to an insurance company.

The cant hook may be called the "reception committee" to a load of logs from the woods; let me say that this useful tool should be the best obtainable, with strong, straight-grained handle, with properly tempered and properly sharpened points.

When the end chains or chocks have been removed from a load of logs at the pond and an unloading line is used, the equipment should be such that it will be unnecessary for any person to be on the pond side of the cars. When no unloading line is used, every precaution should be taken to avoid injury from logs which might roll from the car. Of course, rollways or skid timbers are recommended, but in any case the banks of the log pond should be reinforced to prevent a cave-in. If a cant hook is used to dislodge logs on the car, it should be placed on a solid section of a log so that when leverage is applied it will not be suddenly released to precipitate the unloader into the pond with, perhaps, a 3½ ton log following him to impress upon him the error of his ways. A man soon learns, or should be taught, to stand well in the clear when the logs start to roll from the car.

Inclement weather makes the footing around ponds and on runways and platforms very uncertain. This is especially true when ice or sleet has formed. Not only should all such places be well sanded before work begins, but creepers, or other devices to prevent slipping should be firmly attached to the shoes of each man engaged in moving logs in the pond. A life preserver fastened to a rope and stored for emergency use in a covered box conveniently located at one or more places about the pond is a wise precaution, especially where ponds exceed five feet in depth.

Pike poles should be of the best grade and kept sharp and, when not in use, stored on racks with points in one direction and guarded.

It is a wise plan to line the log haul with sheet iron and provide a runway equipped with a hand rail on one side and with cleats to prevent slipping.

Chocks should be used on the log deck to keep logs under proper control after the kicker has removed them from the loghaul. Cotter pins and lock nuts are added safety factors for the steel connecting pins for deck kickers.

The sawyer's station should be heavily and completely barricaded against the moving logs on the deck, and the carriage control lever should have the additional protection of a metal enclosure with extended shield to protect the operator's arm from any object which might come in contact with it. Arrangement for locking the lever is very important.

Normally we do not look for, or expect, accidents at the log deck, but one accident at this point coming to my notice several months ago is worthy of mention. An unusually large log had prevented the loader from returning to its normal position. One side of the log was in contact with the carriage and the other side was resting on the lower arm of the loader. The sawyer left his station and secured a short piece of 4x4 timber and wedged it between the then vertical arm of the loader, with the other end against the rough bark on the log, presumably for the purpose of using the power of the loader to move the log a sufficient distance to release the loader arm. With the block in place and the sawyer in direct line with it, the loader suddenly released itself, striking the block with such force that it was thrown up and out, breaking the sawyer's jaw bone in two places. For a time his recovery was doubtful. It is my understanding that the nigger could not be used to move the log in this instance.

The provision of metal guides for niggers, as well as spring recoil buffers, is a generally recognized safety practice in all mills today.

Carriages with safe and experienced operators cause very little trouble in a mill so far as accident experience is concerned, and if the carriage is properly decked over, cleats added for firm footing, and steel goosenecks firmly fastened to the knees, the carriage men are afforded a reasonable degree of protection. One accident, which fortunately did not result in bodily injury, but which caused considerable

property damage, occurred some time ago in Alabama. A shotgun carriage was being moved forward by the sawyer slowly, in preparation for a general clean-up of the carriage runway. No setters were on the carriage. The feed line to the cylinder was vertical, and the operating valve was located in the vertical section of pipe line. A section of piston ring broke off and was pushed by the piston into the feed line and wedged in the valve seat. The sawyer was unable to close the valve. The carriage speed was no longer under control, and the carriage struck the buffer with sufficient force to set it back a foot or more, causing the cylinder to part at one joint. This might have been a serious accident. Its prevention could have been simply accomplished by inserting a screen "catch-all" in a joint over the valve.

Aside from the usual protection found on band mills today, coupled with the fact that this machine produces very few accidents, there seems to be no need to dwell on further physical protection for it.

The circular log saw, however, is a different proposition. The nature of the log it cuts prohibits a hood guard being used; therefore, the only protective device which might tend to prevent saw contact accidents is a horizontal bar set sufficiently high over the saw so as not to interfere with the sawing of logs—but low enough so that it can be grasped for protection if a person should stumble or fall toward the saw. An accident of this type recently occurred in Canada. A workman fell in front of the saw and his body was cut in two.

The guarding of live roll shafting is not always taken as seriously as it should be by mill superintendents. There is no particular reason for leaving it exposed because the oil cups on bearings do not need to be covered in the construction of the guard. In many mills, sections of the shafting are guarded, but I claim (and this claim is substantiated by insurance company records) that a mill is not well guarded until every inch of live roll shafting, including the bevel gear drives, is completely guarded. There is a living example of the need of this protection in northern Michigan today. He is at the threshold of manhood handicapped by the loss of his right arm, including the shoulder blade. A short section of live roll shafting was exposed, and his clothing became entangled with the sad result described. Other accidents from this cause could be cited, but I believe the one case mentioned justifies my advocacy of nothing less than complete guarding of live roll shafts.

Climbing over live roll transfers is a prolific cause of accidents. It is an awkward step in the first place, and then the added danger caused by stepping on a roll or being struck by material in transit increases the hazard. Convenient transfer bridges with steps at approaches and rails at sides mean greater safety.

Slabs often fall from live roll transfer tables on to the feed or the legs of operators. Sometimes they are carelessly pulled with a hook and fall on the feet of the operator wielding the hook. Exercising greater care will prevent accidents like this.

Edgers and horizontal band resaws are real accident producers in some mills. Assuming that the best known protection has been provided against accidental saw contact and that the sectional feed wheels are not unduly worn, we still have the chip and "kick back" hazard to contend with. A substantial screen chip guard suspended near the front and slightly above the feed side of the edger catches many chips that might cause bodily damage to someone.

A series of non-kick-back fingers mounted on a substantial shaft and rigidly secured in place on the machine has stopped kick back accidents on edgers where installed, but this type of guard is of no practical value on a horizontal band resaw where the "kick back" is sideways.

On horizontal band resaws the "kick back" or "side kick" action occurs most often where there has been introduced a slab or flitch much thicker on one end than another and with the heavy end the last to leave the saw. Facing the rear end of the machine, the saw gives one last pull to the right as the final cut is made and the other end of the flitch flies to the left, usually striking the left side "take-off" man a serious blow in the stomach and sometimes causing serious injuries. Where mill

room or machine arrangement will permit, a raised edge on the take-off table out of line with moving stock will receive the shock of the blow. Where space behind the horizontal band resaw is limited, no satisfactory solution of the problem has yet been devised, or I have not yet learned of one. To be sure, some mills are waiting for the solution.

Slashers and trimmers cause practically no trouble when properly guarded, and where swinging barriers are provided in front of the saws accidental contact with saws is minimized. The constant barrage of blocks and chips from the trimmers wears a hole through a two inch barrier in a comparatively short time. Such openings should be closed as soon as discovered, or the planks removed and replaced.

The transmission hazards in a mill can best be observed by following the oiler on his rounds. Many hazards which might otherwise be overlooked in a mill safety program will come to light. One instance is recalled where an oiler found it necessary to lean over the "in" or nip portion of two pulleys to oil a bearing. The pulleys were installed at right angles to each other with only six-inch clearance between the moving runs. He slipped and fell between the pulleys in such manner that his body was carried between the pulleys and wedged beneath the narrow opening. The fast moving belt on both pulleys inflicted severe burns on his upper leg, which the unfortunate victim was unable to avoid because he could not extricate himself. A fractured hip bone also resulted, and many skin grafts were necessary to restore this man to usefulness. A keen observer may find many conditions similar to this in a mill transmission department, and as an accident foreseen is an accident prevented, your trip with the oiler may be a very profitable one for the company you represent.

Refuse burners are employed by many mills to dispose of surplus refuse. The burner is usually fed by a long, slow moving conveyor chain in a trough. Some of the pieces of refuse being carried to the burner do not rest securely on the belt, and vibration or unevenness of the path on which they travel often causes a piece to slip over the edge of the conveyor trough or side pieces and fall below. Wood canopies over roadways are especially desirable to avoid such hazards or, better yet, platforms placed at each side of the conveyor to catch pieces which may leave the conveyor.

Another series of accidents resulting from falling materials occur at the slab chute, receiving its supply directly from the slashers. These accidents are usually sustained by teamsters who are loading their wagons directly from the chute. Pieces drop from the chute when they are not expecting them. Other accidents result when the teamster or his helper endeavors to remove the key slab which has caused a "choke" in the chute. When it is removed a half ton of slabs may fall on the man who releases it. It is much safer to use a long pole, standing to one side, or to have a convenient and safe place provided above the "choke" where a person might stand to release it.

Just a word or two regarding the wood hog. All of them are, or should be, hopper fed, and with the mouth of the hopper well above floor level. The chip hazard can be removed or greatly minimized by providing a swinging gate or haffle inside the hopper, or by suspending a chain screen from an overhead cross bar which, when lowered, will allow the chain ends to hang at least six inches inside the hopper. The chains attached to the cross bar can be lowered or raised by means of rope and pulleys when a choke is being removed. Belts and pulleys on this machine should always be fully guarded.

Lath bolters with solid feed wheels are heard from quite often in the matter of "kick back" accidents. In order to salvage as much stock as possible, many odd shaped pieces are introduced into the machine. When a slab has a large knot in it, the only bearing of the feed wheel is on top of the knot, leaving thinner sections of the slab without bearing. Many of these pieces are kicked back against the stomach or abdomen of the operator with serious consequences.

Lath bolter operators are generally paid on a piece-work basis and work hastily,

perhaps too hastily for their own safety. Non-kick-back dogs, which will rise and descend with the feed roll but remain in contact with all points across the stock being cut, will be helpful in reducing accidents on this machine.

In many mills access from one point to another is a perilous task and requires the agility of a mountain goat and the nerve of a steel worker to reach the destination. In some instances this denotes poor judgment in the mill layout. In others, greater capacity has been required without adding to the floor space, resulting in congestion. One thing is certain—that when the mill is closed down for repairs or changes, someone in the organization should have sufficient interest to study the best method of gaining access to all points without involving unnecessary peril to life and limb, and provision made to reach all points with safety.

Changes of saws on hand mills and resaws involve but little hazard because in the more modern mills it is a mechanical process and saws are elevated to the filing room by means of hoists or tackle. Some accidents are reported due to accidental contact with the teeth of the saw in removal or replacement, but these are usually minor in nature and signify the need of exercising greater care and providing some degree of protection for the hands while handling the saw.

The selection of the sawyer bears on the safety record for a mill, perhaps more than we are at first inclined to admit. Efficiency is, of course, the prime consideration in the selection, but it has been noted that a sawyer experienced in the operation of a left-hand mill loses some of his efficiency when placed on a right-hand mill, and until he is accustomed to the changed condition of operation becomes confused to the detriment of himself and those who are working with him. In one case, a left-hand sawyer was seriously injured. The management spent three weeks and considerable expense for telephone, telegraph, and traveling before another man was obtained for the job. It is estimated that the uninsurable portion of loss occasioned by this accident amounted to a sum in excess of the compensation and medical loss on the case.

After the lumber passes the trim saws and is ready for marking, sorting, and grading, the handling hazard increases. The common or most frequent injuries are those caused from wood splinters, low and improperly piled stock tipping over, running trucks or lumber carts over the feet, slipping while pushing loaded trucks, and having hands or fingers crushed between pieces being handled and adjoining fixed objects such as buildings or lumber piles.

In the yard, unsafe piling, boards being dropped or blown from tops of piles, climbing up on piles and falling from them have caused some fatal and many serious accidents. The use of heavy leather aprons and hand pads or leather gloves will reduce the splinter hazard, but the other types of accidents mentioned appear to be those best governed by close supervision and selection of careful men. Infection resulting from wood splinter punctures is proportionately greater than from puncture wounds made by other agencies, and for that reason every man receiving such injury should be induced or compelled to have the wound promptly and properly cared for by a competent person.

I recall a long trip in an automobile three years ago extending over several hundred miles. Another party, unknown to me, was traveling over the same route. His speed was exactly 35 miles per hour. I was traveling at speeds running from 45 to 55, but I made more stops than he did, and it seemed that every time I stopped for oil, gas, or water the "thirty-five-mile-an-hour" man went breezing peacefully by at the same old speed. I will venture a guess he reached his destination (which was also my destination) at approximately the same time I did, and with less wear and tear on his equipment. This situation has a parallel in the accident prevention field. Spasmodic efforts to prevent accident are of no practical value, and such indulgence sometimes works more harm than good because the result of the effort begets lack of confidence in making another attempt. Slow, steady, progress in overcoming troublesome accident causes begets confidence in the system and is lasting in its effect.

No campaign for safety will be successful without executive interest. More than once, in my experience in this field, have I heard a foreman say, "It's all right for you to talk about safety and production going hand in hand, but all I hear around this place is production. The men do not believe the boss is sincere because he never takes any interest in our safety activities and never will entertain any suggestions which involve the least bit of expense in compliance."

This is a subject on which we can talk broadly. The plants or mills making the greatest inroad on the accident frequency and severity loss ratios today are those having executives in sympathy with the principles which spell success in safety effort.

CHAIRMAN GOODSPEED: That takes off man; you say the space behind the horizontal bandsaw is limited. Why can't you get more space there?

MR. BARR: The end of the lumber that comes through the saw in this particular place is just long enough so the sawer can swing it onto the next bench where it goes on to the trevis. There would have been no room to take up a side on the takeoff table. The planks were coming through there two inches and were too heavy for one man to lift. You couldn't lift it over the guard.

O. F. W. CROMWELL (Central Pennsylvania Lumber Co., Ridgway, Pa.): Mr. Barr spoke of pipeholes on the pond. If you put a ring on your doghouse about two feet in diameter and make these fellows run their pick up through this ring and make it drop in the decking, you will prevent pipehole accidents.

Then he spoke of the ramp alongside the log chain. I have in most cases made them put steps all the way up with handrails; the steps are about 3½ feet wide so there will be plenty of room and so water won't splash all over. If it does splash put up a shield to keep stairs from getting icy.

Do you provide your men in the mills with small hooks for hauling lumber off the transfers and off the live rolls? We find every once in a while two men will get too close together and one fellow will hook the other fellow.

We have a 2-inch hardwood forward drop down in front of our slasher. It is on a hinge so it can't swing back against the slasher. It is located about 2 feet in front of you and has a clearance of about two feet from the floor. We thought we had everything protected, but last year there were two men feeding a slasher and in some way one fellow got tangled up and slipped on a wet slab and fell, and before he could recover he had his foot cut off at the ankle. So now we make this guard so it is automatic. If anything touches the guard it automatically steps in a few seconds. We found we had to do that to protect the men working there.

You mentioned chips from the hog. I don't know how your men feed your material into the hog, but ours comes down the usual slant and we locate the hog so it is completely enclosed from the conveyor entrance. Then we have a trapdoor of about 3 by 4 over the top of the hog so if the hog gets jammed, then the man that operates it has a long pole to reach down and break up any jams. But we had quite a few injuries from pieces flying back when he was trying to break it up. So one of our superintendents suggested putting on a baseball mask on this fellow and so now every man wears a baseball mask to prevent having his head broken.

He mentioned the possibility of logs getting jammed and coming over the top and about the kicker kicking them at an angle. We provide both of our men on the carriage with hooks. So if anything is out of line, everything is stopped and one man comes out with the hook and straightens it out.

Another thing, he spoke about shafting drive live rolls. We found that we couldn't use wood very well on our conveyor platforms, so we use channel iron and then have a flat that drops down over it so it is completely enclosed. About five years ago we had one accident where a log hit it and broke the cover, and a fellow got his overalls in there and was chewed up pretty badly.

He mentioned splinters. We must keep after our first aid all the time. The

smallest splinter will sometimes cause the nastiest infections. Last year we had a man piling logs and he had a dermatitis start on his toes and spread all over his body. The commission found that he got it from piling lumber.

I have found most of our accidents in the saw mill are around the yards, either from splinters or sawdust in the eyes and from injuries of that kind.

Two years ago we tried an experiment of doing away with all our docks. The only place we have a dock is where the lumber comes from the sorting shaft. It is piled on cars and then runs down an incline to the ground. It is carted off and taken out through the mills with one horse pulling four to six cars and piled from there by having a platform jack fast to the lumber pile.

MR. MURRAY: Is there any supervisory regulation as to when a belt may be changed and by whom, at what speed it may be operated when this job is done, or whether a shutdown is necessary on a heavy belt of six inches or more?

MR. BARR: I don't know. You get about sixteen different answers from the mill managers as to why a mill accident occurred. They will tell you they have to put this belt on while it is in motion. They couldn't attempt to put the belt on the pulley unless there is some speed to the pulley.

MR. MURRAY: We want to determine whether the safe operating speed is half speed. Is it worth while to shut the mill down to half speed for this particular operation?

CHAIRMAN GOODSPEED: We will go to the next item on the program, "Education of the Woodworking Personnel as a Means of Accident Prevention"; the speaker is Mr. William A. Wilson, Personnel Manager, Frank Graves Sash, Door and Mill Co., Los Angeles.

Education of Personnel as a Means of Accident Prevention

By WILLIAM A. WILSON

Personnel Manager, Frank Graves Sash, Door and Mill Company, Los Angeles

The term education carries with it an atmosphere of the schoolroom and the elementary three R's, but I wish to use it in its broadest sense. Education, as I consider it, is the process of training, guiding, directing and leading—education applied to producing a better product, at a lower cost. When our education has accomplished the ultimate goal of industry, it will have produced a better product at a lower cost, and sold it in a market at a profit; education, in its broadest sense, will almost solve the problem of accident prevention.

Personnel training is a function of the line. Not merely a staff office. Personnel training received its greatest stimulus from the stirring events of the World War. Prior to that time we can hardly recall mention of the term. Following the war, personnel training was one of the many newer features that were absorbed by industry. You remember how many of the military methods were adopted, then modified, and many dropped. Personnel training was one of the innovations that needed considerable clarifying, revamping and reconstructing. I remember one of the incidents of the days which none forget, where a young lad who had, up to the time of his entrance in the army, been accustomed to doing just about as he pleased. In the army he made a fair showing of continuing this type of existence, which lead him, as you realize, into countless difficulties. I spoke to him about his attitude and told him that there was just one other way for him to follow, and that was to do just what he was told to do. In the army, we could do that, but in civilian life, it just doesn't work. Our training must be an acceptable education, if we are going to develop better workmen, who will make a better product at a lower cost, whose standards of work and citizenship have been raised, who have become safety-minded.

Last year, at the National Safety Congress, we listened with dramatic silence to

the reading of the report of the Committee on Resolutions. It enumerated the number of accidental deaths and injuries: 96,000 deaths in the United States during the year covered by the report. Of that number the automobile was charged with 27,000; our homes, another 24,000; our industries also 24,000; and 20,000 deaths occurred in public places. The committee estimated that there had been 10,000,000 non-fatal accidents during that same period, and then the report closed with the resolution, that the keynote for the coming year shall be *education*; that every man, woman and child, every school and organization shall have implanted therein the principles of safety.

Again and again throughout the sessions of that memorable Congress, our leaders advocated education as a means of accident prevention. Dr. C. A. Prosser emphasized that mechanical methods have had the front of the stage for years, but that the day of education is at hand.

H. W. Heinrich, of the Travelers Insurance Company, in his far-flung analysis of the causative elements in accidents, says that only 2 per cent are unavoidable, while 98 per cent are preventable. A study of his chart reveals that education of personnel, from the chief executive down, is necessary as a basis of accident prevention.

President George B. Cortelyou, of the Consolidated Gas Company of New York, recently stated that they had reduced their accident record 51 per cent, by *education*.

A 95 per cent reduction of accidents on the Atlantic Coast Lines was recently reported by Robert Scott, director of safety and insurance. Mr. Scott claimed that their educational program was largely responsible for this remarkable result.

The personnel program of education at the Frigidaire Corporation plants at Dayton, under the leadership of Dr. Harry Myers, is a worthy example of what education means to industry. I will again refer to Dr. Myers' program.

We might go on and on, quoting authorities who are successfully following some program of training or education of their personnel. Such programs require a generous application of horse-sense. By horse-sense, I mean stable-thinking—where you use your sense of perception.

The physical elements, as safety factors, are more easily observed and have therefore been given greater attention. The personal elements are obscure, more difficult to measure and observe, and according to Mr. Heinrich, form the great majority of the causative elements. They should receive a proportional share of our effort in accident prevention.

We are learning that there is a causal relation between accidents on the one hand, and age, experience, health, temperament and general mental traits, on the other. It is not a facetious observation that establishes a relation between indigestion and accidents.

Ignorant workers are accident risks because they frequently do that which produces accidents, or fail to do that which would prevent them. We recently placed a worker at a band rip saw, whom we had every reason to believe was fully acquainted with the rules and mechanical features. He removed the guard and attempted to clean between the cogs of the feed rolls, with his knife, while the machine was running. His index finger was nearly sawed off. He said he did not know of our safety rule; "Never oil or clean machinery while in motion." We now have metal plates attached to each starting apparatus, that carry this message.

As employers, we are inclined to attribute accidents to the carelessness of the worker, but as employees, we are just as strong in our belief that accidents are caused by physical elements in the environment of our work.

The problem is one for employers to solve. The attitude of management is a basic determinant in accident prevention. Our criticism of the workers should be tempered, and as Dr. H. S. Hulbert says, the old formula of two pats on the back to one kick in the pants still holds good.

Besides the usual Workmen's Safety Committee, foremen's training conferences, bulletin boards, inter-department contests, the use of the National Safety Council's posters and *Safe Worker Magazine*, all of which are good safety educational me-

diums; besides these we have adopted the plan of interview with the new employee. This is made with the hope of instilling in his mind, not only the spirit of willing cooperation, but also of the safety program and the company's policy in reference to accidents and production.

The interview idea is largely one which I have gathered from previous safety congresses. And especially from representatives of the General Motors Corporation, to whom I wish to give both acknowledgment and appreciation.

For example, in the use of goggles, I usually produce a few pairs of goggles that tell a story of eyes they have saved. For instance: "This pair of goggles was once worn by our millwright as he was chipping a burr from a casting. The burr struck the wall and returned striking his goggles. Both the millwright and the rest of us believe that he has two eyes instead of one, because of these goggles."

"This pair was worn by our mechanic Bonhill. He was pouring a bearing with babbitt. He thought the casting was dry, but the babbitt exploded and Bonhill thanks these goggles for the fact he has two good eyes." We make our appeal to the new employee, for his sake, not ours. The results are favorable, we have not had a disabled eye since 1924.

I sometimes say to our men, that if a certain amount of intelligence and caution will prevent the occurrence of a certain number of disasters, why should not an increased amount of intelligence and caution prevent the occurrence of more disasters?

We usually agree that negative thoughts bring negative results; that positive thoughts bring positive results; that "as a man thinketh, so is he."

Safety must come from within. "Not from textbooks, libraries or laboratories," says Dr. S. Parkes Cadman. Safety is an attitude of mind, gathered from experience and observation and learning.

There is an ancient Persian Proverb that says,

"He who knows not, and knows not that he knows not, is a fool; shun him.

"He who knows not, and knows that he knows not, is simple; teach him.

"He who knows, and knows not that he knows, is asleep; waken him.

"He who knows, and knows that he knows, is wise: follow him."

After hearing Dr. Harry Myers, at the New York Safety Congress in 1928, and having had the privilege of visiting the Frigidaire plant at Dayton, I returned to our mill, and invited the president of our company to my home for dinner.

For hours I poured out to him, as best I knew, the inspirations I received from the Congress, and at Dayton. As a result, he called a meeting of our department leaders and their assistants; spread before them a sumptuous dinner, and then turned the meeting over to me. At the close of that meeting, there was a unanimous acceptance of a personnel educational program patterned very closely after the plan outlined by Dr. Myers. We adopted, also, those six brief laws of good work; we, too, wanted to do "better work, that we might make a better product, at a lower cost."

We therefore have asked our workers "to be clean and orderly," clean about their person, and orderly about their work. We believe that personality is evidenced in the product one produces. As we are making a "better product at a lower cost," we therefore ask them to be clean and orderly.

The inter-department housekeeping contest that was inspired from this effort, has been a factor that resulted in the lowest accident record thus far, and approximately \$1,000 less fire insurance premiums, per year, from the lowered insurance rate.

We ask that they "follow instructions carefully and continuously," that we may manufacture a better product, at a lower cost.

"Take good care of property and materials." Dr. Myers told me an interesting story in connection with this law of good work. Five young men entered the employment office one morning. The company was not employing anyone that morning, but Dr. Myers said if those boys measured up to his expectations he would find work for them. They were asked where they were from. From Cincinnati. How had they come? By automobile. Where was their machine? About a block away from the

office. So, said the Doctor, "we all moved down the street to the automobile." As he approached the machine he saw that it was one of the late models of the Victory-Six Dodge Bros. sedans. Fairly well covered with dust and mud. But, said the Doctor, "I could forgive the dust and mud providing they had not been on too long." Time was the big factor. But when he opened the front door of that sedan, and saw on the floor, burnt matches, cigaret stubs, dirt and a general mucky appearance, and also a hole, about three inches in diameter, burnt in the new upholstery of the seat, the doctor turned to the boys and said: "I'm sorry, but this just cooks your goose; we only employ those who take good care of property and material. You have shown that you do not."

The day after I told this story to our group, one of those who had heard the story invited me to take a ride in his automobile. He had cleaned it up, inside and out, and proudly asked me if I saw any burnt matches or cigaret stubs in his car. The story had gone home.

Again, we ask them to "work well from whistle to whistle", for we are manufacturing a "better product at a lower cost." If our payroll amounts to but \$10 per minute, and the whole plant loses 10 minutes a day, there are \$100 lost, and for 300 working days, there are \$30,000 added to the cost of the finished product, that must in turn be charged to the buyer, in order to make a profit. So we ask them to work well from whistle to whistle.

Another request that helps to make a better product at a lower cost, is that the men are asked "to work every day or let us know when they cannot be present." It helps maintain the manufacturing order, and saves starting and instructing a new man for that place.

And lastly we ask them "to work well with others", for "we are making a better product at a lower cost."

New employees are selected from the data obtained on their applications and from the facts that are given in the interview. No phrenology or psychology tests are attempted, but the employee is informed that after he has started to work, he is judged upon three characteristics.

First, does he do his work when told once? If so he is dependable.

Second, while doing his work does he see other things to be done? He has initiative.

Third, is he willing to do more than what he is required to do? He has willingness, if he does. Thus on dependability, initiative, and willingness, the employee is judged.

In closing, may I repeat that there are many intangible causative elements as accident factors which we may never be able to determine, but if we can offer to our workers a program that builds character as well as products, we are progressing.

"For the earth bringeth forth fruit of herself; first the blade, then the ear, after that the full corn in the ear."

We are still in the blade. Last year our record was better than the year before, and thus far this year, it is better than for the same period last year. We are progressing.

Accident Experience of Members of the Woodworking and Lumber Manufacturing Section During 1929

By J. B. GRIER
Chairman, Statistics Committee

The members of the Woodworking and Lumber Manufacturing Section have not lagged behind other sections in realizing the value of keeping accident records. They have analyzed them to determine "where, when, why, how and what", for use in the prevention of future cases, and have submitted their experiences for the

mutual benefit of the section members. The interest of members in all sections in comparing accident experience to ascertain where they are weak and where strong, was never greater than during 1929. About 3600 establishments with an exposure of over 5,000,000,000 man-hours reported for 1929 in comparison with only 2550 industrial establishments whose employees worked a total of 4,260,000,000 man-hours in 1928. Our section contributed the accident experience of 222 organizations with an exposure of over 160,000,000 man-hours to this grand total. The 1929 cross section of the accident experience in various branches of our section is the widest we have ever obtained.

Many members have been engaged in accident prevention work for years and have accomplished excellent results. One, operating a saw and planing mill, one of the most hazardous occupations in the industry, reported over 122 lost-time accidents for every million hours worked during 1926, but for 1929, a frequency rate of 43 was reported. This plant also reduced the severity of accidental injuries from over 9 days lost per 1,000 hours worked in 1926 to only about one-half day in 1929. In our logging division, we have a company which has gradually decreased its frequency rate from 75.67 in 1926 to 43.28 in 1929. For the first time in four years this organization was able to go through a year's operations without a fatality or permanent partial disability so that its 1929 severity rate, too, was equally the best it has yet established. When one considers that logging operations rank with under-ground mining hazards, this record is a very good one. A furniture manufacturing plant reported a large increase in its employees during 1929, but though it had several serious accidents, it established a good record under the circumstances. During 1927, this plant had over 20 lost-time accidents per million hours worked but during 1928 and 1929 it reduced its frequency rate to about 5.5.

But improvement in the entire industry is accurately indicated only by the experience of those plants that have reported every year. We have 80 establishments with an exposure of about 64,000,000 man-hours that have reported for each year since 1927. Collectively, these three year identical organizations have reduced the frequency rates 2 per cent each year during the period, but days lost per thousand hours worked have increased about 25 per cent each year. Our decrease in frequency, therefore, was about one-third the reduction of 11 per cent effected by industry as a whole during the same period; and our increase in severity was distinctly higher than that for all industry. What types of accidents are responsible for this sharp increase in severity rates during the last three years? The fatality rate for all sections sharply increased during 1928 in comparison with 1927 but remained constant during 1929. Our fatality rate, on the other hand, has risen markedly for both years. And although our section, as well as other sections, showed a decrease in the frequency of permanent partial disability accidents during 1928, this tendency was sharply reversed during 1929. Thus, the general reduction in the frequency of lost-time accidents has been achieved by eliminating temporary disability cases rather than serious accidents. This increase in severity deserves consideration, therefore, in all sections.

Many reasons have been advanced to account for it. Has industry concentrated on eliminating minor causes of accidents and overlooked some major ones? It has been suggested that the rapid increase in electrical and other types of power-driven equipment has been a factor in the situation. Some safety engineers in plants whose operations have been speeded up to meet increased demand for their products state that careful training and supervision of the new employees is apt to be neglected at such times. It may be, also, that more liberal allowances by state industrial boards has artificially increased severity. Whatever the explanation, it is up to us, individually, to check this situation in our own plants, and if necessary, correct conditions.

Serious accidents are more of a problem with us than in most industries. One

employee out of 1888 was killed or totally disabled in all industry during 1929 while we had one fatality for every 1207 employees. Although fatalities were more numerous among employees of public utilities, construction, quarry and mining sections, permanent partial disability accidents occurred more frequently among our men, except in the case of mining. We had one permanent partial disability accident for every 256 men in comparison to one for every 430 for industry as a whole. We have done much in recent years through guarding, instructions, education, and other well known means to eliminate these accidents, but we still have much to do.

A survey of the various occupations of our section shows that accidents are more numerous and serious in our logging operations. The average frequency rate for this group was 80.06 and the average severity rate was 9.70, in comparison to a frequency of 74.43 and a severity of 9.99 for the mining industry and 26.71 and 6.11 for the quarry industry. Almost half the fatalities reported by members of this section occurred in logging operations, although the experience in this division only covered one-eighth of the total number of employees reported. On the other hand, our furniture manufacturers averaged only 19.96 lost-time accidents per million hours worked, the lowest frequency rate for any division of the section. Sash, doors, blinds, and interior trim mills had an average severity rate of only 1.12; not a fatality was reported by any of the 46 mills in this group. The 1929 frequency rate for our saw mills and planing mills was 46.98 and the severity rate was 3.85; these are slightly higher than the corresponding rates of 42.83 and 3.59 for the entire section. The accident rates for industry as a whole during 1929 were 25.53 for the frequency rate and 2.23 for the severity, which, you observe, are considerably lower than for our section.

A representative group of our members, however, 34 per cent of the 222 reporting for 1929, had frequency rates less than 20.0. These records reflect effective accident prevention work. As I have stated, logging is the most hazardous branch of our section, but we find much individual experience better than the average rates for this group indicate. Most of the logging companies had frequency rates less than 60.0, though the average rate was 80.06, so that the high average rates were largely due to adverse experience by a few companies with rates well over 100.0. No doubt these plants will bring their experience more in line with the rest of the division during 1930. Although the average severity rate for the entire section was 3.59; 75 per cent of all reporting members had rates less than this. In fact, 60 per cent of the records showed severity rates less than 1.0. Among our logging companies, for example, though the average frequency rate was 9.70, almost half of them had severity rates less than 2.0 which is lower than the average for industry as a whole.

The ability of our members to improve their accident experience is demonstrated by firms reporting for both 1928 and 1929. Reductions in the frequency of lost-time accidents were made by 64 establishments against 53 that had higher rates. Similarly, declines in the severity rates were reported by 63 organizations in comparison to 54 with higher rates than in 1928. Is there any reason why we should not continue this steady downward tendency during 1930?

In conclusion, I wish to emphasize the importance of keeping an accurate record of accidents and sending your report to the Council each year. Individually or collectively we can not hope to measure our progress in eliminating accidents without comparative records. The response to requests for reports has always been excellent as shown by the steady growth in reporting members. Your sectional officers appreciate that kind of support. Make it a point, then, to send your 1930 records to the Council in January, next year.

ADJOURNMENT

Thursday Afternoon Session

October 2, 1930

M. C. GOODSPEED, Chairman
General Electric Company, Erie, Pa.

The third session of the Woodworking and Lumber Manufacturing Section convened with Chairman Goodspeed presiding.

CHAIRMAN GOODSPEED: I have a great deal of pleasure in introducing a gentleman who is to talk to us about "Horse Sense." The speaker is Dr. William J. H. Boetcker, Executive Director, National Inside Lyceum Bureau, of Erie, Pa.

Horse Sense

By WILLIAM J. BOETCKER*
Executive Director, National Inside Lyceum Bureau, Erie, Pa.

I thank you for the liberal applause you have given me before I start, because it reminds me of a church. I always take up the collection before the services. I take no chances.

I am delighted to meet so many ladies here today. I am not here for the purpose of making you laugh and forget. I try to make you think and remember.

My peculiar topic is "Horse Sense." I started in schools and have talked to thousands of children. A certain boy was asked in school one day to form a sentence about horse sense. He was a farmer's son. He said: "My Pa left the barn door open and he hasn't seen the horse since."

The horse was gone. They tried to get the horse back. So they found some idiotic kid downtown and went to him and said: "Pete, would you like to make five dollars?" "How?" "If you find that horse I will give you \$5.00." "All right." He went to the barn door, stuck his head in the open door where the horse went out. He had an idea. Away he went, up the hill, over the fence, and came back an hour later with the horse. They said: "How in the world did you find the horse?" "Well, I stood there for a little while and said to myself—where would I go if I were a horse? And then I went down and found the horse." So he had some horse sense.

I have been here for two days. I have attended several meetings and heard some great talks. But they were all along one line. How to do it and when to do it. I would like to tell you why to do it. The psychological professor says we need motivation.

If all the bodies of persons killed last year in accidents were put together in one line it would reach 132 miles. If automobile accidents alone were considered, the dead would be 30 miles long. All the persons injured last year, if they were all put in one line, do you know it would reach 4,261 miles, or from Los Angeles to New York and back to Chicago? Consider all the money that was lost. Change that cash into dollar bills six inches long, then put all that money in one continuous string; it would reach from here to the moon and back to earth. Figure it out!

If you take the best teller of money in the bank, get him to count the money that was lost last year due directly or indirectly to accidents, it would take him a little over 90 years to count that money. Forty dollars for every man, woman and child in America.

Do you know what that would mean if you could have saved it? You could have

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built 900,000 homes at \$5,000 apiece. And 6 per cent of that would mean \$270,000,000, or \$739,000 every day. These are facts.

What can we do to save that money? One thing, let's not have so many committees. We need some committees, but we need individual activity. Let each man in America consider himself a committee of one.

I had 26,000 children promise me if they see a banana peel to pick it up; an orange peel, wood with a nail in it, or carpet tacks, or a piece of glass. I wish I could ask 20,000,000 children in America—to serve that way.

Down in Erie a man came into the hospital with a big hole in his head. They asked him how it happened. He said: "A lady threw a flower at me." "How was that?" "The flower was in a pot." The lady had the flowers on a window sill and out they fell on somebody's head. Thousands of accidents happen every year because careless, thoughtless individuals leave things on window sills.

When I spoke in one school I remember a girl came up to me and cried and said: "Doctor, that happened to my father. He has been blind in one eye ever since because some boy stretched a wire across the walk." In my home, the last one who retires is responsible to see there is nothing around on the floor. In an emergency there is nothing over which to stumble. Let's use horse sense. Let's look ahead and prevent. Don't wait until something happens.

I have seen your exposition. I am amazed at this tremendous effort. But again I say, we hear what to do and how to do it. Let's seek a motive. I often hear poor excuses that get on my nerves. "I don't know." "I forgot." "I didn't think." Those three excuses are inexcusable excuses.

You will forgive me if I confess that I am a minister and I believe I am my brother's keeper. You remember the Titanic disaster with over one thousand passengers lost. I remember the description. I can visualize a ship going down and when the captain realized his ship was doomed, he took care of the passengers first. I almost see how it goes on. Women and children first, and after all women and children are taken care of, then every man for himself. I believe we have had too much of this every man for himself and the Devil take the hindmost in the past. But we need and we can carry on a great safety work if we revive that part of the code of the sea—women and children first.

Some employers naturally will ask: "Well, does it pay?" It does pay! Not only in dollars and cents, it also pays in added loyalty. And another thing the manufacturers of America see more and more—every time somebody makes a dollar by doing wrong, somebody must pay ten dollars to right that wrong. Whenever any employer tries to save a dollar by not doing what is right, it will cost him one thousand dollars to make wrong right.

It is an inspiration to me, friends, to see this convention which contradicts the claim of the radical element who claim the employer has no heart and soul for his employees. This very demonstration belies such a statement, because this demonstrates that the employers are trying to prevent accidents. Never mind the money. Human life is more valuable, but they must have the co-operation of the employees.

Horse sense. Let's look ahead, see straight! I am my brother's keeper. If we could only make the men in the shop look ahead. I remember when I was here during the wartime in a certain factory something happened. It was a crowded condition. There was a 20-foot flywheel and somebody was walking nearby. And one day something rattled; the whole building shook, and all the workmen dropped their tools except the man near the wheel. As quick as a flash he climbed a pole and did something and the machine stopped and all was safe. The manager, the president, foremen, ran out and asked the man at the flywheel: "What's wrong?" "All right, boss." "What was it?" So he confessed: "You know, gentlemen, when I got this job at this wheel I looked around and found one dangerous place. Should it ever happen that the washer should break, that will work loose and tear the whole building

to pieces. If it happens I need a monkey wrench to tie it down." And he went to Kresge's on Fifth Avenue and bought for 15 cents a little square monkey wrench and had two nails to hang it on, until something happened. He saved the whole situation. The president and manager looked at each other, said to him: "Come up to the office. A man like you who will look two years ahead, who becomes prepared, who doesn't wait, who spends 15 cents out of his own pocket to buy a monkey wrench, should be promoted." That man left the office as assistant superintendent. His salary was raised several thousand dollars.

Friends, most accidents that happen today could have been prevented if somebody had used horse sense and not waited until it was too late.

You will not count it against me if I confess that I am a lawyer. In law if any man sees a crime and if he can do something to prevent it but does nothing, we hold that man partly guilty of that crime. And I believe every man who sees an injustice done and will not go to the limit to prevent it is partly guilty. And any man who sees a possibility of an accident and does not go to the very limit to prevent it, I believe he is guilty of that accident. Because we should not only look out for ourselves, but for others as well.

I do not like this eternal, "I didn't know," "I didn't think" and "I forgot." You may have seen the Indemnity Insurance Company verse:

"Don't kid yourself into believing that you know how to handle your car, that nothing can happen to you. You have driven her ever so far. It's not what you do to others, it's what others might do to you should you happen to meet with a fool."

There are a great many fools around this country. And we must always consider what might happen if we meet with a fool.

Among workmen the great question is more wages. I suggest there are only three ways in which we can bring about higher wages. Either by doing more work or better work, or finding improved ways of doing it or by eliminating waste accident. Eliminate that tremendous waste of accidents, because after all, it is a part of the price of production. Every man, woman and child must pay 40 dollars a year directly or indirectly on account of accidents.

I suggest also, use horse sense and take no chances. You may have heard the story of a certain Mississippi boat captain who ran aground and a man came from a little boat and said: "Captain, will you leave this ship to me? I'll bring it down to the harbor?" The captain said: "Do you know all the dangerous places?" "No, sir." "How do you expect me to leave the ship to you if you admit you don't know all the dangerous places?" "Well, I know all the safe places, sir." He got it all right.

A man in the Bavarian Alps, a count, had a castle and one day he needed a new driver. His old driver did something which a great many honest men do—he got married. A man who is single is either a poor salesman or cheats a woman out of a man, which isn't fair. This man needed a new driver and he asked each man who applied: "Look here, young man, I may hire you, but I want to know how near can you drive to the edge of the mountain road with safety?" One said, "I can handle a double team within six inches." Another said twelve inches; a third, eighteen inches. One man said: "I don't know. I never tried. I always stay away from the edges as far as possible." That is the man who got the job.

A man came from the southeastern part of Germany where I was born; I paid sixty-five dollars to get here and you who were born here didn't pay a cent. You searched in when nobody was looking. A man came from Germany and he had to use a trolley car down in Jersey City on Pavonia Avenue. When the conductor said: "Look out," the man bumped his head against a wall and was taken to the hospital unconscious. Two days later the conductor called on him and said: "Why didn't you look out?" "That's what I did. You should have told me to look in!" In that case look out must look in.

That leads me to one question. If you want to know why we have so many accidents, it is because people not only don't look out, they forget to look in. Whenever a man has an accident in Erie, they say: "Where have you been last night?" Knowledge alone won't keep people straight and safe. If information about immorality and sex would save a girl and a man, then every prostitute should be an angel and every libertine should be the acme of virtue. Knowledge alone will not do.

I would like to ask every one of you: "Are you doing the right thing outside of working hours to make yourself a safe worker during working hours?" You can never do your best, you can never make the most of yourself during the day if you do your worst, if you make the least of yourself at night."

Friends, economically I suggest to men—don't spend all your money. Save some money for a rainy day, a little ready cash may mean your only salvation. I wish, men and women, you could help me to drive that home into the mind of every man in America, and we can reduce accidents 50 per cent.

Don't waste when you are outside of working hours all your vitality with riotous living and continuous thrill. Save some of your brains for the day when you need the brains. And keep some brains and vitality for a dangerous moment when you need every bit.

There was an accident in Erie not long ago when a man was killed in erecting the Boston Building, and it was admitted, if that man's brain had worked a little quicker, he would have been saved. You can never be a safe worker, during working hours unless you do the right thing outside of working hours.

Money which is lost can be replaced. Almost anything can be replaced, but not human life, nor heartaches.

Therefore, I again suggest the code of the sea—women and children first. And when I think of all the accidents that happened last year alone, one continuous string from Los Angeles to New York and back to Chicago of injured, I wonder how many thousands of children run around today neglected, forgotten, because the father is gone due to some accident. How many women today are hopeless, helpless, without the love and protection of a husband because the husband and father are gone due to an accident.

I promise that you will never fall or stumble over a banana peel if I see it first. Will you do for me what I promise to do for you? I assure you that not a single woman will ever lose a husband or protector by an accident if I can prevent it. Will you do it for me? There shall be no child ever go halfhearted through life because of the loss of a loving father and playmate, for which there is no substitute; that no child shall ever lose a father by accident if I can prevent it. Will you do for me what I promise to do for you?

What is it after all we are living and fighting for? I have an exceptionally happy face. I am in love with my wife today if for no other reason because I admire her for picking out such a nice husband. And the greatest reward in my life is what? It is not the money I make. The highest reward is when you come home and there find a wife waiting for you—not with an open hand here and a rolling pin here.

I wish that every married woman present would agree to do two things, and we can reduce accidents that way. Will you try to do it? Will you try and kiss your husband every morning before he goes to work; and send him away with a smile, a word of encouragement? Close your eyes if necessary. But do it! Do you realize that we husbands marry a woman to fight for? I am not going to fight with her. Two people cannot fight if one doesn't want to. We never fight in the presence of our children anyway. We always send our children outside and that is why my children look so healthy from outdoor living.

I have seen men in the factories downhearted, heartbroken, licked, and beaten before they start. If I have a wife who sends me away in the morning with a discouraging remark, I am licked before I start. Some men don't care. They have not found the

woman to fight for. The greatest reward a man is willing to fight for is when he comes home and has a wife who says: "I am proud of you, I love you; you're a good man." That implies everything. And if you come home and find children waiting for you who love you and welcome you—"Daddy, you're the best daddy in the world". Give the men that incentive, a happy home. He will be twice as careful. We are willing to fight twelve hours a day for our family, but we cannot fight for them in the daytime if we have to fight with them at night.

I had the peculiar experience not long ago in Erie when a machinist came up to me and said: "Doctor, last winter you had my whole family crying." He reminded me of a speech I made over the radio. I had been telling why a certain woman never would get to heaven. She couldn't get there. Why? She killed her husband. Her husband could have lived ten years longer but he died heartbroken. She nagged him, found fault, eternal nagging. Whatever he did was wrong. And as far as money was concerned, the idea that a man can earn so much and no more never entered her mind. She kept on spending and spending. And I dare say, she brought him to his grave ten years too soon.

That is what is back of many accidents. Men are worn out, heartbroken. The only thing they were dreaming of, a happy home, is gone. What's the use fighting?

I am through. May I suggest, find out what to do and how to do it and then put the proper family encouragement of the home in back of the men, and they have a reason why they shall do it. Let's use horse sense.

CHAIRMAN GOOSPEED: The next speaker is Major H. Steere-Clark, safety director, British Columbia Loggers Association, Vancouver, B. C., Canada.

The Lumber-Jack—Hazards and Safety Methods of His Job

By MAJOR H. STEERE-CLARK

Safety Director, British Columbia Loggers Association, Vancouver,
B. C., Canada

The subject upon which I have been requested to address you is an extremely wide one and in this highly mechanized age the work of the modern lumberjack embodies many jobs requiring skill, distinctly apart from what the old time red shirted lumberjack ever dreamed of.

The technical nature of modern logging, with its speed of production, is gradually spreading to different parts of the world, even to the Orient and as time goes on the lumberjack we once knew is gradually being replaced by men reared "in a machine age." I doubt very much whether any logging company of today can boast of employing more than a few of the old time typical lumberjacks whose skill with an axe was universally recognized.

I understand that in this Woodworking Section are many men who use the raw product of the forest in one way or another but have not come into actual contact with a modern logging operation as carried out in the large timber of the northwestern Pacific coast. Therefore, I propose to show you some pictures taken at random in various logging operations of British Columbia which may prove of some interest and by the means of formulating safety ideas in your minds that may be beneficial to this section.

It is readily understood that anyone who sets foot in a forest, where the timber is of great size and density, ranging as much as 350,000 to 500,000 board feet per acre, is at once surrounded by potential hazards until clear of the timber. These hazards (one may term them natural hazards) are ever present and are the result, principally, of natural decay. A tree may fall or limb may drop without the slightest warning being given, resulting in severe physical injuries or death, should a person be struck. This natural hazard is increased manifold when wind, ice, snow, frost and other natural causes accelerate the movement.

Mother nature has endowed us with wonderful mountains upon the slopes of which every person must use a sense of caution for rolling logs, falling rocks, even land and snow slides are not uncommon.

It will therefore be seen at the very outset, that men who are employed continuously amidst nature's varying moods, have their being with hazards inherent with the logging industry, which hazards cannot be controlled.

Many men who have been in the forest for a lengthy time, acquire an intuition in anticipating any of the foregoing hazards and seem to act accordingly, and again they may hear the faint cracking of a limb indicating a probable fall whereas an unaccustomed man would be completely ignorant of what was taking place.

I could talk at great length on the many types of accidents met with in the logging industry but for the present will confine myself to those hazards that are responsible for the greater number of preventable injuries.

Logging operations, by their very nature, are but temporary. When the timber limit in which the present operations may be carried on is cut over, operations cease and the machinery and camp (so far as is deemed serviceable) are moved to another timber limit which may be many miles from the old operation. The new limit may be very different topographically from the previous one and require special additional equipment to efficiently log off the area. The actual hauling of logs from the stump to the railroad or water, may be entirely different from that formerly employed, in fact the conditions of logging are constantly changing. Logs must be secured no matter where they grow, be it on the level ground, swamp, canyon or mountain side.

The logging engineers and surveyors are the first to enter the virgin timber, to map and lay out the proposed method of logging off the area in the most efficient way, which may entail the use of several methods of transporting logs, such as railroads, skid roads, log chutes, inclines, flumes or tractors, all of which have certain specific hazards.

Hazards in connection with Pacific coast logging are more or less the outcome of handling heavy masses and their transportation at high rates of speed. Many individual logs weigh twenty tons or more, therefore, it can be readily understood why modern logging equipment needs to be extremely powerful and have a large margin of safety to take care of sudden stresses.

Logging operations have changed extensively during the last thirty years chiefly owing to the introduction of machinery. Powerful and speedy machines have taken the place of the old slow oxen and horse teams with a consequent increase in speed and hazards.

The only phase of logging that has not been affected by any radical change in method is the work of the fallers and buckers. From time immemorial trees have been felled by the use of the axe, be it stone, bronze, iron or steel, and trees were felled generally in the inclination of their lean from vertical. It is within the memory of men when the saw was generally introduced as an aid in felling, and during recent years experiments have been carried out with power driven saws with varying success in certain kinds of timber. As yet no efficient power-driven saw has been found to meet all conditions and sizes of trees and man-handled saws are still the order of the day.

Falling and bucking crews are exposed to more inherent hazards than any other men employed. This accounts for the large number of fatal and serious accidents they sustain. They work in gangs of three or four, two men falling and one or two bucking the felled tree into commercial lengths.

The felling of a tree is the work of a skilled man. The reason is obvious. It is only for a short period of felling that a tree weighing many tons is controlled. Directly the cutting has proceeded to a certain point, this heavy mass is beyond human control. Therefore, foresight and sound judgment must be exercised to anticipate what may happen when the tree is on its downward flight.

In certain sections of mixed forest, where small cedar trees are to be found, it is customary to cut and haul out these poles, used for telegraph and electric power lines, before larger timber is put down. The large timber is then felled and the smaller (other than poles) that are of commercial value, are cut down last.

The procedure is necessary so as to avoid crushing the smaller timber. The safety precautions that have to be taken are many, and a description of the usual method adopted is worthy of repetition, previous addresses in this section having dealt with the subject.

Having selected the tree to be felled, the clearing of small brush in its vicinity is important, to enable proper clearance to be obtained for the swinging of an axe and the movement of the saw, also to insure a quick safe get-away when the tree is about to fall; a procedure that is often neglected with disastrous results.

Many trees are swell butted and cannot be efficiently cut unless spring boards are used.

These are stuck into the tree in a cut notch at a suitable point and form a platform for a man to stand upon and so get close to the trunk of the tree. These boards are made of selected timber about 5 to 6 feet long, 10 inches wide and from 1 to 3 inches thick. A circular steel shoe is fitted to one end which fits into the notch referred to and permits the board to move in an arc (horizontal) of ninety degrees or more, depending upon the shape of the stump.

On many occasions the entire chopping, sawing and wedging is done from these boards, falls from which are responsible for severe injuries, the height of a fall being considerably increased where the cutting is done on steep hillsides and broken ground.

The direction and ground on which trees fall are carefully chosen to avoid hitting other trees, stumps, large rocks, uneven ground or other object which may create the hazard of side-winders, thrown limbs and timber breakage.

Having decided the direction of fall, an undercut is chopped with the opening toward the direction of fall, which varies in size and depth according to the growth and size of the tree and its probable lean from the vertical.

The base of this undercut has to be perfectly straight and face at true right angles to the direction of fall. This base forms a fulcrum upon which the tree has its downward flight. Any fallers who disregard this true angle take the risk of the tree not falling in the required direction; the result may be kick-backs, which often prove fatal to anyone near the falling tree. On account of the enormous weight of the timber and the inclination of trees growing out of the perpendicular it is necessary to insert steel wedges to obtain the necessary leverage to force the tree over into the direction of the undercut. The fallers then use the falling saw which is sometimes 10 feet in length and very flexible, and commence cutting the tree from the opposite side of the undercut.

Several hazards are met with in sawing, particularly when two men, for a great part of the time, do not see each other, being on the opposite sides of the tree. Should the saw enter a pitch pocket or a hollow spot or perhaps some dry rot, a sudden checking of the saw movement takes place, and the synchronized action of the men's bodies being upset for a moment, the men lose their balance and so release their hand-hold on the saw and either fall or receive cuts on the hand or arm.

Often the saw becomes difficult in movement on account of timber-bird or the tree sitting back on the saw. This is overcome by the introduction of steel wedges following the saw cut, so easing the weight from the saw and at the same time forcing the tree toward the desired direction of fall.

This sawing is continued until the cut has reached within a few inches of the undercut (never entirely through). It is at this point when the continued wedging forces the tree from the perpendicular that it becomes uncontrolled.

It will be readily understood that when trees of such size as described fall toward the ground they come into contact with trees standing nearby or at least the limbs

of other trees which are broken off and constitute a serious hazard. In many cases these branches fall on other branches and remain there until a breath of wind or the vibration set up by a hammer or saw causes them to fall at an unexpected moment.

Many of the smaller supple trees are sometimes pushed out of the vertical by the falling tree, having received but a glancing blow, and will swing back like a steel spring and throw branches in every direction, some two hundred feet or more; and this again demonstrates that to avoid being hit by flying objects of this kind, it is necessary for the men to make immediately for prearranged cover, hence the clear getaway.

It is neglect of this precautionary measure that has caused the death of many skilled workers who took an unnecessary chance. Another danger that must be taken into consideration is the fact that many of our trees, although of such size, are not firmly rooted in the ground; therefore it will be seen that in thickly wooded timber, a falling tree may strike another a hard glancing blow and cause that tree to fall in any direction. Cases are on record where trees of this kind, known as side-winders, have even fallen in the direction of the falling crew themselves. Another hazard is the ever present one of dead trees, known as snags. When one of these is struck it may only receive a jar, yet in many cases this jar is sufficient to snap off a part of the top, depending in a great measure upon which part of the tree the decay is most severe; it may fall in any direction and in its turn may break off scores of limbs in its downward flight. In making the saw cut, care has to be exercised to insure that this cut will terminate above the undercut. This precaution is necessary, so that when the tree falls it has a projection which prevents the tree from kicking back over the stump.

Should a tree be inclined, partly by its shape and partly by the number of branches growing from it, to show a tendency not to fall in the direction desired, the saw cut is so arranged that more uncut wood fibre is left on one side so as to give it greater strength in holding the tree when falling.

From the foregoing it will be seen that the hazards of the falling crew are numerous and demand skillful, mentally alert men to carry on the work without sustaining severe and oft times fatal injuries.

Now a word about the buckers. Of course they are similarly exposed to the hazards of falling limbs to what the fallers are. It is their job to cut the tree the suitable lengths, the average being forty feet. The necessity of obtaining sufficient clearance for the use of saw and axe is apparent. Men neglecting this procedure often sustain severe cuts as already outlined. The tree has to be bucked just where it falls, be it in swampy ground, on a hill side, or on the level. On the Northwest Pacific coast the bucker works by himself, one man to a saw. The bucking saws average seven feet in length and weigh approximately fifteen pounds. It will seem that men of this type have to be of good physique and skilled in using a tool of this kind. Hand guards are furnished with these saws and are the means of stopping many injuries when the hand slips from the handle owing to some sudden obstruction impeding the swing of the saw.

Bucking on a hillside is another hazard that is often responsible for serious injuries. These are distinctly preventable. The careful bucker will invariably chop and cross-wedge his tree in such a way that when the cut is nearly completed one log will not roll away from the other and so prevent the slabbing of timber considerably depreciating its value. Severe injuries and fatalities are the outcome when men have used the saw from the downhill side. We discourage this practice wherever it is noted.

The wedge hazard is gradually being overcome by educating the men to acquire the habit of having them properly dressed or replaced when they become dangerous to use. Many men during my experience have received serious injuries and the destruction of eyes by neglecting this precaution.

Falling and bucking crews work together as a gang and arrange their work in such a way that the buckers are not in immediate danger from the falling crews. Yet we have on record buckers who have been caught by the tree that was being felled or by side-winders through failure to heed the warning made by fallers. This word of warning—"timber"—should invariably be given followed by the direction of the fall, such as "Timber towards the spar tree", and so on.

The buckers too have to exercise extreme care when cutting heavy timbers lying on uneven ground by making a cut from underneath, known as undercutting, when the teeth of the saw are turned upward. In this process the back of the saw is supported, as a rule, by the handle of an axe, which has been driven into the log in a horizontal position. Under-cutting is necessary when the ends of the log or tree are supported on uneven ground, the center bridging a depression. Should a bucker make a normal cut from the upper side of the log, in this case it may not be possible for him to use a saw after cutting part of the way through the log, the weight of the log having a tendency to pinch his saw. A partial remedy is sometimes effected by following the saw with steel wedges and to a certain extent preventing the cut from closing.

Chances of slipping, tripping and falling when going through dense timber, brush and wind-falls is realized by anyone, but when men have to carry sharp edge tools from place to place, their hazards are increased. Although care is exercised by the average man when carrying tools, and although his boots may be properly spiked with calks, there is no foreseeing when, walking upon logs, the dislodging of a piece of loose bark may cause a serious fall.

I have dealt at some length with the foregoing fallers and buckers for they constitute the source from which many of our non-preventable as well as preventable types of accidents emanate. We will now pass on to the rigging crew.

In the old days the hauling of logs from the woods to water or to the point of loading was a somewhat slow process, oxen and horses being used for this purpose. This method was efficient enough forty years ago, but today has been superseded by high powered machines operated by steam, internal combustion engines or electric energy. Naturally the amount of logs hauled today is out of all proportion to what was formerly the case and with this increase of speed has come an increasing number of accidental injuries.

Nearly all modern logging operations are using one of several methods of hauling logs, depending a good deal upon the topographical situation of the country.

In the Pacific Northwest the predominating method of hauling is by use of a high-lead system, the skidder and tight and slack sky line systems. These systems require the rigging up of spar trees, toward which all logs are hauled. Without going into the merits of one system over the other it is safe to say that steel cables and blocks of various dimensions are invariably used.

The work of the high rigger now commences in rigging the spar tree at a suitable point which has been very carefully selected beforehand. Spar trees are selected for their height and strength and soundness, and should there be no tree suitable for this purpose at the point required, one has to be felled where found and raised at the point desired. In rigging the spar tree the first thing that has to be carried out is to free the tree from limbs and cut off the top. This requires highly skilled men. The rigger climbs the tree by means of spurs, belt and rope, the latter having a wire core as an extra precaution against having the ropes severed when using his axe. These belt ropes may be forty to fifty feet long and take a good deal of manipulating when used in climbing a big tree. A precaution the riggers are apt to neglect is to see that both ends of this rope are firmly secured to the belt when climbing or descending.

It is obvious that when commencing to climb the tree where the diameter is much greater than at the top the rope is used its approximate full length, but as the rigger makes his way upward this rope has to be shortened owing to the diameter of the

tree decreasing, and he takes the precaution to secure his rope properly to his belt on each occasion.

When a point has been reached where it has been decided to take off the top, he then makes a notch in the tree which has to be very carefully sized up and is generally made on the side toward which the top may be leaning. It is then side-notched to prevent the tree from splitting, then another notch is made at the opposite side of the main notch, until the top has been practically cut through.

At the first sign of this top falling the rigger has to move around quickly to the opposite side to which the top is falling and so avoid being struck by this top or any of the limbs.

Many of these tops are fifty to one hundred feet long, therefore it can be realized how skillful a man must be, and the caution necessary to do his job safely.

A small steel cable strap is placed close to the top of this spar tree to which a block, known as the pass block, is secured. A steel cable, known as the pass line, is passed through the block and is used to assist in rigging the tree. It is desirable to rig a tree as high as possible to secure clearance of lines, and this makes it easier to haul logs for greater distances by having the front end of the log to be hauled obtain a certain amount of lift.

The rigging consists briefly of the following: the upper guys, consisting of cables approximately an inch and a quarter in diameter and six to eight in number. These are secured to suitable stumps.

Another set of guys is put below these, known as buckle guys. These serve a two-fold purpose from a safety standpoint alone. They prevent the tree from buckling when a heavy strain is made upon it, and should the top of the tree break owing to unforeseen circumstances, these guys have a tendency to sheer off the falling top and upper guys.

Many blocks are hung on the spar tree, depending upon the system employed, but they all exert a strain on this tree at some time or other. The main haulage block often carrying a shieve 36 inches in diameter, or more, and weighing upward of one ton, is secured in place below the upper guys. This block has a safety strap or wire rope secured to itself and is connected up loosely with one of the upper guys; its purpose being that should the strap holding the block break, it will cause it to slide down the guy line and prevent it from falling on the crew or machine immediately below the spar tree.

A glance at any illustration or actual spar tree will convince anyone of the extreme importance of the safety factor in this work; and in spite of all precautions a tree now and again will be broken or pulled over, either through some hidden defect in the spar or guy lines or the pulling up of stumps to which the guy lines have been secured.

Yarding machines of various types are placed near the spar and many cable thread through the block and extend into the woods over the various logs to be hauled.

They pass through blocks that have been secured to spar trees at the far end of a setting or threaded through blocks that may be secured to stumps near the ground. These back spars are necessary so that the main cables can be pulled out over the logs by means of a haul back line secured to them.

The yarding now commences by securing heavy wire chokers around a log or logs. These chokers are in turn secured to the main cable and, upon the proper signal being given by means of a steam whistle situated on the yarding machine and operated by a wire from the woods near where the yarding takes place, are hauled toward the main spar tree. An alternate method of signaling is the use of a steam whistle operated electrically through a wire stretched through the woods; the terminal being in the vicinity of the men employed in hooking on the logs. The greatest care must be exercised in transmitting signals correctly so that the correct movement may be made by the engineer operating the machine. A mistaken signal has meant the death of more than one man.

The hazards of yarding are many and require constant alertness on the part of the hooktender and his crew, also the engineer; the latter, more often than not, does not see the men in the woods, and has to rely entirely upon the correct signal being given as to what is required of him.

The modern logging machine can exert such power in hauling that it may break the main steel cable with a breaking strain of 140 tons.

It is no easy task for men to move around with heavy chokers among the debris caused by brush and fallen timber, and it is here where many injuries are sustained through slipping and falling and failing to keep in the clear when logs and cables are moving. The only safeguard that can be utilized is constant alertness and watching one's step.

The speed with which logs are hauled over rough ground ranging as high as 2,000 feet per minute creates further hazards when coming into contact with stumps and other articles, the latter in many cases being flung to considerable distances. Men sometimes forget that cables, by being under various sudden strains and spread over considerable distance, have large lateral movement and receive many injuries by being too close to them. This is best demonstrated by imagining for a moment that a log has hung up owing to some obstruction. The line tightens on account of the heavy strain and will either pull the log through or over the obstruction or break the cable. Given sound equipment (which is customary) a line is rarely broken, for an engineer who knows his job feels what strain he is putting upon it, or the watchful eyes of the hooking crew have foreseen the obstruction and signaled the engineer to stop.

We will now pass to the loading crew. When logs are dropped near the spar tree, the loading crew loads them onto railroad cars or any other vehicle used in transporting logs. The railroad cars are especially constructed for logging purposes and consist of two sets of trucks of standard pattern with strong reinforced timbers connecting them. They are standard equipment in every way and fitted with air brakes as well as hand brakes.

Upon the skill of the head loader depends in a large degree the safe transportation of logs to the point where they are to be dumped. By means of tongs and a loading engine the logs are picked up and swung over the car on which they are placed. There are several systems of loading, such as boom loading and duplex loading. Taking into consideration that many logs weigh from ten to fifteen tons, the hazards of loading become apparent; here is another case of heavy weights being suspended from cables. Loaders sometimes forget for the moment that logs occasionally fall from tongs, resulting in the death of a man should he be beneath this suspended weight.

Every precaution is taken to insure that the loading tongs are properly imbedded in the log, yet they will now and again release a log partly on account of the log being too big for the tongs or the tongs being imbedded in a rotten portion of the log, and thus not getting hold of solid wood.

Owing to the various shapes and sizes of logs, great care has to be exercised in building up the load, so as to prevent them from rolling off in transit. They are held in place on the steel bunk partly by their weight and partly by the cheese blocks which can be adjusted at the end of the bunk upon which the logs rest but are rarely more than eight or ten inches in height.

The transportation of logs on a railroad car has all the hazards of any railroad operation, but is somewhat increased on the temporary railroad track used in the various parts of a logging operation.

Owing to the various shapes and sizes of logs it is readily understood that all logs cannot be loaded alike, therefore it is a common sight to see many logs lying beside the railroad track that have fallen from loads in transit.

The main railroad track of a logging operation, which as a rule is planned out to cover the entire area to be logged, is very well constructed; many such tracks are on

a par with the finest railroads. The temporary spurs emanating from this line cannot possibly be in quite such good shape, so greater care has to be exercised in moving over them.

When the logs have been taken to the dumping grounds they are dumped into the water, sorted and built into booms or rafts. The hazards here are not very numerous, excepting that of an occasional man falling from logs into the water who may be drowned.

In conclusion I would like to point out that accidents occurring in the industry are very rarely traced to defective equipment. It is bad economy to have the whole of a logging crew waiting while some defective line or other piece of equipment is being repaired.

I know of no industry in which men are exposed to more inherent hazards than that of the logging industry, particularly where engaged in big timber. This is borne out by the high rates of assessment levied by insurance companies, the Workmen's Compensation Board, or Industrial State Insurance upon the industry.

Since the inception of organized safety in British Columbia Loggers Association camps a noted improvement has been seen in the reduction of preventable types of industries. Our safety department has recently issued our half-annual statement ending June, 1930, and comparing it with the same period for 1929, we find the following gratifying results:

Frequency of accidents	21% Reduction
Fatal injuries	33% Reduction
Time Loss Injuries	22% Reduction
Minor Injuries	16% Reduction

It may be pointed out that the production of logs for both periods was about the same.

The contributory factors in effecting this improvement may be summarized as follows:

1. An increasing interest shown by all toward accident prevention generally.
2. The increasing importance given to the deliberations of safety committees in camps.
3. The realization that modern accident prevention is a large business problem, treated as such and placed on a par with any part of an operation demanding supervision.

The increasing importance of inviting men to make a sincere effort and actively participate in safety deliberations, chiefly conducted through safety committees, seems to be the only effectual way of overcoming a great proportion of preventable injuries, which certainly cannot be overcome by any mechanical device whatsoever.

I have noted the importance given to various phases of accident prevention work in the sessions I have attended at the National Safety Congress on several occasions, and the supreme importance given to Safety Committee work seems to be universally accepted.

Bulletins, warnings, and safety slogans, when properly displayed, certainly play their part, but it is the active interest behind them that is the real factor in accomplishing anything.

I appreciate the many helpful hints that I have received and which we have put into practice at the various deliberations and Round Table talks at the Safety Congress and if this address has in any way helped other members I feel that my presence here has been well worth while.

(Major H. Steere-Clark's address was accompanied by lantern slides.)

J. J. POSSITT: You mentioned that you trained your men by talks on first aid. Do you find most of them able to understand English?

MAJOR STEERE-CLARK: Someone suggested we should print our publications in five or six languages. But if you make each one sufficiently interesting, the men will work it out among themselves. If you put up a notice in your camp that there will

be an increase or reduction in salary from that day on, I guarantee within ten minutes if you ask the most illiterate man in the camps he will tell you what is on there. So if you can make this safety work interesting enough, the men will ravel these problems out themselves.

MR. POLLACK: Have you ever passed a year without a fatality?

MAJOR STEERE-CLARK: We have never passed a month, much less a year, without injury.

MEMBER: The Major spoke of a twig remaining on top of a tree. No doubt you have had experience with icicles. We had a serious accident of an icicle falling from a tree and blinding a man in one eye.

ADJOURNMENT

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