TRANSACTIONS

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NATIONAL SAFETY COUNCIL, INC.

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Foreword

THE Transactions of the Twenty-fifth National Safety Congress, 1936, are published by the National Safety Council in two volumes. This, the first, contains the general, the special subject, and the Industrial Section sessions. The second volume contains the sessions of the Child Education, Home Safety, Street and Highway Traffic and Vehicle Fleet Sections.

All industrial members of the Council automatically receive Volume I. Volume II is sent to members believed to be interested chiefly in the sessions it covers. Other Council members, however, may obtain it upon request.

Many members have found it worth while to distribute copies of the Transactions to supervisors, foremen, and others in an administrative or supervisory position who may make practical use of them for reference purposes. The following quantity prices are quoted on extra copies: 1 to 10 copies of the large volume, $1.50 each; 11 copies or more, $1.25 each; copies of the smaller volume, 50 cents each.

THE Transactions are published as a condensed record of the proceedings at the National Congress. The papers of each session or division of the Congress have been edited carefully to eliminate extraneous matter and to abbreviate the less essential portions because of space limitations. Thus the material herein presented is not a verbatim report of all the speeches presented at the Congress, but rather an abridged version made as compact as possible, yet without injury to the technical aspects of any address. The original manuscripts are on file in the Council's Bureau of Information, where they are available for additional reference. Where illustrations were sent by the speakers to the Council, these also are on file.

The National Safety Council at its Congresses seeks to eliminate from discussion matters which are not pertinent to the aim of the Congress or which are contrary to Council policies. It cannot accept responsibility for the views expressed either in the papers presented or in the discussions based upon the papers.

NATIONAL SAFETY COUNCIL, INC.
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Council Purposes and Policies

The fundamental purpose of the National Safety Council is to conserve human life. It seeks this goal through a continuous campaign of accident prevention that is nationwide in scope, applies to all types of hazardous activity, and directly or indirectly reaches the entire citizenry. It is a non-profit organization, non-sectarian, and free from political affiliations. Since its organization in 1913, it has won respect as an essential national institution.

Inseparable from accident prevention is the Council's work in improving health conditions and preventing vocational diseases in American industry.

Today there are 4,000 members, representing every state in the Union and many of the Canadian provinces. There are 400 foreign members. The membership includes industrial corporations, firms, individuals, public officials, schools, chambers of commerce, clubs and civic organizations. About 70 per cent are industrial concerns, including the large steel companies, the oil companies, most of the railroads in the United States, the automotive industry, and others of outstanding importance in our national industrial field.

Origin and Growth

The history of the Council, an absorbing story, is too long to be detailed here. In brief, the First Co-Operative Safety Congress was held under auspices of the Association of Iron and Steel Electrical Engineers in Milwaukee, in 1912, and, as a result, the National Safety Council was organized in New York the following year with fourteen members. During the first year the membership increased to 971.

The pioneers of American safety worked on the sound premise that accidents were unnecessary and that through application of proper remedial measures they could be avoided. They set about to nationalize this theory, and to develop the detailed methods and materials through which accidents could be prevented. The members of the organization now are more than ever convinced that accidents are unnecessary and that they can be and are being prevented. Striking examples of accident reduction in many fields prove this contention.

Results of Organized Safety

Since the National Safety Council was organized in 1913, the national accident death rate in all fields excepting motor vehicle has been reduced 39 per cent. The motor vehicle accident problem continues to be a serious one. While there was a slight decline in fatalities in 1932—the first drop that ever occurred—increases have occurred in succeeding years, with an all-time high in 1935. Better-than-average results in motor vehicle safety have been achieved among school children, in commercial vehicle fleets, in states with properly administered drivers license laws and in cities with an effective community safety organization. These bright spots indicate that the national problem can be solved by a careful study and application of the methods which have already produced results.

The National Safety Council was started as an industrial safety organization and the best results are to be expected in this field. Here spectacular achievements have been made. The steam railroads, for instance, have reduced the accident rate among employees 78 per cent since 1923. A group of our

effort on the individual in the interests of safety by supervision, medical and safety departments, should be the modern keynote to the movement; it offers the field of maximum opportunity and return to the worker in safety.

ADJOURNMENT

Maintaining Interest in Safety

WEDNESDAY AFTERNOON SESSION

October 7, 1936

The causes of lagging interest in a safety program and the means of reviving this interest were discussed in the session on Maintaining Interest in Safety, which was held Wednesday afternoon, October 7.

C. B. Boulet, Personnel Director, Wisconsin Public Service Corp., Milwaukee, was chairman of the panel discussion.

Panel participants were E. W. Beck, Supervisor of Safety, U. S. Rubber Products, Inc., New York City; Roy S. Bonsib, Chief Safety Inspector, Standard Oil Co. (New Jersey), New York City; Clayton Braatz, Personnel Director, Marathon Paper Mills Co., Rothschild, Wis.; W. T. Filmer, Supervisor of Safety, Youngstown Sheet and Tube Co., Youngstown, Ohio; G. A. Kuechenmeister, Personnel Manager, Dominion Forge and Stamping Co., Walkerville, Ont., Canada; T. E. Lightfoot, Engr. in Charge of Accident Prevention and Compensation, Koppers Coal Co., Pittsburgh; G. E. Sanford, General Electric Co., Schenectady, N. Y.; and H. F. Webb, General Safety Director, West Penn System, Pittsburgh.

Chairman Boulet: It is easy to start a safety program. With the blare of bands and the flag waving everyone is temporarily interested, and usually accident frequency will take a sharp drop. However, after you have had a program for several years everyone takes it for granted, and the interest drops. Immediately your frequency goes up. For this reason it is vitally important to find ways to maintain interest.

But first we must find out what causes lack of interest.

A. H. Nielan (Crown Cork & Seal, Baltimore): Is it possible that a let-down is due to a part-time safety director?

Mr. Lightfoot: Yes. A safety director's job is an all-time job. I feel that if you have a part-time safety director, you can look for a let-down. There may be an exceptional case of an unusual industry, or an unusual part-time safety director, of course.

But it is hard to understand how any plant can maintain an efficient and definite safety program when the safety director or the safety engineer may suddenly be called away or directed to do something else.

Chairman Boulet: I think that is the right slant for a big plant—a full-time man; but I disagree on the small plant. I don't see how you can have it.

Mr. Titus (National Lock Washer, Newark, Ohio): It seems to me that if you take up these problems with the safety man, and he is not much interested in them because he has a lot of production work to do, he just slips up on the job.

Mr. Braatz: If your management is thoroughly sold on safety, whether your safety director is part-time or not, your program will be successful. I am laying the blame for a let-down in the safety program in management's lap entirely. You men probably have had waste to contend with in the past, and your wastes have been overcome by action through your management. Accidents are merely another form of waste, and when your management lays some emphasis on waste, you are going to get action, and not until then.

Mr. B. Lincoln (Indemnity of North America): A good foreman is recognized as a good example of the part-time safety man. His duties are multiple and important in successful safety management.

George Lexander (Socony Vacuum): Outside influences have a direct bearing on the let-down of your safety program

—interesting influences of national scope, such as bank holidays.

Chairman Boulet: Elections and world series?

Mr. Lexander: Right.

Mr. Beck: I disagree with the statement about the foreman doing safety work on a part-time basis.

A foreman will do it in his own department, yes, but you are interested in the whole plant. If you have a small plant you can maintain interest with a part-time safety man, but only if he is given responsibility.

Chairman Boulet: I think that clinches the part-time question: In a large plant a full-time man is necessary, and in a small plant a part-time man can do a good job and maintain interest, provided he is definitely given the responsibility and authority.

Mr. Turner (Bethlehem Steel): What influence has the depression had on the let-down of safety?

Mr. Webb: A great deal, because our executives, even though they were safety minded and thought a great deal of safety, neglected it during the depression.

Safety effort reached bottom during those years, but I think it is coming back fast. It is regaining executive assistance and support, and that is what you must have to maintain interest in safety.

You must have a two-fisted executive who will go down the line and say, "I am for safety, and I am going to have it!"

Chairman Boulet: Does a continued good record cause a let-down in safety?

F. M. Pepper (Illinois Bell Telephone Company): There is a danger of that. I am not a very strong advocate of contests, and the reason ties right in with that. I think there should be some form of appreciation of a job well done, whether it is safety or something else, but I don't think we should pick out the safety job particularly and pin saucers and medals and other things on men's chests just because they did something they should be doing; and that goes for the supervisory people just as it does for the workers.

A continuous and successful safety program brings a danger of getting contented with what we are doing. The winning of too many contests will lead to that to some extent, and it takes an energetic executive to keep prodding us, to keep us out of that situation.

H. P. Heyne (Industrial Commission of Ohio): I disagree. In Ohio we are interested in the community type of safety campaign, and in Cleveland some years ago we started a safety campaign among all the industries. We had 307 companies. This year on October 1 we completed our sixth annual campaign with 1,400 Cleveland companies. If there is any way to maintain interest, and if there is any way to keep from getting too satisfied with a safety record, I believe this is one way of doing it.

Not only has it proved successful in industry but also in vehicle fleet management.

As a matter of fact, the company that won in Cleveland this year has now won first place four times out of six years; and it employs 1,800 men, and works close to 2,000,000 hours, without a single lost-time accident.

I believe that the number of companies participating—307 in 1931, 500 in 1932, 650 in 1933, 715 in 1934, 1,100 in 1935, and 1,650 in 1936—is enough to bear out the value of the contest.

George Hanley (Perfect Circle Co., Hagerstown, Ind.): I think the question of lack of interest in safety is measured by how busy the firm is. This old question of dollars and cents enters into safety more than anything else, and when we have licked that, we have licked the whole problem. When the departments of a plant get so busy that they just haven't got time for safety, that is when accidents happen.

When management and men really become interested in safety, not from a safety angle, but from the angle of people going home whole and unhurt and well and in their normal condition, then we will have real safety; but until then, there isn't any contest nor anything of that sort that will answer the purpose.

Mr. Beck: We have been conducting a safety contest for 10 years, and if I were asked to discontinue everything but one thing, I would hold onto the safety contest.

One of the large rubber companies has just established a record of 6,000,000 man hours without a lost-time accident. Interest has been stimulated through the rubber section contest, and not a man can afford to break that record. They are on their toes all the time. Bring in crutches? No, sir.

The contest is based on compensable accidents; and where money is spent, it counts against their experience. They cannot cheat. The contest is tight and sound. It is based on their improvement on their previous three-year average, and they are all competing with themselves and nobody else.

T. E. Lightfoot: Why should we run contests in our plant, with only 250 men? We know their families, and we know these men. We simply tell them, "Don't get hurt, whether it is accidental or wilful or anything else."

We don't say that contests are no good, but my point is that they should be used in a program if they fit. If you can prevent injuries without contests, why not do it?

You know what happens to production any time the supervisory staff loses interest in it. Down it goes; and if it is true what we have been told for the last five or ten years, that safety and production go hand in hand, then why try to separate them and run safety as a program or contest or something of that sort, when you don't do it and don't have to do it with production?

Chairman Boulet: How many think contests are all right? How many are opposed?

The ayes have it.

T. A. Schlatter (Davison Chemical Co., Baltimore, Md.): The main instrument for the prevention, not of accidents, but of personal injury, is education. If we conduct a contest, we don't do it for direct commercial value, but for advertising value; and from that advertising we receive safety education. If you can do this, by all means use your safety contest.

But if the manager of a plant puts an injured man to work pushing a broom to keep him from considering it a lost time accident, he is not kidding anyone but himself. The only valuable information we get from a safety contest is how much better we are doing our job than we have done it before, and how much better than the other fellow in the same line of work. If we are losing interest in our safety organization, it is not the fault of the management, nor of the men, but of you, the safety engineer.

Dust off your bookshelves, read up on safety, and you will be able to stimulate more interest among your men than a safety contest can do.

To keep interest stimulated in a man, we must understand the individual. We must know his domestic troubles, and sympathize with him, give him advice, and not mistreat the confidence he has in us. When a safety engineer accomplishes this, he will not have a problem of stimulating interest.

Chairman Boulet: "What is the proper method of approach to the workers to inspire interest in safety?"

Mr. Sanford: With various types of individuals the same method isn't going to work. Suppose you have some ruling that you would like to put through in the plant. You may start with your general supervisory committee and discuss it. Then let each one of those men go back to the group of which he is chairman and discuss the thing, asking, "What do you think of it?" Then sell the idea to the next group, and so on, until you get to the workmen's committee. Get their slant and bring it right back to the management. When the order comes out, you will find these fellows saying, "There is something I had a hand in."

Get them to express their opinions, and you may sell the idea to them without their realizing that it is coming from the top down.

Another rather old-time method is the workmen's safety committee. I know of one plant that arbitrarily picked out one man from ten, right down to the floor, telling him he was on the safety committee. It was his job as long as there were no accidents.

It was surprising how accidents decreased immediately. Each man was taking care of his brothers as well as himself.

V. I. Calkin (American Seating Company): Sometimes these methods come from the men themselves. In our plant the men suggested that each foreman appoint one or two men in each department, for one month, to be the safety committee in that department. It was decided to try it for one month, and the results were such that the plan was used for a whole year. So far this year we have

at least sixty men vitally interested in safety who were not greatly concerned with it before.

Taeke Bieboer (American Seating Company): We also instituted a safety cigar or candy bar plan. In any department which goes without a lost-time accident for a month, every member gets a cigar at the end of that period. I think this has done more to interest our men in safety than anything else.

W. P. Coster (American Sugar Refining Co): What success have any individual members had with strict enforcement of discipline in inspiring safety or keeping up safety interest?

I. H. McNeil (Nebraska Power Co., Omaha): A few years ago we used to give cigars away, and we threw the plan out. Strict enforcement of discipline and observance of safety rules will do more than anything else.

A. D. Schiller (Corning Glass Works): About four years ago in the mixing room at the Corning Glass Works we had the problem of making the men wear goggles and respirators. We used discipline, telling those men either to wear the goggles and the respirators or to leave their jobs. Now they wear their protective equipment without being told.

A. H. Trestrail (Pickands, Mather & Co., Caspian, Mich.): We had difficulty in training men to report accidents, but after we gave a man a three-day layoff, we didn't have any more trouble. We do give awards, however. We used cigars for a long time, but now have an accumulated credit system. If a department goes a month without a lost time accident, we credit each man with 25 cents. After the second month this is increased to 30 cents a month, and by the end of a year a man builds up a prize fund of about $3.50. By buying wholesale we can give him a reward of something worth about $7.

Now, you can laugh at cigars, but we gave candy, cigarettes, cigars, and then we switched over to this accumulated credit system, and it works. Discipline has to be accompanied with some sort of contest. We couldn't teach men first-aid until we had first-aid contests. This stimulated their interest enough to make them seek an education; if you can get a man interested in safety, he will seek his education, but of course you have to have the educators ready to supply the information.

Mr. Filmer: Notice the wording of that. The best way is to inspire, not to compel. Action that is compelled is not spontaneous. It is likely to let up as soon as the compulsion is removed.

When you inspire, you appeal to the best there is in a man, and he responds because something inside of him is telling him that it is to his interest, not somebody outside telling him, "You do this, and you get a cigar." Possibly there is a selfish purpose behind it for the man, but where can you eliminate selfishness?

Why ask a man to wear safety shoes? If he fails to protect his feet, his own toes will suffer. Why ask him to wear the goggles? To save his own eyesight.

Something inside of the man is telling him, "For your own interest, for the interest of your family, for the interest of your future and your ability to carry on your job with all of your faculties—work safely. It is your problem, and not ours."

You are then inspiring that man, and not compelling him. You have him working with you, and you don't have to worry so much about him after that.

Mr. Kuechenmeister: How many of you men have a working agreement with your wife, that for every day she doesn't burn her finger, you will give her any little trinket? Do you promise your children that if they come home from school without getting hurt, you will buy them a lollipop? You haven't got your working program with your family, and you don't think it is necessary, because you suspect that being hurt is very much like virtue—it has its own reward.

Teach the man in the plant that it is his eyes, and his toes; but provide him with the necessary devices. Make it easy for him to buy safety shoes. Show him that it is for his own protection, and that safety, or the lack of injury, has its own reward.

Chairman Boulet: Jim Eaton, here, gives away safety shoes. Will you tell us why you do it, and whether it works?

James P. Eaton (General Electric, Schenectady): I think the plan was suggested by the men themselves, a group in the plant. If they go six months without an accident, their name is put in a hat, and they get a pair of safety shoes free. I don't know how many accidents we have prevented, but it is creating a lot of interest.

Mr. J. L. Schaeffer (National Cash Register Co., Dayton, Ohio): One way to maintain interest is to investigate every accident, minor or otherwise, and discuss it with the injured and with the men closely associated with him. That has a psychological effect on the whole department. It shows that the foreman, supervisor, or the leaders of that department are interested in the man's welfare and that where anything can be done to prevent some other workman from having a similar accident, it will be done.

G. A. Cooper (Public Service Electric & Gas Co., Newark): What about the "white elephant contest," in which the management provides a white elephant, and the foreman with the worst record for the previous month is obliged to keep the elephant on his desk and explain to all inquirers why it is there.

Chairman Boulet: We have a white elephant in our company. Our company won national honors in the Public Utilities section for three or four years, and then we had a let-down.

We decided our supervisory force was at fault. We started this contest on June 30, and we have not had a lost time accident since then. For the first time in the last three years we have gone more than 30 days without a lost time accident. I give the elephant some of the credit. It is just a means to the end. In itself it doesn't mean a thing, but nobody wants it, and everybody is on his toes.

Let us see hands. This is a debatable question. This disciplinary action, and we will have the vote.

Somebody wants a vote here, so I am willing. How many favor disciplinary action where it is needed?

How many say no?

Well, here is a man that says no. He wants to talk again.

Mr. Hanley (Perfect Circle Company): Regarding discipline and protective equipment—we have no right to go into a man's pocketbook, even though it is a protection to himself, and take the wages that belong to him and his family. There is another approach to this disciplinary action that is much more effective.

In our plant each foreman is told, "Don't have a lost time accident in your department."

He will say, "But what shall I do about this?" We say it is up to him to figure it out. He calls his men in and says, "Men, we are not going to have a lost time accident." He works with those men personally, and after all, safety is a personal problem.

When you get your foreman working with individual workers in his department, you will soon eliminate accidents.

We have in each department a foreman's safety record, hanging on a bulletin board. If he has a clear record for the month, we send him a gold star, and he gets his men together, and up goes the star. If he has a lost time accident, he puts up a red star together with the man-hours of exposure, and his standing in comparison with other departments.

H. E. Hensel (Youngstown Sheet & Tube): If you want your men to be interested in your accident prevention program, give them a part in it. Several of our foremen developed this idea.

In the semi-monthly meetings of their men, they appoint a man from the ranks to talk on safety at the next gathering. When those fellows dig up facts on accident prevention, talk and think about hazards of their department, they can't very well go back into the department and commit unsafe practices.

Chairman Boulet: I think that is a hundred per cent right.

R. B. Robinson (Washburn Crosby Company): The only man who can do the work safely is the man doing the job; but the foreman must help him. We have used that principle for the last three years, getting the man himself to take part in our program with the help of the foreman, and you would be surprised at the practical ideas that will come from those men.

Mr. Kinner (Accident Prevention Association of Ontario): I want to give another slant on this disciplinary thing. Some years ago I investigated a fatality on a construction job. The victim had been riding on the foot board of an engine, and the engine jumped the track. The man died from loss of blood and shock.

The foreman said "I warned him every day for a week not to ride on the foot board of the engine."

I said, "If you had fired him the second day you caught him doing that"—

"Yes," he said "he would probably be alive today."

I said, "I don't know whether he would or would not, but at least your skirts would have been clean of any possibility of being blamed for his death."

There is another point regarding disciplinary action. In Ontario we don't pay compensation until a man has been off for seven days, and we had one firm with an exceedingly large number of one-week accidents. At the end of the seventh day all the men were ready to come back to work. The boss, peeved at this, said, "For every man that loses time through an accident that is his own fault, I am going to deduct 5 cents an hour from his wages for the same number of hours that he loses through the accident."

At the end of the next year he had taken 15 cents off his workmen's wages.

Regarding the proper method of approach to inspire interest, I would suggest the setting of a good example. Mr. Kuechenmeister has a rule that the president of the company can not come into the plant unless he wears goggles like the rest of the men, and that inspires interest in his workmen.

Mr. Braatz: I wonder how many of you men ever asked your foremen what they want to do about discipline? Our safety committee, composed of men in the ranks, set their own safety rules, and they follow them.

David Snell (Kimball Glass, Vineland, N. J.): I disagree with the thought that 75 per cent of the men will obey rules and be safe and that the other 25 per cent, for some reason, need discipline. The latter are intelligent enough to do their work, and certainly intelligent enough to be safe. It is up to the men above them to take the responsibility.

Mr. W. H. Hasam: If a man makes a recommendation regarding a hazard, see that it is followed as quickly as possible. That shows your interest in his ideas, and he then takes a greater interest in his work. In discipline I believe we should be tolerant. If a man breaks the rules, talk to him about it and reason with him; if he continues to commit the crime, use your disciplinary measures.

C. V. Davison (American Rolling Mill Co., Middleton, Ohio): During the past few months we have taken on a lot of new men, fellows who have been out of work, or who have been out of school for possibly five or six years and have never worked before. Sometimes these boys get into trouble. I have found that instead of using discipline it is better to talk to them like a Dutch uncle.

Chairman Boulet: What is the responsibility of the safety department, the management and the foremen, in stimulating interest in the program?

E. J. Kreh (Philadelphia Co., Pittsburgh): I think responsibility begins with the management. It is necessary first to get the support of the executive and work through him to get the support of the supervisors, and down through them to the men.

J. P. Watson (Bureau of Indian Affairs): The fact that an organization has a safety engineer is evidence that there is executive interest in safety. It is not the responsibility of management to direct the safety engineer. He was hired on the assumption that he knew his business.

If he has the correct application and interpretation of the statistics in hand, then the interest on the part of other departments will be self-evident. They will recognize the value of what he is trying to do, and the results will be, I think, sufficient remuneration.

Mr. Bonsib: I think the function of the safety engineer and the safety man is to act as a mainspring, to keep the thing moving. I don't think it is possible for any safety man to go in and tell a man what to do, but he should be the means of getting that employee to do what he should do—and to get the employee to see that the things that cause accidents are exactly the things that cause high production costs, waste, and inefficiency.

The sooner we safety men stop talking safety and talk efficiency and cost, the sooner we will get safety.

The trouble is that the safety man is thinking only of how he can prevent accidents, and he forgets about the fact that the plant is trying to make dividends. If a guard interferes with production, it is going to be taken off; it is up to the safety man to work with the production man and see that a guard is designed so that it helps production rather than hinders it. That is simply a technical matter that can be worked out. Some of the guards these safety men design are ridiculous, and I think that that is what has hurt the safety movement—the failure of the safety man to realize that the production has got to go on.

I want to repeat—the same thing that causes accidents causes inefficiency.

Chairman Boulet: I suppose we might sum that up by saying that the job of the safety department is to act in an advisory capacity.

M. A. Gimbel (General Electric Co.): If a man is to be disciplined, have you ever had your foreman say this: "If I send that man home, we are penalizing ourselves; we need the job."

From the floor: Send the man home. You are driving for safety. If you get sentimental, and he gets hurt, then it is your responsibility.

Chairman Boulet: You think after one or two penalties you won't have the trouble again, and that an accident will stop production, too.

Suppose the foreman is responsible for an accident?

From the Floor: Any time that there is an accident in a department, we compel the foreman to wear a big yellow button for the following week. We hold the foreman strictly responsible for every accident in his department.

I. A. Brinkman (Macintosh-Hemphill Co., Pittsburgh): The president of our company issued an order that if any man had an accident which goggles or safety shoes would have prevented, that man would lose his job, and the foreman would get a week off without pay.

One fellow took the lenses out of his goggle frames and lost his eye. He lost his job, and the foreman got the week off without pay. We haven't had an accident to an eye or a foot since.

Chairman Boulet: Let us get down to the responsibility of the management.

Mr. Wurten (Bayuk Cigar Co.) I am a manager. Our plant has gone about four and a half million man-hours this year without a lost time accident. I have heard varying opinions here that the foreman is the crux of the situation, or that the safety director is the crux of the situation, but everyone seems to agree that management must first be sold.

It doesn't make any difference what the safety director or the foreman is—management is 100 per cent responsible for every accident that occurs. Until the management in our organization recognized that fact, we got nowhere.

Chairman Boulet: Let us go to the foreman.

P. H. Sanville (Philadelphia Electric Co.): I was, until about a year ago, general line foreman. My conception of safety was that it was entirely my job to sell it to the foremen and the linemen and the ground hands. That was in conjunction with the safety department.

It was necessary that the safety department act as a clearing house for me. I had to get my facts from them. Still, I believe that the foreman is the only man who can carry safety through to those below him.

Mr. Filmer: I wish this matter of management were as simple as has been represented. I wonder if we have enough sympathy for the position of management? The same men who are responsible for safety at the top are also responsible for production, for satisfying customers, for satisfying stockholders, for satisfying everybody, and they have to play all those things together.

We must look to them for the establishment of a policy which they are able to fulfill. We must take safety out of the abstract and put it into the concrete and say, "We know that sometimes the budget will not permit the purchase of this or that, or permit certain work to be done, but we don't want to stall on it."

The attitude of management is not understood by the man on the floor. The superintendent may not want to add to his month's costs something that ought to be done. And the man on the floor is going to say, "You talk to me about safety; why don't you have that taken care of?"

Management's responsibility is to keep the man on the floor in sympathy, and management needs to be in sympathy with the man on the floor.

Mr. Webb: When you produce something that you think is going to help stimulate the safety program, remember that it is not an all-time stimulator. Be-

fore long you have to think of something else to maintain the interest of the men.

Mr. Bonsib: Remember that everything that we do is a result of two great principles, pride and fear. Fear gets results, in the way of discipline, but pride is the greatest instinct man has. Lie awake at night thinking of how you can do your work better, and you will think of things that will appeal to the employees' pride. Pay attention to statistics, but use them correctly. Get statistics along lines that will show you where the trouble is, and what causes it.

With such statistics you can stimulate the competitive instinct, because deep down in his heart every man honestly believes he is just as good as somebody else, and he wants to show it.

Chairman Boulet: The meeting is adjourned.

ADJOURNMENT

Occupational Diseases

FRIDAY MORNING SESSION

October 9, 1936

The session was called to order by the chairman, Dr. Hart E. Fisher, Vice-President for Health, National Safety Council, and Chief Surgeon, Chicago Rapid Transit Co., Chicago, who presided, introducing the speakers.

The Lesser Known Facts About Common Occupational Diseases

By DR. ROBERT B. HUNT

Medical Advisor, American Mutual Liability Insurance Co., Boston

Probably the leader in the parade of industrial diseases is an acute or chronic inflammation of the skin which we call dermatitis. This disease may present itself in any type of shop, factory or foundry. Any paste, powder, gas or liquid which comes in contact with the employee's skin, even the water supplied by the town in which he lives or works, may be the potential cause of such a skin disturbance.

The wide diversity of causes together with the varying susceptibility of different individuals makes the problem of control difficult.

Much investigation is under way to determine why one person may be susceptible to a certain substance while another is not. It has been proved many times that a poisonous substance formed within the body has been able to prolong the action started by some external influence. A printer developed a marked dermatitis from ink which persisted for two years. Finally food tests were made and showed that he was susceptible to lettuce, which, when removed from his diet cleared the skin. He returned to his usual occupation without a return of symptoms.

The poisoning of allergic substances is usually an accumulative process. It takes time to produce a manifestation of disease, but let any other substance cause the disease, and the irritating food may be of sufficient strength to magnify its action.

All cases of dermatitis cannot be cured by eliminating offending foods, but further investigation along these lines may give us a clue with which to lessen the loss of time from work and the discomfort now produced by industrial dermatitis.

Metals

Lead

The distribution of lead poisoning is quite extensive.

The skin of the body is a protective covering, and as long as it remains intact it does a good job except in the case of tetraethyl lead, which is used in blending gasoline and which is readily absorbed through the skin, having a tendency to create changes in the nervous system. The effect of other forms of lead, through that avenue of entrance, is practically nil, which explains the extremely low poisoning rate in typesetters, painters and others who continually come in contact with metallic lead.

Lead in any form, introduced through the mouth, acts rather slowly when compared with the inhalation of lead dust or fumes. However, no matter what the portal of entry may be, lead is acted upon by the body fluids and so converted that it may eventually be deposited within the bones.

Those bony safe deposit vaults may retain their lead contents for days or for years, and if the exposure is removed, may also free the employee of all signs

and symptoms of lead poisoning. But imagine the surprise of that supposedly cured person when years later, perhaps following some type of infectious disease or the excessive use of alcoholic beverages, he awakes to find that he suffers the aches and pains and paralyses of an acute lead poisoning. As the body fluids alter lead that it may be deposited, so may those fluids attempt to de-lead the body, and too rapid absorption may produce the original disease with all its discomforts.

One can readily see, then, that in some cases investigation of previous occupations is quite necessary to determine the original contact with lead.

Heating of molten lead causes a black scum of lead suboxide to form on its surface, and the heat from the metal disburses the fine powder into the air. Hence, in the process of smelting ores such as zinc, copper and silver, mixed with lead, we find a rather high lead poisoning rate.

Those engaged in the manufacture of lead wire and cables, batteries, glass, pottery and rubber industries, plumbers and users of dry colors offer their share of lead poisoning.

Probably the greatest source of lead poisoning may be found among those who sandpaper, scrape, chip or burn lead paint, for the dust and fumes caused by those activities are rather rapid in their action. Such workers may become incapacitated in a few days because the inhalation of lead dust causes the maximum amount of absorption into the blood stream in the minimum space of time.

Chromium

Chromium is a metal widely used as a foundation for colors, and dusts from its various salts may produce lesions of the skin and mucous membranes of the nose. Chromium plating by electrolysis may cause fumes which are similarly irritating. Although chromium poisoning does not usually cause death, the number of days of absence from work on account of incapacity which it causes is gradually increasing.

Other Metals

The most efficient portals of entry of foreign substances into the body are the nose and mouth. The smaller the dust (the size of smoke particles for example) the greater the speed of absorption by the blood. Fumes from hot metals carry not only poisons but numerous minute dust particles. This explains the incapacities occurring among those engaged in acetylene and electric cutting and welding. When men are so employed over a prolonged period of time, the constant inhalation of fumes and dust might produce symptoms of the metal upon which they work. In the shipbuilding trade, particularly in the construction of metal ships, we find occasional cases of metal-fume fever. "Brass chills" and "spelter shakes" from zinc are names applied by the lay people to such diseases. The terrific heat applied to some of our common metals and alloys by acetylene torches produces sufficient fumes to cause a temporary incapacity in 24 hours. Permanent disability from such causes is rare, however.

Diseases Due to Dust

Twenty-five per cent of all workers exposed to high concentrations of inorganic dust are expected to develop changes within their lungs due to that agency. We are at a loss to explain why the other seventy-five per cent are not so affected.

Mining, quarrying, foundry work, grinding, sandblasting, abrasive soap manufacturing, asbestos work, the making of emery and carborundum products and many other occupations offer opportunities for employees to inhale microscopic dust particles and create a foundation for possible future incapacity.

We are interested particularly in those men who work with sandstone, quartz, flint, granite, and sand, because they expose themselves to silica, and the chemical changes between that dust and the body fluids, in the presence of tuberculosis, may and usually do lead to a fatal ending.

It is safe to say, in light of our present knowledge, that the action of other inorganic dusts is much less virulent and incapacitating. That, however, does not allow us to lower the vigilant methods to improve dust control and protect employees, because all dusty occupations are potential trouble makers.

Although the actions of various dusts differ within the body, the exposure to asbestos fibres, present in the weaving and grinding of dry asbestos material, offers another type of dust which may cause fatalities among workers.

The organic dusts from cotton, silk, wool, tobacco, flour and similar substances are practically harmless. Such dusts rarely reach the lungs but may cause irritation of the windpipe and larger air tubes and result at the most in a mild bronchitis.

The factor which should be borne in mind, particularly when dealing with silicosis and asbestosis, relates to the progression of such disease. When changes occur within the lungs as a result of the presence of such dusts, nature forms scar tissue to heal such lesions but may fail to stop when the job is finished. As a result, the continuation of that healing process may lead to such structural changes within the lungs that partial or total incapacity may follow months or years after the employee has been removed from his dusty occupation.

Benzols-Benzene

Benzol is a distillate of coal tar used extensively in industry. It is an essential ingredient in the manufacture of explosives. It is an excellent solvent for grease, oils and cements, and because of that property it is important in many phases of the rubber and cleaning industries. In the manufacture of shoes benzol may be an ingredient of the dressing applied to the leather and of the cement which fastens the heels and soles. Not only in the shoe trade but in other branches of industry where employees work with gummy, sticky material, the workers soon learn of the solvent and cleansing action of this liquid and use it freely for that purpose upon themselves. The subsequent outbreak of skin afflictions may be the first indication of such unauthorized use.

Benzol is extremely poisonous, entering either through the nose or mouth or absorbed through the skin. Its action within the body is varied and may produce a multitude of signs and symptoms. The bone marrow becomes affected which in turn alters the character of the blood; hemorrhages are common; it may cause death.

The fumes from benzol are heavier than air and lie near the floor, which is an important point in the engineering problem of ventilation.

The members of the benzene group are absorbed through the skin, and more cases of poisoning are found when men perspire than when their bodies are cool. Probably the answer to that is that the fumes may solidify as they cool and the powder may settle on the skin. The sweat on the body may dissolve this dust so that it is more readily absorbed through the increased surface blood supply.

Chlorinated Hydrocarbons

This group of petroleum derivatives has been known to science for years but during the past decade its advance into the industrial field has been widely distributed and most important. Led by carbon tetrachloride and its chemically associated members, it has furnished industry with refrigerants for ice chests, excellent solvents for rubber, wax, oil and grease, thinners for lacquers and a very fine household necessity for the removal of spots from clothes. Hospitals have been using it more and more for the removal of adhesive plaster.

Due to the non-flammability of carbon tetrachloride, it is used in fire extinguishers. The rapid evaporation produces fumes which may smother a small blaze, but we must not forget that excessive heat of the actual fire may bring about combustion sufficient to produce such biproducts as hydrochloric acid and phosgene gas. Like its associated member, chloroform, it may produce sleep when inhaled by an individual, and only 1/350 of an ounce in a quart of air is necessary to produce such action. That thought must be remembered when a large quantity of those liquid products is spilled on the floor, perhaps accidentally. Action should be started at once before the liquid gasifies, and employees should be notified to keep their heads up to avoid the low ceiling of gas.

Chemists have developed and introduced to industry many new products, the basis of which is the chlorinated hydrocarbons. These derivatives of petro-

leum distillation are frequently combined with those from coal tar to form valuable chemical combinations. They have been placed on the market so rapidly that medical science has been unable to determine their physiological effect upon the health of man. We have known that some of these chemicals are capable of creating changes in the liver, and only recently in a city in Massachusetts one of these newer products caused the death of two employees and a battle to retain life among two others.

Carbon Monoxide

You remember the adage, "Where there is smoke, there is fire." We might add to that, "Where there is fire there is carbon monoxide."

This odorless but poisonous gas may occur in any industry or in any home, but the poorer the ventilation the better the chance of producing physical incapacity.

Since the advent of the motor car, whose exhaust pipe may pour forth as high as 6% of carbon monoxide, we are all exposed to that gas, particularly in crowded cities. The ordinary passenger car liberates about two cubic feet per minute, and one can readily estimate the physical damage that may be done if such a motor is allowed to run within the doors of a poorly ventilated garage or shop. Fortunately, serious cases of such poisoning are not common among those employed in public garages, but many of those employees are likely to complain of headache and faintness at the end of a day's work, especially in colder weather when doors and windows remain closed.

In the steel industry, where gas is used as the heating agency in the blast furnaces, care must be used to provide proper ventilation. Within the mines, workers are warned to allow enough time following blasts for the escape of this gas.

Being a colorless, odorless and tasteless gas, quick of action within the human body, the manifestation of the very first symptom may be too late to save a workman from partial or total incapacity or perhaps death.

Because the exposed person suffers first from motor paralysis, he may be unable to help himself or even to warn others of the danger. Even if removed from the poisonous gas at that period, the damage actually done by the gas may result in permanent physical damage.

Infection

The skin is a protective covering of the body against infection and is extremely efficient as long as it remains intact, but allow it to be broken or punctured, introduce bacteria, and a battle ensues between the offensive agencies of infection and the defensive powers of the body. The winning of such a struggle may determine the presence or absence of incapacity. Infections are common throughout industry, but two types are particularly prominent — infection resulting from anthrax and infection among meat packers and fishermen.

Many of our fur, hair or wool-covered animals may contract anthrax. The germs of that disease defy the ordinary methods of sterilization and may linger on hides, bristles or hairs for long periods of time. Tanners, wool sorters, and hair or bristle workers may introduce the anthrax spore beneath their skin and undergo much physical suffering and sometimes death.

Infections are frequently found among meat and fish packers and those engaged in deep sea fishing. Although death rarely occurs, the loss of fingers, hands and nasty septic wounds are the result.

Punctured wounds, cuts, abrasions, burns and scratches are potential avenues of entrance for bacteria which would seem to be waiting everywhere at all times for such a break in the skin. Early medical treatment might often save later surgical interference, not to mention the accompanying discomfort, incapacity and perhaps the loss of an essential body part.

Summary

I feel that the time has come when an employer must demand of a manufacturer the answers to two questions:

1. How will your product affect my business?
2. How will your product affect the health of my employees?

That employer is entitled to honest answers based upon sufficient chemical and physiological examinations of the questionable product. That manufacturer should be held responsible for the ills produced by the use of his product and unless he can guarantee its safety, it has no place in industry. Too many lives have been lost or jeopardized by too little knowledge of a product's action upon those who handle it.

The incidence of lost time due to illness and injury in industry has been greatly lessened by the many agencies working along lines of safety. When industry has been made fool-proof by the substitution of non-toxic preparations for those now found to be harmful, and when each employee is imbued with the idea that constant thoughtfulness and care are most necessary for the maintenance of health and happiness, then, and not until that idealistic stage has been reached may vigilance and perseverance to maintain and preserve health, limb and life be lessened.

Pre-Employment Examination as an Aid to the Control of Industrial Diseases

By DR. W. C. TEMPLER
Medical Director, Corning Glass Works, Corning, N. Y.

We may well ask whether or not physical examination is of any value to the world at large, rather than limit the discussion to the control of industrial diseases. In the conservation of life and health much progress has been made in the eradication or control of such diseases as occur in epidemic form,[1] as well as that type of disease which is not truly epidemic, but occurs in such frequency that general health programs are necessary. Much has been done to control such disabling illnesses as heart disease, arterio-sclerosis, kidney disease and diabetes; and something has been accomplished in the control of morbidity, which tends to, at least, make people happier through good health, even though an increased span of life is not gained.

Physical examination has played a large role in accomplishing these things, because it was through physical examination and physical observations that investigators were led to exert themselves to find a remedy for the cause of such conditions. Small-pox is no longer prevalent, due to such observations, which led to its control by vaccination. Malaria and yellow fever have been brought largely under control, and knowledge is now available in the control of venereal diseases, if the proper physical examination and laboratory methods are used to arrive at a diagnosis. We are all familiar with the results obtained in decreasing the death rate due to tuberculosis. In fact, in the treatment of all epidemic-type diseases that have so far been eradicated, the examination of patients to determine the severity of symptoms and the improvement has been of foremost value.

Knowing that the average span of life has been increased eight years in the last quarter century and assuming that the above mentioned factors have had some bearing on it, could we decry the value of physical examinations for the general population?

If we know that examinations made by insurance companies and their associating examining institutions, the clinics run by the United States Public Health Service, and the great mass of physicians, who all carefully examine their clientele, have been of value in the control of disease, may we not assume that examinations in industry will help control the incidence and extent of industrial disease, particularly when the life expectancy of industrial workers is less than that of the general population?

In fact on April 14, 1936, at the National Conference on Silicosis and Similar Dust Diseases, called by the Secretary of Labor, Dr. R. R. Sayers of the United States Public Health Service said, "Preliminary and periodic physical and roentgenological examination should be made of all employees engaged in industrial processes where there is a potential if

What Can the Engineer Do to Eliminate the Hazards of Occupational Diseases?

By REUEL C. STRATTON
Supervising Chemical Engineer, The Travelers Insurance Co., Hartford, Conn.

If I were asked, "Can the engineer prevent the majority of occupational disease cases" my answer would be, "yes." Obviously, with the exception of those diseases brought about through a sudden or accidental contact with a poisonous material or a virulent disease-producing organism, if the exposure were controlled by engineering technique, then there would be no occupational disease.

The engineer must rely upon the medical director to place individuals capable of working in hazardous occupations and to assist him in controlling these individuals through periodic physical examinations when the men are exposed to occupational disease hazards; but the engineer alone is responsible for reducing generation of harmful substances and for the control of employees' contact with processes using harmful materials.

The ascribing of many and new occupational diseases to industrial environment has produced a problem for him. The engineer generally works with materials which he can see, but the study of industrial disease control may require the handling of invisible materials. It is a common fault to focus attention upon one object to such an extent that others of equal importance may thereby be relegated to obscurity. Today safety engineers and industrial hygienists are concentrating their attention upon diseases caused by the inhalation of dust, but I do not believe the safety engineer is warranted in confining himself to the prevention of diseases caused by dust alone. His consideration should extend to include all materials produced in any manner that they may cause an effect upon a worker. The question of whether a material exists as a gas, a vapor, or a dust is but one of particle size and chemical make-up.

He must not forget that many such diseases are produced by exposure to vapors and gases as well as to dust, and that the control of these industrial diseases may be brought about by the application of certain fundamental principles common to all.

While the problem confronting individual safety engineers varies according to the industry, there are certain fundamentals common to all such problems which provide a workable basis upon which an occupational disease prevention program may be developed. Once these fundamentals are set in motion toward a safe working environment, continuance is much the same whether the engineer is engaged with a large organization or with a small one. The fundamentals follow this sequence:

(1) An occupational disease inventory is required.

(2) A plan for correction of the exposures shown by the inventory requires development.

(3) A concentrated attack upon the major exposures first, following through until all are corrected or eliminated.

An inventory of all materials used in a plant will astound the average engineer. He will find many items about which he may have little or no knowledge. He may be confronted with items he had not recognized previously, even though he has been associated with the plant perhaps many years. When this inventory is complete, he should card index it, placing against the name of the material the health hazard associated with it both from a material and a process viewpoint. Such a card index should contain the component parts or constituency of compounds.

Process exposures should be studied in conjunction with hazardous materials. Assistance in compiling such data may be obtained in the bulletin "Occupation Hazards and Diagnostic Signs," prepared by Dublin and Vane of the Metropolitan Life Insurance Company, and in a publication of the United States Public Health Service, Public Health Bulletin No. 216, "The Potential Problems of Industrial Hygiene in a Typical Industrial Area in the United States."

In addition the engineer should obtain all available information upon the materials he is required to study. New chemicals, solutions, dusts, degreasing agents, condensation products, paints, lacquers, dyes, abrasives, and other products too numerous to mention are being placed upon the market daily, and the average engineer's knowledge of their possible effects upon health is slight. Academic research determining the effect of these new materials upon humans is progressing slowly, and serious injuries may be sustained in industrial application long before the toxicologist is able to determine the properties of the material and the maximum permissible amount to which a worker may be exposed. In seeking this information it is essential to determine in so far as possible the maximum permissible amount of contaminants which may exist in a work place without causing an occupational disease.

Armed with this information, the engineer is in a position to locate properly in his own plant the process and the operation in which the exposure may exist. The engineer should study together with the plant physician the length of employment of exposed individuals and they should jointly determine the normal expectancy or average length of employment for the specific exposure. From such data may be developed a factor of safety, and the maximum allowable period of employment in certain areas may be assigned. Naturally this study should be focused upon the more hazardous locations first, and when these are corrected, attention turned toward minor conditions.

Housing. One of the most important considerations in attempting to control occupational disease is housing. Whenever practical, any hazardous manufacturing process should be separately housed and isolated; every effort should be made to arrest harmful substances—dust, vapors, or gases—at their source of generation. Buildings should be so constructed that accumulations of dust may be avoided.

When physical separation of departments is required, such physical divisions should be dust or vapor tight. Floors should be tight to prevent transfer of materials to floors or departments below. The engineer should give study to the complete enclosure of machinery or process units as individual units and, if so required, vent each one separately. The transfer of hazardous operations into the open air does not always eliminate the danger; in fact, it may increase the number of workers affected.

Process Revision. To reduce transportation of materials and exposure to harmful substances it is desirable to have all processes mechanically continuous and, if possible, enclosed. When this cannot be accomplished, suitable physical divisions should be provided. The engineer should consider the substitution of wet processes for dry processes, providing at the same time for the disposal of the moist collected material in a safe place. He should consider the substitution of automatic operations for hazardous hand work or machine work. A change of abrasive material will often reduce the quantity of dust produced.

I can cite an example of how a little thought can cure a hazardous machine operation with little or no expense:

A plant producing a finely pulverized material created large amounts of dust in bagging the material, using porous sacks. This high concentration of dust, not necessarily toxic, inconvenienced the workers. The cost of ventilating the department would have been prohibitive. By careful study the engineer determined that the fall of the material into the sacks forced the air out through the interstices of the material, carrying with it a quantity of the pulverized product. His problem, thus, was to provide a means whereby this air could be harmlessly expelled from the sack prior to filling. Study led him to suggest and apply the use of a collapsed paper bag which contained little or no free air. The problem was solved. Dust generation was practically eliminated by this simple change. Many hazardous processes in ordinary manufacturing operations may be cured in like manner if the engineer exercises his ingenuity.

Ventilation. Proper ventilation is of paramount importance in the control of any occupational exposure. Most of the chief occupational diseases other than dermatitis arise through the inhalation or the ingestion of foreign material. If ventilating equipment can reduce the concentration of contaminating materials to a safe limit, the problem is solved. The engineer should study each process separately and ventilate each separately. It is seldom wise to rely upon general ven-

tilation. Instead, high velocity ventilating apparatus should be installed, functioning as closely to the point of generation of the harmful substance as is possible.

Individual machines should be so equipped if possible. Baffles may be introduced to prevent air stream disturbances or to increase the intake efficiency at the nozzle. Down-draft systems should be preferred for the collection of dust or gases of high specific gravity.

Even after the installation of exhaust systems, the engineer must study the type of maintenance required to keep them operating at peak efficiency. Nozzles should not be permitted to become covered nor moved out of proper position. Exhaust piping must be kept dust tight. Blower efficiencies must be constantly checked to insure that intake velocities are proper. The best ventilating system is a false protection if it does not function properly or if it is so poorly maintained that it falls below its designed rating. The engineer must exercise extreme care to provide a clean source of replacement air for the work place. He may find it necessary to install filtering and heating devices. The engineer must study the proper disposal of the collected or expelled material to be positive it will not drift back into the work place.

Employee Protection. While the primary engineering means of protection against possible occupational diseases should be mechanical correction, the engineer will find instances where even the best systems must be supplemented by individual protection. He must carefully study such exposures to provide the highest efficiency of protection, yet obtain a device easy for the operator to wear continuously. When the engineer has been successful in obtaining such a device, he must educate workers to use it.

Sanitation. Clean washing facilities and toilets should be provided. Lunch rooms should be not only clean but also well lighted and attractive and should be under the supervision of the plant physician.

Scientific Tests. Up to this point the engineer has deduced that an exposure exists, and from accumulated data has devised his means of prevention. However, the engineer interested in ascertaining not only exposure but also efficiency of control should realize control cannot be fully effective nor the efficiency of any protective device determined without scientific tests. Assumption, guesswork, unscientific procedure or apparatus have no place in an engineering program. The engineer must test each step unless it has been previously proved, carefully calculating in advance to avoid false protection.

He must be familiar with dust counting, air sampling, and chemical analysis technique, having such determinations made by established and proper methods. If such tests are beyond the scope of his ability or equipment and if the engineer considers such tests absolutely essential, then his executives should permit him to obtain experts qualified to make such surveys as his problem may require. The need for an accurate engineering approach to any control measure cannot be overemphasized.

Conclusion. Every engineer realizes control of any industrial disease exposure is divided, part of such control falling within the jurisdiction of the industrial physician and part within his own engineering province. Medical knowledge is invaluable in the detection of early symptoms and in the administration of suitable preventive treatment. The engineer should gladly obtain the services of an industrial physician to make a study of the plant, to assist in the classification of the hazardous operations and working locations. By such coordination he will speed control of the exposure.

Each individual occupational disease exposure must be studied, analyzed, and controlled individually. While general data may be available upon common exposures, the solution can be found only in individual treatment. Such exposures cannot be compared to ordinary safety engineering efforts. A circular saw is a circular saw wherever it may be operating, but industrial disease exposure varies within plants and certainly varies between different manufacturing establishments, even though they may produce a like product or article.

ADJOURNMENT

Safety Belts

TUESDAY AFTERNOON SESSION

October 6, 1936

This session was called to order by Chairman George Opp, Safety Engineer, the Detroit Edison Co., Detroit, Mich., who introduced the successive speakers:

Safe Design and Construction of Safety Belts

By DR. M. F. SKINKER

Assistant Director of Research, Brooklyn Edison Co., Brooklyn, N. Y.

Safety belts for linemen and for infrequent repair work will always be justified. This does not appear to be true of window cleaners' belts. Window cleaner accidents are so frequent that insurance costs as much as one dollar per day per man. This should be avoided by designs that would make window cleaners' belts unnecessary.

Failure of a lineman's belt in service and of a new lineman's belt before going into service prompted our investigations. Many of the belts we had in service were found to be inadequate to meet an emergency of reasonable expectancy. A study of the safety belt specifications and test data at that time made it apparent that safety belts were designed with tensile strength sufficient to hold a man securely while doing his task but with no definite requirement to allow for slipping or other accidents. The hardware was tested to 1,500 pounds but the leather seldom reached 1,000 pounds. This seems ridiculous since the leather deteriorates and the metal does not.

We purchased new fabric belts and tested all our old leather ones to destruction. In general the tough old leather one had little elongation and those leather belts with considerable elongation did not have the proper strength.

In changing to fabric belts we had another reason of more fundamental importance. As legal evidence of adequate safety protection, records of periodic proof tests are much better than of visual inspections. Fabric in good condition may be given repeated proof tests without injury to itself. Defective belts can be removed from service by such proof tests plus inspection. In contrast with this, leather is not uniform, and always stretches under test which will gradually wear out the belt; leather does not have the original strength and it takes an expert to inspect leather even when new. In our experience, linemen's fabric safety belts that look badly worn and are discarded have over 60 per cent of their original strength.

Leather for this service must have suitable tanning and oiling to discourage dry rot and moisture. Similarly, fabric should be protected against mildew by rubber or by impregnation with suitable rot-proofing compound. In practice it is difficult to tell what compound is best because of the many variable factors.

To get the full use from the belting material the method of fastening the hardware is of importance. There is considerable advantage in using large diameter rolls for any terminal equipment. If the roller or bar is small the outer layer of the material may take all the load and break, then the second layer and so on

Recent study and development of steel scaffolding has made it possible for all industrial plants to avail themselves of superior maintenance equipment. Steel scaffolding is better than the old type wood scaffold for several reasons:

(1) Elimination of fire hazard.
(2) Safer construction.
(3) More economical in maintenance.
(4) Greater flexibility.

With wood scaffolding there is the ever present hazard of fire. Although the fire hazard is not entirely eliminated in the steel stage—because wood planks must be used for the working platform—yet it is possible to obtain fireproof planks and thus erect a scaffold which entirely eliminates the fire hazard.

In the steel scaffold one need have no fear of snapping a member. There are no imperfections in steel comparable to the knots and cross grain in lumber. These hazards are eliminated.

We are all interested in keeping down costs. One element in operating economically is equipment that will stand up under service and will require little maintenance. Steel scaffolding is so durable that it is almost indestructible and can be used for many years without replacements, particularly when the components are galvanized. Lumber breaks up and cracks and is easily destroyed, requiring frequent replacements.

Steel scaffolding is more flexible than wood. It can be used in places and under conditions and in a manner to which wood would not adapt itself. Because it is less bulky than wood, steel scaffolding takes up less room when erected, is less unsightly and gives a greater feeling of security. Steel components are uniform in size and thus require a minimum of storage space.

Steel scaffolding is of the tubular type, consisting of a base plate, tubular members of various lengths with interlocking fittings at either end of the tubes and a coupler which connects the tubular members. There is nothing intricate about it. The regular maintenance crew about the plant can very readily erect it. Steel scaffolding can be used and adapted to meet the most unusual conditions and because of the smaller size of its components as compared to wood, obstruction of light is reduced to a minimum.

Probably every industrial plant has had at some time a block and fall swinging scaffold. Some may still employ this in their maintenance work, whereas others have discarded it for the more up to date and safer piece of equipment known as a cable type safety swinging scaffold.

This may be a recent development to some. A machine and wire rope take the place of the block and fall. It does away with the hazard of acid-eaten and dry-rot ropes, which have been the cause of so many fatal accidents. Both the block and fall and the cable swinging scaffolds are sometimes referred to as single point suspension scaffolds.

The latest and newest development in suspended swinging scaffolds is the two-point suspension scaffold. In referring to these scaffolds as "single" and "two-point," I am considering suspension at one end of the swinging scaffold only, there being in reality two and four points of suspension respectively in each scaffold.

This two-point suspension scaffold was designed to give a more stable scaffold and to permit more freedom for workmen and less obstruction. It consists of two drums with channel and angle iron connections which support the platform. To each of these drums is attached a cable, one leading to a point directly above and the other passing down and around the under side of the platform and then upward to a point directly above the inside edge of the platform. The machine is operated by a single ratchet mechanism to which are attached two driving pawls. Locking pawls are provided to hold the scaffold in the required position. This type scaffold requires as part of its installation an outrigger to which the cables are attached.

Discussion following the address was based on these points:

1. Should ladders ever be painted?

No. Paint would hide any defects that might be present or develop. If it is necessary to protect ladders from the weather, they may be treated with linseed oil and given a coat of white shellac.

2. What should be done with ladders in need of repair?

They should never be patched haphazardly and turned back into service. Ladders needing repair should be tagged and turned over to the foreman, who should determine whether they can be repaired. If he decides that repair is possible, he should turn the ladder over to the maintenance department.

3. What should be the angle of a ladder leaning against the wall?

In general practice the ladder should stand one-quarter of its own length away from the wall.

4. Is it possible to use steel scaffolding for temporary work?

Yes. This type of scaffolding is easily erected and can be placed on rollers and easily moved about.

5. In purchasing a ladder how can it be determined whether the tenons project far enough into the side rails to give a firm footing?

There is no type of inspection that will determine this. The only way one can be sure the tenons are firmly imbedded is to purchase a quality ladder.

6. Is the airplane cable or the solid steel bar the best form of re-enforcement in a ladder?

The solid steel bar. It gives the firmest and most dependable support. Cable re-enforcement is now practically obsolete.

Unusual Developments in Leg Protection

By R. L. WHEELER
Chicago

In times of serious illness one always obtains the services of the best doctor available, buys the best medicine procurable, from a reliable source. Is there any reason why protective apparel should be regarded differently? Is not the preventive as important as the cure?

Part of the time almost any kind of protective apparel is good enough, but when the emergency arises, when real protection is needed, then is the time your men should be provided with the best protection obtainable. If protective apparel does not protect against the extreme hazard, it is absolutely worthless. Your men may complain that certain apparel is a bit cumbersome, a bit uncomfortable, but an accident is a thousand times more uncomfortable, and usually results in loss of time plus untold suffering. To be safe it must be sturdily made, though it may not be 100 per cent comfortable; but complete working comfort without maximum protection is a compromise that does not make for safety.

There is now available standard leg protection that will safely meet every normal hazard in industry, and furthermore, it is possible to have made special products for specific hazards of almost any nature.

Possibly because of the fact that the greatest number of them have been used in recent years, the most unusual and varied development in leg protection has been centered on what are commonly called "foundry leggings."

The first leggings I know anything about consisted of bag-like tubes that hung from the waist or from the knee and were made from anything that wouldn't explode upon coming in contact with molten metal. Early it was discovered that chrome leather was a good heat resister and gradually asbestos cloth was woven into a more useable, pliable fabric, with fire-proofed duck used in some instances. These three materials are still chiefly used, with chrome leather leading.

With more or less stabilization of basic materials, improvement in design came in for prompt attention. Leggings with snap buttons and straps were put on the market, and arctic buckles were also used as a means of fastening. The knee length legging rapidly became the most popular style. It is a prime requisite that such a legging shall be so constructed that it will afford protection from the knee down to, and including, the foot. Its design should be comfortable, but comfort should not be sacrified for safety. It should be fully and quickly adjustable and instantly removable.

With these fundamentals in mind various kinds of spring knee leggings were created—one of the first great improvements in legging construction. However, in some cases there seemed to be justified complaints about the circular springs getting too hot for comfort and so the manufacturers promptly eliminated this by covering the springs or insulating them. Spring knee leggings still are preferred by some and will undoubtedly be used for many years to come.

But we find many new so-called springless types of leggings appearing in the field. We also find that the old stunt of wrapping legs in wet burlap is almost extinct, thanks to the efforts of safety men.

Subsequently the springless type of legging further combined safety and comfort. The popular appeal of this type was chiefly its greater comfort and finer adjustability. Every conceivable kind of fastener is here used to insure ease of putting on and to assure quick removal. Entirely new fasteners have been developed and use has also been made of already existing types.

Individual features carry their appeal to safety men, but all recognized types of leggings on the market today are much more comfortable and safe than those of a few years back.

Leg protection against acid splashes calls for not nearly so many styles of leggings but is adequately covered. The types of leggings and spats that protect against cuts, bruises, and similar injuries are many and varied. Some are made from a heavy leather base covered with metal reinforcing strips, properly placed to give the needed protection. Others are made entirely of heavy fibre with or without metal flares as the hazard demands. Steel studded chrome leather is also used in some cases. There are styles made from chrome leather reinforced with flexible reeds backed up by felt to act as a shock absorber. A most interesting anti-rattlesnake legging is made in a sort of spring knee type, using fibre as a base and covering it with water-proofed duck as a further protection while walking through long wet grass.

Pure grain rubber mounted over light leather has been successfully used as leg and foot protection against sand blast shot. Hip length leggings, while used in lesser numbers, are still standard equipment in foundries where protection is needed from the hip down. They range in style from regular pant leg shapes to extensions put on spring knee or springless type leggings and are made from asbestos cloth, fireproofed duck, and leather. A combination of chrome leather bottom with an attachable asbestos top has proved a very desirable style from both a safety and an economical standpoint. Here again, as in the knee type, safety, comfort, adjustability, ease of putting on and taking off are important factors. Of course, almost any of these styles of leggings is adaptable for other uses, especially when sparks, molten metal or severe heat are encountered.

In rather rare instances light leggings or spats have been used with more or less success for leg and foot protection for women.

Proper protective apparel will speed up production, will keep men on the job, will keep them happy, and will increase profits.

The following questions were brought out in the discussion:

1. Do spats give as good leg protection as leggings?

No.

2. Why are spats worn at all?

They are used when workmen have an aversion to leggings or when only low splashes of hot material are expected. In the latter case, however, the workman wearing spats is taking a gamble, because, by the law of averages, the hot splashes may not always be low.

3. What material is the best heat resister?

Asbestos gives the best protection from severe heat, but this material will not stand wear and friction as well as some other materials.

Respiratory Protective Equipment for Use Against Dusts, Fumes and Gases

By PHILIP DRINKER
Boston, Mass.

There appears to be some confusion as to the distinction between dusts, fumes, vapors, mists, and gases, with the result that respiratory equipment for protection against them occasionally is wrongly applied. The respirator manufacturers have many examples of such misunderstandings and often are blamed for errors which result solely from confusion in nomenclature.

Dusts include all types of dry earthy particles small enough to be blown about by ordinary air currents. Dust suspensions may be generated as the result of a grinding, blasting, or comminuting process; or they may result from the handling of finely divided materials as in mixing processes, in sweeping, or the blowing about of wood flour, plant pollens, or common road dust. There is no chemical limitation implied by the term "dust" while the range in size of dust particles extends from the sub-microscopic to small sand grains. Such materials can be caught very effectively by the modern type of dust respirator.

Fumes embrace two definite kinds of atmospheric suspensions. It is unfortunate that such double-naming exists in the trade but one had best admit the fact. Thus, "lead fume" is a very old term used to describe the visible dark grey suspension which evolves from lead heated to high temperatures. The material in such suspensions is mostly tiny particles of lead (and lead oxide), much smaller in size than those of the average dust, with some lead in the gaseous state. When such a mixture is cooled down to the point where it can be breathed the contaminant is then the lead particles alone without any gaseous lead.

The word "fume" is also used to describe the mixture of gas and mist which may come from a bath of hot nitric acid, for example. None of the material in the suspension is dry—it is all in the form of a true mist (liquid droplets) or as a gas, yet it may have a thick brownish color. One buys fuming sulfuric acid (a liquid) from any chemical supply house and one can see large plants for recovering lead fume—a dry powder. Obviously, one does not want the same kind of respiratory equipment for two such different substances yet the customer often asks for a respirator to protect against fumes.

Lead fume happens to be very difficult to filter out so that the ordinary respirator which catches dust particles may be inadequate against lead fume. The acid fumes, containing both liquid particles and gas, require a filter to catch the droplets and a gas absorbant to catch the gaseous constituent. Therefore, it usually happens that the respirator manufacturer, in self protection, advises the customer to use an air-supplied or air-line respirator because he will then be adequately protected whether the fume is of solid particles, like lead, or a liquid and gas mixture. If the customer stated exactly what the suspension consisted of or told how it was generated he might be able to use less expensive equipment.

A vapor is a gas which can be converted into a liquid at ordinary temperatures and pressures. Thus, water vapor is a common constituent of the air and is contained in concentrations which vary with atmospheric conditions. Respiratory protective equipment is used against low concentrations of a great many vapors arising from common organic solvents such as benzol. Many such substances are absorbed by activated charcoal as in gas masks. There is a small cartridge type respirator in which the cartridge is filled with activated charcoal for absorbing a vapor such as benzol or with soda-lime for absorbing an acid gas such as carbon dioxide. Because these small cartridges contain comparatively little of the absorbant their use is limited to very low concentrations. They should not be used for emergency rescue work.

A mist consists of a suspension of liquid droplets together with the gas from which the droplets condensed. The commonest example is atmospheric fog.

Droplets of mist are necessarily microscopic in size or they would not remain in suspension. As soon as several droplets collide and form a large drop the liquid settles out. Therefore, it is possible to dispel a true mist very readily by simply stirring up the air—ventilation or dilution is unnecessary.

Mist droplets can be filtered out by ordinary dust respirators—that is, the visible portion of a fog is easily removed by filtration—but the gaseous constituent may pass through the filter. If the mist happens to be corrosive to fabrics the resultant effect upon a dust respirator is bad. Paint spraying generates a mist and a certain amount of vapor. Protection usually consists of an air-line respirator but it is not at all uncommon to use cartridge respirators containing activated charcoal and a filter.

A gas contains no solid or liquid particles under ordinary atmospheric conditions. The filter units of any of the common makes of respirators are ineffective against gases. Respiratory protective equipment which catches gases always consists in some chemical agent which either absorbs the gas or converts it into some other substance which can be absorbed. Because one can rarely be sure of the gas concentration to be encountered it is common practice in exploring man holes, for instance, to use devices supplied with air or oxygen in order that the wearer may be safe, regardless of the conditions he finds. The gas mask, however, and its outgrowth, the chemical cartridge respirator have a definite place in industry and are in wide use today.

The U. S. Bureau of Mines has helped in the manufacture and use of respiratory protective equipment greatly by its issuance of specifications for permissible equipment. Their present schedules do not include the air-supplied respirators such as those used in paint spraying or sand blasting but both the Bureau and the American Standards Association will issue such specifications presently.

Discussion following the address was based on these points:

1. What protection is provided against a dangerous accumulation of air pressure in the ordinary fresh air hose mask?

The helmet is not rigid. Air will leak out long before a dangerous pressure accumulates, or a safety link, provided in some types of hose mask, will blow out.

2. Would a protective mask approved for lead dusts filter out zinc oxide?

Yes. However, almost any type of mask will filter out zinc oxide, since these particles are easily trapped.

3. Will the simple face mask filter out ordinary smoke or will it absorb it?

It is impossible to answer such a question. There are as many types of ordinary masks as there are ordinary dusts. A mask must be purchased to fit a specific need. This is not difficult, however, since all types are available.

Glass Used for the Protection of the Eyes Against Injurious Radiation

By E. D. TILLYER

Southbridge, Mass.

The effect of excess visible light on the eye is immediately felt. If there is too much, anyone except the sun gazers immediately turns away, closes the eyes or seeks some kind of relief. There is a tendency to use too dark glasses in welding, inherited from the days when even the blackest glasses gave practically no protection from the insidious invisible radiations. A proper rule is, use a shade number which gives good, immediately comfortable vision and insist that this glass give protection against the invisible radiations.

The effects of the ultra-violet and the infra-red radiations are not as quickly noticed as the visible. We cannot say, as we said for the visible, "get good immediately comfortable vision" because the first noticed effect of the ultra-violet occurs several hours after the exposure and the infra-red effect is usually longer delayed.

One outstanding piece of research was that of Sir Wm. Crookes on glasses to protect the eyes of glass workers. From statistical data, Crookes arrived at the conclusion that the ultra-violet and/or the infra-red produced cataract in the human eye. This was important, but the real importance of his research was that he found that the infra-red was absorbed by iron in the ferrous state in ordinary glass.

Also, he found that a cerium compound when added to glass was an excellent absorber of the ultra-violet. These two discoveries were important in the manufacture of good absorbing glasses, although full advantage was not taken immediately because Crookes found no ultra-violet, but only infra-red, present in the radiations to which glass blowers were subjected during their working hours. These last four words should be underlined from the indications of modern research.

A very important paper was published by Von der Hoeve of Leyden in 1920 which showed the tendency of ultra-violet to produce either cataract or macular degeneration. Macular degeneration has not been considered as frequently as cataract in the literature. Probably it occurs more frequently after the removal of the crystalline lens in the cataract operation. The crystalline lens is in many cases, although not always, an effective screen cutting out ultra-violet.

Dr. Janet Clark has published an outstanding research paper which appears to tie together both ultra-violet and infra-red in its more serious forms of injury to the human eye, that is, cataract. She says: "The initial process of light denaturation may therefore occur in the lens without any visible opacity, and it is probable that there is always some denatured protein present as the result of exposure to sunlight." . . . "The second step in light coagulation by proteins is very much accelerated by heat and occurs rapidly at 40° C. (104° F.) . . . It is probable therefore that the higher incidence of cataract in workers exposed to molten glass and metals is due to an increased rate of precipitation of light denatured protein when the lens is heated above body temperature by exposure to large sources of radiant heat, and when low concentrations of calcium or other substances producing a similar effect are present."

We always have some ultra-violet in sunlight. In welding, especially arc welding, we have extremely intense ultra-violet. Add to this the infra-red from hot metal or "radiant heat" and combine this with a very slight excess of calcium and we have the necessary and sufficient conditions to produce cataract.*

We have considered the more serious results of radiations. The less serious, although extremely uncomfortable at times, are more often experienced. The most common is "sand in your eyes," from ultra-violet falling on the conjunctiva. This is not comfortable to say the least, and frequently is caused by reflections from the original source reaching the side of the eyeball. Some white paints do not reflect the ultra-violet while others do. One of the best reflectors is an oxidized aluminum surface, one of the poorest is a highly polished silver surface, quite different from the way these materials reflect visible radiation.

The first felt action of infra-red on the eyes varies among different individuals and with different regions of the infra-red. The long wave infra-red (longer than about 1.5) is absorbed by the water in the tears or the conjunctiva at the very surface of the eyeball, since water is extremely opaque to these radiations. Shorter wavelength radiations than this, but longer than the visible waves, penetrate deeper and deeper into the eye. The simplest way to avoid the different types of eye troubles so produced is to eliminate both types of infra-red radiations.

The early glasses used for protection were a delusion and a snare. The visible was reduced so much that the work could not be seen, in the hope that the eye would be protected. Sometimes the ultra-violet would be eliminated, sometimes not. The infra-red was usually well transmitted, about as well as with two or three layers of ordinary window glass.

The infra-red was another matter, rarely being reduced much by accident. Only two cases do I remember, one an

* Many other conditions may produce cataract besides excessive radiations.

DISCUSSION

In the discussion which followed the formal addresses Col. Hartney endorsed the viewpoints of the speakers, commended the "fine spirit of cooperation evidenced by the National Safety Council" and expressed the opinion that an official resolution from the Council, supporting the Federal Government in a progressive policy of adequate appropriations for airway aids in the best interests of public safety and better business, would be most timely.

Earl F. Ward, of the Bureau of Air Commerce, Washington, D. C., suggested that the state aviation officials cooperate with the Federal Government in educating and encouraging the private pilot to use the airways traffic control system. He emphasized that this system is a directing rather than a policing agency and that it can function satisfactorily only if everyone cooperates.

He expressed the belief that much might be accomplished by the establishment within each state of an advisory council as an auxiliary to the State Aviation Board. This council would be composed of experienced pilots, one from each section of the state. The members would cooperate on a non-remunerative basis with the state officials for the advancement of safety in aviation. Each member would be of sufficient prestige to discourage hazardous flying in his section of the state.

Col. J. C. Cone, of the Bureau of Air Commerce, Washington, D. C., discussing the direction finder, expressed the belief that the ultimate solution would be a combination of the radio direction finder on the ground and the radio compass. He emphasized the need of obtaining public interest in supporting the establishment of additional aids.

Jerome F. Lederer, of the Aero Insurance Underwriters, New York City, supported Lieut. Barker's contention regarding the safety of air transportation and pointed out that even the non-traveling public is benefited by the more rapid exchange of ideas, goods and people. He stated that air transportation accelerates the creation of wealth for everybody.

The session unanimously approved Col. Hartney's suggestion that a resolution be prepared and submitted to the Executive Committee of the National Safety Council for its official approval, with the suggestion that copies be sent to the incoming members of the Senate and House of Representatives. Mr. Lederer, Mr. Aldworth and Mr. Ainsworth were authorized to prepare the resolution, which was drafted as follows:

Resolution

WHEREAS, Safety is the foundation of public confidence in air transport: and

WHEREAS, The Federal Government, along with the several States, can, by the maintenance of proper navigational aids and the adoption of an adequate airport program, along with wise regulation and vigorous promotion, guarantee safety to the flying public; *therefore*

BE IT RESOLVED, That the Federal Government be urged to materially increase the present inadequate navigational aids and inaugurate an airport program based on service to the public and national safety requirements; and, That the United States Department of Commerce increase its personnel and provide necessary transportation in order that an adequate inspection service can be rendered, together with such promotional development as will point the way toward simplification of flight procedure; and,

BE IT FURTHER RESOLVED, That the various States be urged to promote uniformity of regulation, the development of air marking projects, state planning of airport facilities, and the dissemination of accurate information concerning aeronautical development.

A motion picture on cloud formation and dispersion was shown by Dr. D. M. Little, Chief of Aerological Division, U. S. Weather Bureau, Washington, D. C.

After re-election of officers the meeting was adjourned.

ADJOURNMENT

American Society of Safety Engineers—Engineering Section

Officers 1935-36

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*W. F. Boehnen, J. B. Stetson Co., Philadelphia, Pa. (Philadelphia Chapter.)
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Thomas E. Lightfoot, Koppers Coal Co., Pittsburgh, Pa.
M. G. Lloyd, National Bureau of Standards, Washington, D. C.
W. S. Paine, Aetna Casualty & Insurance Co., Hartford, Conn.
Geo. F. Prussing, Union Oil Company of California, Los Angeles, Calif.
C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
A. S. Regula, Industrial Relations Counselors, Inc., New York, N. Y.
John Russell, Jr., Public Service Electric & Gas Co., Newark, N. J. (Northern New Jersey Chapter.)
G. E. Sanford, General Electric Co., Schenectady, N. Y.
H. S. Smith, Union Carbide and Carbon Corp., New York, N. Y.
R. C. Stratton, The Travelers Insurance Co., Hartford, Conn.
K. F. Thalner, Buick Motor Company, Flint, Mich.
S. E. Whiting, Liberty Mutual Insurance Co., Boston, Mass.
William P. Yant, U. S. Bureau of Mines, Pittsburgh, Pa.

Officers Elected for 1936-37

General Chairman—D. L. Royer, Ocean Accident and Guarantee Corp., New York, N. Y.
Vice-Chairman—C. B. Boulet, Wisconsin Public Service Corp., Milwaukee, Wis.
Vice-Chairman—R. E. Dorovan, Standard Oil Company of California, San Francisco, Calif.
Secretary—W. Dean Keefer, National Safety Council, Chicago, Ill.

* Deceased.

Members at Large—

CYRIL AINSWORTH, American Standards Association, New York, N. Y.
C. B. AUEL, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.
J. I. BANASH, Consulting Engineer, Chicago, Ill.
F. W. BECK, United States Rubber Products, Inc., New York, N. Y.
H. K. BIXLER, Union Carbide and Carbon Corp., New York, N. Y. (Metropolitan Chapter)
E. W. BULLARD, E. D. Bullard Co., San Francisco, Calif. (San Francisco Chapter)
H. F. GILBERT, American Cyanamid Co., Linden, N. J. (New Jersey Chapter)
ROY M. GOODWIN, Philadelphia Electric Co., Philadelphia, Pa. (Philadelphia Chapter)
W. M. GRAFF, National Bureau of Casualty & Surety Underwriters, New York, N. Y.
H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Western Pennsylvania Safety Council Chapter)
R. McA. KNOWX, Industrial Commission of Wisconsin, Madison, Wis.
J. M. KERRIGAN, United States Rubber Reclaiming Co., Inc., Buffalo, N. Y. (Niagara Frontier Chapter)
EVERETT F. KING, Lever Brothers Co., Cambridge, Mass. (Boston Chapter)
THOMAS E. LIGHTFOOT, The Koppers Coal Co., Pittsburgh, Pa.
M. G. LLOYD, National Bureau of Standards, Washington, D. C.
H. L. MEKER, E. I. du Pont de Nemours & Co., Wilmington, Del.
W. S. PAINE, Aetna Casualty & Insurance Co., Hartford, Conn.
GEO. F. PRUSSING, Union Oil Company of California, Los Angeles, Calif.
C. E. RALSTON, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
A. S. REGULA, Industrial Relations Counselors, Inc., New York, N. Y.
G. E. SANFORD, General Electric Co., Schenectady, N. Y.
C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.
H. S. SMITH, Union Carbide and Carbon Corp., New York, N. Y.
R. C. STRATTON, The Travelers Insurance Co., Hartford, Conn.
R. F. THALNER, Buick Motor Company, Flint, Mich.
S. E. WHITING, *Liberty Mutual Insurance Co., Boston, Mass.*
WILLIAM P. YANT, Mine Safety Appliances Co., Pittsburgh, Pa.

WEDNESDAY NOON SESSION

October 7, 1936

The annual meeting of the ASSE-Engineering Section of the National Safety Council followed a luncheon and convened with C. W. Smith, Standard Oil Co. (Ind.), Chicago, general chairman, presiding. All reports had been mimeographed, and copies were distributed at the luncheon.

Dr. Francis F. Lucas, Member, Technical Staff, Bell Telephone Laboratories, New York City, and international authority on microscopy and photomicrography, spoke on "Late Developments in High Power and Ultra Violet Microscopy."

The report of the nominating committee was presented by A. S. Regula, chairman. Other members of the committee were S. E. Whiting, R. F. Thalner, C. B. Auel, and Dr. M. G. Lloyd. The committee's list of officers, as elected, will be found elsewhere in this sectional record.

Other sessions sponsored by the ASSE-Engineering Section included those on "Safety Belts," "Safety Training," "Exhaust Systems," "Safety Exchange Round Table," and "Occupational Diseases." Reports of these sessions will be found elsewhere in the Transactions.

Late Developments in High Power and Ultra Violet Microscopy —Their Value from an Accident Prevention Viewpoint for Detecting Flaws in Metal Structures

By DR. FRANCIS F. LUCAS

Member Technical Staff and Head of Microscopic Laboratories, Bell Telephone Laboratories, Inc., New York City

• • •

Dr. Lucas used about 30 lantern slides and discussed each briefly. The high power and ultra-violet microscopes were first illustrated and described. Following this was a group of four slides showing the development of high power metallography. The first photograph showed a specimen of chrome iron (stainless iron) at 200 diameters magnification. The structure was so fine that at this magnification little could be seen. The next photograph, at 1000-X, began to show some structure. Ordinarily this would be regarded as a high power micrograph. Next the structure was shown at 4000-X with the best apochromatic system the world affords. The structure was then resolved to better advantage, but not fully. The final micrograph was of the same specimen but photographed with the new mono-brom-naphthalene immersion system of N. A. 1.60 and showed the structure completely resolved. Details of structure — minute carbides of iron and chromium — measuring about 150 atom diameters in size were very distinctly resolved.

Dr. Lucas showed how this high resolving power system could be applied to a study of fatigue cracks, which vary in width from about 150 atom diameters upward.

• • •

Cracks in metal bring to mind fatigue phenomena as the cause. If one arrived at this possible conclusion, he would not be far wrong. I shall not be concerned particularly with methods of test, test data and the outward characteristic appearance of fatigue fractures. To review very briefly some of the ideas now commonly held on the subject by metallurgists and engineers may refresh the memory. It may be an aid to a better understanding of the new subject of internal stress raisers and their influence on the propagation and trend of fatigue cracks.

It is asserted by competent authorities that a very high percentage of metal failures occurring in service are of the type denoted as fatigue failures. All fast moving mechanisms whose loads are either intermittent or reversed cycles of stress may develop fatigue type failures.

Literally thousands of things in every day use, from a giant ocean liner to the hair spring of a delicate watch, may be subject to fatigue type failures.

The advent of the railroad seems to have been responsible for stimulating thought on the subject of the fatigue of metals under repeated stress. A German engineer prevailed upon Prussian State Railways to undertake such an investigation, and his results have become a classic. His repeated stress tests were reported in the London publication "Engineering" for 1871.

The fracture resulting from repeated stress is a brittle, jagged-appearing one, so that at first engineers and investigators concluded that the fibre of the metal underwent some change. Oftentimes the fractured surface appears bright and shining as though composed of large crystals. Observers of these fractures inferred that a change had occurred in the metal and from the appearance to the eye the theory seems to have developed that the metal had crystallized and hence had failed. No one seems to have advanced any good reason why a crystallized metal should be weaker and more susceptible to cracking than a non-crystalline one, assuming such existed. But at any rate the crystallization theory persisted, and it took almost two decades and much microscopy to dispel the delusion. Even today echoes of this old crystallization theory may be heard from engineers.

As a matter of fact, metals are inherently crystalline. The crystals at times may be large and equi-axed or they may

Automotive and Machine Shop Section

Officers 1935-36

General Chairman—C. T. Wixegar, Chrysler Corporation, Detroit, Mich.
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Health Committee Chairman—Dr. A. L. Brooks, Fisher Body Detroit Div., General Motors Corp., Detroit, Mich.
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Poster Committee Chairman—C. W. Bishop, Lycoming Manufacturing Co., Williamsport, Pa.
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Publicity Committee Chairman—Nelson H. Kyser, The Studebaker Corp., South Bend, Ind.
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C. M. Dotterer, Revere Copper and Brass, Inc., Detroit, Mich.
Hoyt L. Fracher, Detroit Steel Products Co., Detroit, Mich.
Merle C. Hale, General Motors Corp., Detroit, Mich.
M. J. McCarthy, Fisher Body Corp., Detroit, Mich.
R. A. Shaw, Murray Corp. of America, Detroit, Mich.
Carl L. Storck, Delco Products Corp., Dayton, Ohio.
R. F. Thalner, Buick Motor Co., Flint, Mich.

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Members at Large—
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C. M. Dotterer, Revere Copper and Brass, Inc., Detroit, Mich.
Hoyt L. Fraczier, Detroit Steel Products Co., Detroit, Mich.
Merle C. Hale, General Motors Corp., Detroit, Mich.
M. J. McCarthy, Fisher Body Corp., Detroit, Mich.
R. A. Shaw, Murray Corp. of America, Detroit, Mich.
Carl L. Stuck, Delco Products Corp., Dayton, Ohio.
R. F. Thalner, Buick Motor Co., Flint, Mich.
C. T. Winegar, Chrysler Corp., Detroit, Mich.

MONDAY AFTERNOON SESSION

October 5, 1936

The Session was called to order by General Chairman C. T. Winegar, Chrysler Corporation, Detroit, Mich., who presided, introducing the speakers:

What Makes a Safety Program Effective

By J. F. KOLB

Director, Department of Industrial Relations, National Metal Trades Association, Chicago

An adequate program of industrial safety cannot be established and successfully maintained without a comprehensive study of company policies, practices, equipment, and personnel, and a subsequent adjustment of such factors to conform to desirable standards.

In many cases safety programs have failed to function effectively because company policies (1) were so limited in scope as to be quite inadequate and too often have been treated as matters of expediency, (2) were confusing to line or staff officers because delegated authority and responsibility were not definitely defined and allocated, and (3) were seldom properly transmitted to all employees in well written, easily understood language.

Too often a subordinate officer who was interested in enlarging his sphere of activities, hoping to attract the attention of his superiors, has been permitted to work unassisted in the development of safety programs. In many such cases lack of special preparation for the job prevented this officer from comprehending the ramifications of industrial safety. Further, the uncertainty of official cooperation, foreman reprisal, and insecurity of his position because of management's incomplete cooperation, have seriously retarded such safety programs.

The effectiveness of a plant safety program is directly proportional to the interest, support, and leadership of the plant management. Therefore, the manager in cooperation with his staff should develop policies and operating plans that conform to standard practice. He should delegate the administration to competent personnel. The policies and plans should indicate the extent of the program and allocate responsibility and define authority for execution of the plan. The personnel should be impressed with the importance of safety service to the company and each employee. In actual practice some adjustments may be needed to assure accomplishment of objectives.

In developing safety a plant can build one of the most satisfactory organizations and programs or, through lack of intelligent cooperation or actual opposition, reduce the effectiveness of safety work to a point where employees will disregard all rules and ridicule the spasmodic efforts of the management to protect their persons against known hazards.

Employees tend to disregard certain safety rules or orders merely because such orders were given in a disparaging manner which caused them to believe they might disregard them with impunity so far as their immediate superior was concerned. Occasional clashes have occurred between production foremen, maintenance foremen and the director of safety, when either the machine or the mechanical guarding was partially out of order or was being improperly used.

In some cases the foremen's interest in obtaining maximum production caused them deliberately to remove guards or permit employees to do so: in other cases, they have ordered an employee to continue using a machine when they knew that either the machine or the guarding was defective and injury might result to the employee at any time. Sometimes, because of the forceful demands of certain plant officials, those in charge of safety permitted the operation of hazardous equipment until a serious accident forced upon the attention of higher officials the knowledge of neglect or insubordination.

When employees are permitted or encouraged to avoid the use of protective devices, even on jobs when the hazard is slight, they probably will take the next step and encroach in this field until a major accident occurs.

Regardless of the amount of responsibility reserved to the manager, the company's line and staff organizations should be fully instructed regarding their duties, and some major official should periodically check up on their performance to be certain that their efforts are properly coordinated and producing anticipated results. Since the line organization is largely responsible for action and the staff organization for gathering and assisting the line in the dissemination of information, we can easily determine any officer's function and responsibility in relation to the safety program. The value of the contacts established and maintained by the line and staff officers in this field will be measurable in terms of red or black accounting and in terms of employee satisfaction or dissatisfaction.

When the staff gathers and prepares information for dissemination to employees, every line officer should transmit it unimpaired so that employees will accept it in the right manner and make the best possible use of such help. When improper mechanical guarding or defective equipment is reported, the line officers should cooperate fully in guarding or rehabilitating the equipment before using it again and induce employees to use such equipment in the approved way. Further, good management-employee relations help locate and eliminate hazards before men or equipment are damaged. Proper coordination of effort will cause all employees to be so conscious of the need for safety that they will refuse to operate machines or processes when improperly guarded.

The rapid mechanization of industry and the employment of a much larger number of men of limited training and experience has increased industrial hazards to a remarkable extent. Although some of our newer machine tools are effectively guarded, there is so much old equipment still in use by inexperienced men and so much more mechanical equipment in use in general, that we will have to increase our activities in the field of safety if we expect to keep our accident ratios about their present level or to reduce them.

Regular and rigorous re-examination of equipment and guarding will provide reports of hazards that in most cases can be eliminated by mechanical treatment. In many cases these reports can be reinforced by periodic analyses of reports on plant experience, including workmen's compensation cases and other shop cases classified as to the type, cause, point of occurrence, severity, loss of time, and recurrence. In certain cases a combination of these studies will indicate that guarded equipment is improperly guarded, and even though such reports do not indicate the solution, they will at least direct attention to a problem that must be solved.

Management should take the initiative in promoting these studies and not depend entirely upon the reports of inspec-

In each industrial center, therefore, will be set up a local or district Construction Safety Council composed of representatives of the employer and employee, who shall be selected by and through employers' organizations and employees' organizations. In each center will be held educational and instructive meetings to acquaint both employer and employee with the seriousness of the accident situation and to instruct them in the proper method of promoting plans for safety contests. These meetings will also emphasize the proper manner in which to construct, erect and use the temporary facilities, safeguards and devices commonly found on every construction job.

Where heretofore the safety efforts have been largely directed by the employers, under the present plan joint action of both employers and employees is being pursued. It is felt that, since safety rewards are mutually beneficial, safety activities should be a matter of mutual responsibility. We believe this method is the only logical approach to the problem of safety in the industry. How well it works out will be made more apparent when the activities of the council are more thoroughly co-ordinated, which should be early in the coming year.

One feature of the new Ohio campaign that makes it predestined for success is that the industry is not satisfied with a position of entire dependency upon state agencies. The leaders of the movement have approached their problems in a business way.

The entire plan of organization is to create a medium by which and through which the industry will control its accident frequency and which will further serve as a counseling body between the industry and the Industrial Commission on all matters pertaining to accident prevention.

ADJOURNMENT

Food Section

Officers 1935-36

General Chairman—C. W. Dempsey, Liquid Carbonic Corp., Chicago, Ill.
Vice-Chairman in Charge of Program—S. B. Horrell, The Carey Salt Co., Hutchinson, Kan.
Secretary and Publicity Committee Chairman—D. M. Clark, Society of Grain Elevator Superintendents of North America, Chicago, Ill.
News Letter Editor—C. W. Turning, Goddard and Heinselman, Minneapolis, Minn.
Engineering Committee Chairman—Frank A. Hasse, Corn Products Refining Co., Chicago, Ill.
Health Committee Chairman—G. H. Sibley, Jewel Tea Co., Inc., Barrington, Ill.
Membership Committee Chairman—Fred A. Webb, Borden-Wieland, Inc., Chicago, Ill.
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R. R. Chaney, Coffee Products of America, Inc., Ltd., Los Angeles, Calif.
Ray J. Culkin, Rockwood & Co., Brooklyn, N. Y.
A. B. Dean, Commander-Larabee Corp., Minneapolis, Minn.
Alexander Dienst, The National Sugar Refining Co., Long Island City, N. Y.
E. E. Drews, Libby, McNeill & Libby, Chicago, Ill.
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Paul C. Goodnough, The Quaker Oats Co., Chicago, Ill.
D. R. Grant, Beechnut Packing Co., Canajoharie, N. Y.
L. O. Green, Wilson & Co., Inc., Chicago, Ill.
E. C. Grether, The American Sugar Refining Co., New York, N. Y.
Theodore Krueger, Pennsylvania Hotel, New York, N. Y.
Henry J. Mineur, The Borden Co., New York, N. Y.
T. A. Schendel, West Disinfecting Co., Chicago, Ill.
A. C. Schroeder, Church & Dwight Co., Syracuse, N. Y.
Dr. Wilmer H. Schulze, Director, Bureau of Environmental Hygiene, Health Dept., City of Baltimore, Md.
R. M. Seeker, Anheuser-Busch, Inc., St. Louis, Mo.
W. W. Smith, Smith Brothers, Inc., Poughkeepsie, N. Y.
W. E. Stenvig, General Mills, Inc., Minneapolis, Minn.
W. A. Sullivan, Loose-Wiles Biscuit Co., Kansas City, Mo.
Vern D. Sutton, Postum Company, Inc., Battle Creek, Mich.
Wilbur Thomas, Hage's, Limited, San Diego, Calif.

Officers Elected for 1936-37

General Chairman—C. W. Dempsey, Liquid Carbonic Corp., Chicago, Ill.
Vice-Chairman in Charge of Program—S. B. Horrell, The Carey Salt Co., Hutchinson, Kansas.

Vice-Chairman in Charge of Membership—Fred A. Webb, Borden-Wieland, Inc., Chicago, Ill.

Secretary—D. M. Clark, Society of Grain Elevator Superintendents of North America, Chicago, Ill.

News Letter Editor—C. W. Turning, Goddard & Heinselman, Minneapolis, Minn.

Engineering Committee Chairman—G. L. Gore, Bruce Dodson and Co., Kansas City, Mo.

Health Committee Chairman—Dr. Wilmer H. Schulze, Director, Bureau of Environmental Hygiene, Health Dept., City of Baltimore, Md.

Poster Committee Chairman—F. A. Hasse, Corn Products Refining Co., Chicago, Ill.

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A. L. Brown, Post Products Div., General Foods Corp., Battle Creek, Mich.
Ruth E. Cade, A. E. Staley Manufacturing Co., Decatur, Ill.
R. R. Chaney, Coffee Products of America, Inc., Ltd., Los Angeles, Calif.
Ray J. Culkin, Rockwood & Co., Brooklyn, N. Y.
A. B. Dean, Commander-Larabee Corp., Minneapolis, Minn.
E. E. Drews, Libby, McNeill & Libby, Chicago, Ill.
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A. D. Ferrari, Bohemian Distributing Co., Ltd., Los Angeles, Calif.
Paul C. Goodnough, The Quaker Oats Co., Chicago, Ill.
D. R. Grant, Beechnut Packing Co., Canajoharie, N. Y.
L. O. Green, Wilson & Co., Inc., Chicago, Ill.
R. C. Haven, Continental Baking Co., New York, N. Y.
C. W. Knowles, El Dorado Oil Mills & Fertilizer Co., El Dorado, Ark.
L. R. McCash, Henrich Brewing Co., Seattle, Wash.
W. J. Maze, Hawaiian Sugar Planters' Association, Honolulu, Hawaii.
Henry J. Mineur, The Borden Co., New York, N. Y.
I. H. Morgan, Morgan Packing Co., Austin, Ind.
James L. Oliver, American Bottlers of Carbonated Beverages, Washington, D. C.
Douglas Pearn, Walgreen Drug Stores, Chicago, Ill.
George T. Peckham, Jr., Clinton Co., Clinton, Iowa.
G. F. Pfeiffer, Moorman Manufacturing Co., Quincy, Ill.
C. L. Rhys, John Morrell & Co., Ottumwa, Iowa.
A. C. Schroeder, Church & Dwight Co., Syracuse, N. Y.
John R. Sellers, Joseph S. Finch & Co., Schenley, Pa.
G. H. Sibley, Jewel Tea Co., Inc., Barrington, Ill.
W. W. Smith, Smith Brothers, Inc., Poughkeepsie, N. Y.
W. A. Sullivan, Loose-Wiles Biscuit Co., Kansas City, Mo.
Leon G. Tujague, National Food Products Co., New Orleans, La.
Lionel W. Udell, United Fruit Co., Boston, Mass.
H. E. Wheeler, Jr., Henry Heide, Inc., New York, N. Y.

TUESDAY MORNING SESSION

October 6, 1936

The first session of the Food Section was called to order by General Chairman C. W. Dempesy, Liquid Carbonic Corp., Chicago, who presided. Chairman Dempesy welcomed the delegates and introduced the speakers.

Safety and Health in Food Handling

By WILMER H. SCHULZE, Phar. D.

Director, Bureau of Environmental Hygiene, Baltimore City Health Department

While accident prevention programs have been effective in the reduction of loss of life and limb in our industrial population, there exists another field of activity which requires the cooperative interest of all engaged in safety work, namely, the health of the industrial worker. At present health programs in many plants have a status comparable to the safety program of some years ago. Such a state of undevelopment is only natural, however, when it is considered that bodily injuries resulting from accidents are usually instantaneous and the cause is generally evident and corrective or preventive measures can be applied in *most* instances.

On the other hand, injuries to health are seldom apparent within a brief period, and frequently it may be months or years *before* unhealthful working conditions exhibit detectable injury to the employees' health. The time is now opportune for focusing attention upon those factors in industrial environments which have a direct or indirect effect upon the workers' health. National health and labor officials, State departments of health and labor and some municipal health departments are giving the matter of industrial health serious consideration.

For a number of years the staff of the office of Industrial Hygiene and Sanitation of the United States Public Health Service has been carrying on studies of those industrial environments which react unfavorably on the health of workers. The publication of the data pertaining to these investigations has stimulated an increased interest on the part of health officials, labor departments and industrialists.

The United States Public Health Service has recently completed the collection of data in the field as part of an Occupational Morbidity and Mortality Survey conducted on a nation wide basis. The statistical data obtainable from this survey will no doubt furnish valuable information and guidance for the future establishment and development of industrial health programs.

During the early part of 1936 the Division of Standards of the United States Department of Labor conducted the first Training Course for State Factory Inspectors in Baltimore, with the cooperation of the Johns Hopkins School of Hygiene and Public Health, and the assistance of the Maryland State Accident Commission and the Baltimore City Health Department. The course consisted of a series of lectures and field inspections covering accident prevention and health protection in industry. Similar courses will be offered to other groups of factory inspectors in other sections of the country. This training of State industrial inspectors in the recognition and means of correction of accident and health hazards will no doubt increase the value of the services of factory inspectors to industry.

Both State and municipal health officials are awakening to the fact that in order to guard the health of the community they cannot ignore industrial conditions. Connecticut has a well established Bureau of Occupational Diseases in the State Department of Health. In a number of other States progress is being made in the establishment of industrial hygiene services, either in health departments or in departments of labor. The Health Department of St. Louis, with the guidance of the United States Public Health Service, recently completed a survey of representative industries in that city to determine the existent potential industrial health hazards.

In the Baltimore City Health Department a group of industrial hygiene inspectors devotes its entire time to the study of health hazards in local industrial plants. This service has been extended by the establishment of a Bureau of Occupational Diseases under the direction of a physician with industrial hygiene experience. As a result of these technical and medical services, plant officials have welcomed visits to and studies of working conditions with subsequent discussions and recommendations in connection with any health hazards found to exist.

1. **Overhauling meat.** Mr. McClellan submitted blue prints of a properly designed hook and also of a portable platform which had reduced accidents in this operation.

2. **Safety shoes and non-slip boots.** The use of safety shoes with fibre toes rather than steel toes had been found advisable in refrigerating rooms to avoid frosting inside the shoe. Mr. Palmer reported that some of their employees had objected to the stiff toes, claiming misfit and chafing. In such cases the shoe company had taken X-ray pictures of the employees' feet with the shoes on until they had found whether the complaint was justified. By following this procedure they succeeded in getting satisfaction in all cases. Leather soles had been found the least likely to slip in almost all operations, but that nothing satisfactory for use on the vitrified brick floors had been developed and thoroughly tried.

3. **Mesh gloves.** Mesh gloves have been used in two weights. Lighter weight gloves are satisfactory where there is not much chance of tearing against the bone, but the heavier glove has been developed to resist this tearing and is proving much more satisfactory, although some men objected to the increased weight.

4. **Knife guards.** The use of guarded knives on beef killing floors is largely a matter of education. Some of the old time workmen feeling that it is a reflection upon their skill to have to use a guarded knife.

5. **Non-slip floors.**

The vitrified brick floors now being installed in some locations are more slippery than the old type. An asphalt floor with plenty of grit is about the least slippery floor so far developed. Concrete floors that have been troweled to a smooth surface can be roughened by treating with concentrated sulphuric acid and then flushing with water.

ADJOURNMENT

Metals Section

Officers 1935-36

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Vice-Chairman—C. M. Allen, The American Rolling Mill Co., Middletown, Ohio.
Vice-Chairman (In Charge of Health)—Dr. R. C. Excel, Corrigan-McKinney Div., Republic Steel Corp., Cleveland, Ohio.
Secretary and News Letter Editor—R. A. Chaffin, Continental Steel Corp., Kokomo, Ind.
Contest Committee Chairman—Robert L. Schmitt, Louisville Car Wheel and Railway Supply Co., Louisville, Ky.
Engineering Committee Chairman—J. E. Cullinet, Bethlehem Steel Co., Bethlehem, Pa.
Foundry Committee Chairman—Irwin A. Brinkman, Mackintosh, Hemphill Co., Pittsburgh, Pa.
Membership Committee Chairman—Mell E. Trammell, Gulf States Steel Co., Alabama City, Ala.
Poster Committee Chairman—R. H. Ferguson, Republic Steel Corp., Cleveland, Ohio.
Program Committee Chairman—H. M. Crichan, Inland Steel Co., East Chicago, Ind.
Publicity Committee Chairman—C. W. Hanko, Pittsburgh Steel Co., Monessen, Pa.
Railway Car Builders Committee Chairman—P. J. Brand, Pullman Standard Car Manufacturing Corp., Pullman, Chicago, Ill.
Slides and Safety Kinks Committee Chairman—J. A. Oertel, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Statistics Committee Chairman—W. J. Ireland, Kohler Co., Kohler, Wis.
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E. F. Blank, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
J. A. Coltrin, National Radiator Corp., Johnstown, Pa.
G. A. Davis, Carnegie-Illinois Steel Corp., Chicago, Ill.
M. W. Duxbury, Beloit Iron Works Co., Beloit, Wis.
John P. Eib, Carnegie-Illinois Steel Corp., Joliet, Ill.
W. T. Filmer, The Youngstown Sheet and Tube Co., Youngstown, Ohio.
A. C. Gibson, Spang, Chalfant & Co., Inc., Pittsburgh, Pa.
O. F. Hartey, American Car and Foundry Co., New York, N. Y.
S. E. Hawkes, MacWhyte Co., Kenosha, Wis.
H. H. Henry, Otis Steel Co., Cleveland, Ohio.
H. G. Hensel, The Youngstown Sheet and Tube Co., Chicago, Ill.
W. A. Jarvis, The Chase Companies, Waterbury, Conn.
F. A. Laukman, Republic Steel Corp., South Chicago, Ill.
T. H. McKenney, Chicago, Ill.
D. V. Medalie, Interlake Iron Corp., Chicago, Ill.
John O'Rourk, Bethlehem Steel Co., Sparrows Point, Md.
C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Frank Rowe, Wheeling Steel Corp., Portsmouth, Ohio.
Herman Spoerer, The Youngstown Sheet and Tube Co., Evanston, Ill.
J. K. Stafford, Mississippi Valley Structural Steel Co., Decatur, Ill.
J. A. Voss, Republic Steel Corp., Cleveland, Ohio.

* Deceased.

Officers Elected for 1936-37

General Chairman—C. M. ALLEN, The American Rolling Mill Co., Middletown, O.
Vice-Chairman—R. A. CHAPPIN, Continental Steel Corp., Kokomo, Ind.
Secretary and News Letter Editor—MELL E. TRAMMELL, Gulf States Steel Co., Alabama City, Ala.
Contest Committee Chairman—ROBERT L. SCHMITT, Louisville Car Wheel and Railway Supply Co., Louisville, Ky.
Engineering Committee Chairman—R. H. FERGUSON, Republic Steel Corp., Cleveland, O.
Foundry Committee Chairman—IRVIN A. BRINKMAN, Mackintosh-Hemphill Co., Pittsburgh, Pa.
Health Committee Chairman—DR. R. C. ENGEL, Republic Steel Corp., Cleveland, O.
Membership Committee Chairman—H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Poster Committee Chairman—H. H. HENRY, Otis Steel Co., Cleveland.
Program Committee Chairman—C. W. HANKO, Pittsburgh Steel Co., Monessen, Pa.
Publicity Committee Chairman—C. E. RALSTON, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Railway Car Builders Committee Chairman—P. J. BRAND, Pullman Standard Car Manufacturing Corp., Pullman, Chicago.
Slides and Safety Kinks Committee Chairman—J. A. OARTEL, Carnegie-Illinois Steel Co., Pittsburgh, Pa.
Statistics Committee Chairman—W. T. FILSER, The Youngstown Sheet and Tube Co., Youngstown, Ohio.

Members at Large—

F. G. BENNETT, The Buckeye Steel Castings Co., Columbus, O.
R. A. BEYER, Central Tube Co., Ambridge, Pa.
C. A. BIANCHI, H. H. Robertson Co., Ambridge, Pa.
E. F. BLANK, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
J. A. COLTRIN, National Radiator Corp., Johnstown, Pa.
C. S. CRAIGMILE, Belden Manufacturing Co., Chicago, Ill.
H. M. CRIGHAN, Inland Steel Co., East Chicago, Ind.
J. E. CULLITEY, Bethlehem Steel Co., Bethlehem, Pa.
H. W. DARR, Bethlehem Steel Co., Johnstown, Pa.
M. W. DUNMORE, Beloit Iron Works Co., Beloit, Wis.
R. T. DYE, Republic Steel Corp., Warren, O.
JOHN P. EIB, Carnegie-Illinois Steel Corp., Joliet, Ill.
E. A. ELLIS, Wheeling Steel Corp., Wheeling, W. Va.
J. P. GATHERUM, Great Lakes Steel Corp., Ecorse, Mich.
A. C. GIBSON, Spang Chalfant Co., Inc., Pittsburgh, Pa.
O. F. HARVEY, American Car and Foundry Co., New York, N. Y.
S. E. HAWKES, Macwhyte Company, Kenosha, Wis.
H. G. HENSEL, The Youngstown Sheet and Tube Co., Chicago, Ill.
W. A. JARVIS, Chase Brass & Copper Co., Waterbury, Conn.
F. A. LAUERMAN, Republic Steel Corp., Chicago, Ill.
T. H. MCKENNEY (retired), Carnegie-Illinois Steel Co., Chicago, Ill.
D. V. MEDALIE, Interlake Iron Corp., Chicago, Ill.
JOHN O'ROURKE, Bethlehem Steel Co., Sparrows Point, Md.
C. S. PHILLIPS, Revere Copper & Brass, Inc., Rome, N. Y.
FRANK ROWE, Wheeling Steel Corp., Portsmouth, O.
A. C. SCHULTZ, Bucyrus-Erie Co., So. Milwaukee, Wis.
H. J. SHERER, The Youngstown Sheet and Tube Co., East Chicago, Ind.
E. J. STERNER, Bethlehem Steel Co., Bethlehem, Pa.
J. A. VOSS, Republic Steel Corp., Cleveland, O.

MONDAY AFTERNOON SESSION

October 5, 1936

The opening session was called to order by General Chairman H. W. Darr, Bethlehem Steel Co., Johnstown, Pa., who presided. Chairman Darr welcomed the delegates, pointed to the excellent progress made by the Section during the year, and commended the various committees on their work.

Industrial Relations and Accident Prevention

By J. A. VOSS

Director of Industrial Relations, Republic Steel Corporation, Cleveland, Ohio

Industrial relations of the right kind are essential to the success of business. Men are no longer regarded as commodities, to be purchased at the lowest possible rate and discharged when no longer needed. Employees must be as contented as ambitious men can be; deserving ones must have opportunities for advancement; wages, hours, and working conditions must be favorable. There must be an earnest, sincere effort to work with men, to appreciate their needs, and as far as possible, to meet them.

As intelligent labor relations are essential to modern industrial management, so intelligent safety work is essential to a worth while industrial relations program.

The Employee Representation Plan, which has proved so successful during past years, is an excellent medium for carrying out both programs.

This plan, with its representatives elected directly by the men from among their fellow-workers, gives employees and management every opportunity to meet together and discuss all phases of industrial relations, which should include a discussion of unsafe practices and conditions. By holding regular meetings, these problems are promptly settled before serious misunderstandings develop and accidents occur. The safety man has an outstanding opportunity to carry on his work in cooperation with a safety committee from among the representatives.

That safety and welfare represent an important part of the discussions between men and management under this plan is indicated by the fact that during 1935 more than 25 per cent of all the cases handled by the representatives in our corporation dealt with these subjects.

No safety program is really effective if it fails to use the many opportunities that an enlightened industrial relations policy presents to keep safety and accident prevention constantly before the worker. Safety deserves a place of importance in the industrial relations program because of the good will it engenders among workers.

Through a constructive, well designed accident prevention program the management can get closer to the men and at the same time bring them more real good than through any other single medium. Such a program has one great advantage. Whether it's the president of the company or the newest laborer on the payroll, there is a unanimity of opinion about the value of safety.

A sound safety program also provides, through proper organization, a logical system of liaison between management and men. The safety man, who should be, and frequently is, an integral part of the industrial relations program, meets with the superintendents. The superintendents, in turn, pass on the information they have gained to the foremen. Finally, the foremen hold meetings directly with the men working under them. This completes a chain that can, as need manifests itself, be used to pass along other information with equal effectiveness.

Such a relationship is invaluable. It should be fostered and developed, for in this relationship will frequently lie the method which will place a restraining hand on trouble and discord.

In our corporation the safety department is a part of the industrial relations department. The office of the safety manager adjoins my office, and he is familiar with the questions and problems which confront us in carrying out the broad program of industrial relations.

Safety, to us, is distinctly a sales job, judiciously mixed with a bit of crusading spirit.

to think, inability to draw a personal lesson from the experience of others, overconfidence and a desire to make good on the job. These can only be overcome by careful and systematic handling on the part of the supervisor. His is the responsibility of putting over to the worker the value and advantages resulting from a close observance of rigid safety inspections.

Systematic Organized Safety Effort

There should be little need to make a plea for more concerted action along this line. As safety men, we know how easily the small employer could be put out of business as the result of even a few accident losses. The larger employer, as well, cannot afford to overlook the situation—his losses, through waste of time, money and materials, will seriously affect his profits and hold his company up to the public as a very inefficient organization. The ever increasing cost of compensation insurance will undoubtedly be a factor in forcing more consideration for well organized safety work. Personally, I emphasize the side of humanity above the dollar and am satisfied from long experience that where humanity rules, the profits will be satisfactory. Where a real safety program is followed, without doubt efficiency and economy of the highest order will also prevail.

The Present Status of Control of Dust and Fumes in Industry

By H. B. MELLER

Managing Director, Air Hygiene Foundation of America, Inc.; Head, Air Pollution Investigation, Mellon Institute of Industrial Research, Pittsburgh, Pa.

The problem divides itself naturally into medical, preventive engineering and legislative phases, and includes consideration of the responsibilities of employer and employee to each other and to the public.

It is axiomatic that, in case of physical disorder, impairment of function or disability, the more thoroughly the cause and course of action are known, the more certainly can possible remedies be applied or preventive measures taken.

In the diseases or affections under consideration, there are facts upon which preventive methods are based, and upon which further studies now in course or contemplated are, at least in part, predicated.

During the development of the present state of knowledge of the influence of some air contaminants on health, naturally many theories were advanced that later scientific work has modified or displaced. However, not always has the correction been as widely and thoroughly disseminated as was the original theory: this condition, perhaps, has led to some confusion in the minds of many who have not followed too closely the evolution of knowledge in this field.

Clarsification of Dusts

There are available different published classifications of dusts. Included in such classifications are dusts, the exposure to inhalation of which are, or are likely to be, occupational. Those that are inherently toxic when inhaled or otherwise absorbed and which cause systemic poisoning, include lead, arsenic, mercury, manganese. Examples of dusts which have the ability to penetrate the deep lung tissues and to be retained there are quartz, flint, chert, asbestos, talc, coal, iron, clay, slate, and other types of rock dust.

Attention here will be centered upon this last group and upon pneumoconiosis, the general term used to designate lung conditions caused by dust. Silicosis, which is caused by the inhalation of free silica, has been prominent recently in the public press, sometimes in a way that made misunderstanding possible, if not probable.

Aside from silica, many of the insoluble mineral dusts may bring about slight changes in the lung tissues, which may be demonstrated on the roentgenogram if there is silica in the dust that is inhaled. As far as is known today, most of them are relatively or entirely harmless.

Ability of Dusts to Cause Injury

It has been established that the potentiality of silicious dusts to cause lung damage is, with few exceptions, dependent upon their content of free silica (SiO_2). The development of silicosis depends, therefore, upon the concentration of dust containing free silica in the air breathed. In other words, the total amount of free silica breathed and retained seems to be the primary factor; the length of time necessary for a sufficient accumulation is important, but less so than the total load.

Silica occurs also in chemical combination in silicates. Some of these compounds have been proved to be relatively harmless to health, some are still in the realm of doubt, and one—asbestos—may cause the industrial disease called asbestosis, which is the result of lung damage similar to, but not identical with nor as serious as, that produced by free silica.

Importance of Particle Size. The size of dust particles in the air which an individual may breathe is important. Not often are particles larger than 10 or 12 microns found in the deep lungs, except in the case of asbestos dust, where fibers as long as 200 microns have worked their way down lengthwise.

Uncomplicated Silicosis. Silicosis, uncomplicated by an infection, is more of an impairment than a disability. It is not seriously disabling until it reaches an advanced stage, and does not of itself greatly shorten the life of a silicotic.

Silico-Tuberculosis. When a silicotic dies, the immediate cause of death is usually some type of intervening lung infection. It is not known just why the presence of silica in the lungs increases susceptibility to tuberculosis, but when an adult with silicosis is exposed to tuberculosis, an active infection may occur, regardless of the previous state of health. It is thought probable that silica dust can reactivate healed tuberculous lung lesions of the adult type; how long after such lesions have healed the reactivation is possible is not certain. Exposure of silicotics to tuberculosis or of tuberculous individuals to silica dust is serious and should be avoided.

After silicosis has become well established in the lungs, medical science has not found a way to arrest the progress of the silicotic process toward the stage of disablement except through limiting or preventing further exposure to silica dust. Nor has medical science found a way to prevent tuberculosis from being superimposed upon silicosis, except through control of contact. The course of silico-tuberculosis is chronic and is very difficult to influence by treatment, according to phthisiologists.

Medical Control. As a basis for intelligent determination of the physical fitness of a man for a job in a dusty trade, physical examination, with stereoscopic roentgenograms of the chest, is necessary. Along with this study goes, naturally, the preparation of an occupational history with detail as to the exact nature of previous work and of exposure to industrial dust—not a valueless recording of occupations as "laborer," "machinist," etc. Dr. Sayers, of the U. S. Public Health Service, has developed a method of securing information for a proper occupational history; among others, Cummings, of Saranac Laboratory, also has worked out a useful history blank.

Standards have been developed for the diagnosis of silicosis. There is also a suitable technic for taking roentgenograms of the chest in order to bring out the characteristic lung changes.

From the considerable amount of work that has been done, it is possible to forecast with a reasonable degree of accuracy the silicosis potentiality of various dusts.

Periodic physical examinations, including roentgenograms, are essential if employers are to be enabled accurately to learn the effect of individual exposure and intelligently to transfer affected workmen to lower dust concentrations before serious injury has been done, or to work out a system of rotation where indicated as desirable in order that exposure may be intermittent. Such examinations are helpful also in showing the efficiency of engineering control methods.

The ability to place responsibility in case of claim for injury is no small part of the value of such initial and periodic examinations.

Asbestosis. Clinical experience has shown that the inhalation of a sufficient amount of asbestos dust causes a serious type of fibrosis, which is not accompanied

by an unduly high incidence of tuberculosis.

Other dusts and silicate compounds so far studied produce, at most, only a mild non-progressive reaction in the lungs, provided there is no significant amount of free silica in their composition. While not serious clinically, such conditions may give rise to considerable litigation.

Adequate statistics on morbidity and mortality from occupational disease, to serve as a basis for effectively focussing the efforts to study and control dust diseases of the lungs, are non-existent.

In concluding this section, the following quotation from a court decision in Wisconsin is pertinent (Schaefer v. Industrial Commission, 265 N. W. 390 (Supreme Court, February, 1936)):

". . . It will be necessary to distinguish carefully between medical or pathological disability and actual physical incapacity to work. The medical experts apparently ignore this distinction, and so increase the difficulty of arriving at a just result under the law."

Preventive Engineering

It would be needless repetition to discuss in a technical way the engineering phases of dust control. All interested are referred to "Industrial Dust," by Drinker and Hatch, which deals comprehensively with the subject; U. S. Bureau of Mines Information Circulars 6840 and 6848, by Harrington and Davenport, a review of literature on "Prevention of Dust Diseases"; U. S. Public Health Service Bulletin 217, by Bloomfield and DallaValle, on "The Determination and Control of Industrial Dust"; Report Z9 of the American Standards Association; and to the U. S. Bureau of Mines for a list of approved protective devices.

It may be said that, in general, the engineering specialist can and will devise the necessary equipment to meet the conditions specified to him. But the setting of limits of permissible dust concentration is not his but the physician's responsibility. The engineer is concerned with keeping dustiness to or below the limits at present considered satisfactory.

Methods of Determining Dust

Some dusts (as lead) are determined by chemical methods and the concentrations in air are recorded gravimetrically as milligrams per cubic meter. Others (as silica, where size is a factor in determining dangerous particles), are given by count. Neither method gives the whole story, but in both cases it may be possible to secure the information necessary for the purpose.

In one of the reports referred to earlier, there occurs this statement: "There is no doubt in the mind of anyone familiar with the present dust-sampling and dust-estimating methods that they will be amended and changed from time to time. At the present writing we would advise the use of the simplest possible procedures where dust control alone is in question. If one wishes to obtain values which can be compared with published data, it is generally necessary to copy with considerable care the technic used in the original case. This is another way of admitting the annoying fact that results by one method are usually not comparable to those obtained by another method."

In another place, the report says: "It is very doubtful if any useful purpose is served by determining accurately extremely dense dust concentrations—the only excuse for such data is to show the skeptic that the workplace is much dustier than it should be. . . .

"It is probable that any sampling procedure which fixes concentrations in groups 100 per cent apart is sufficient and that the results of any attempts to come closer to the concentration at the moment of sampling are simply misleading. Thus ranges such as 0-5, 5-10, 10-20, 20-40, etc., suffice for dust control."

As dust particles in the lungs are of the order of 1 micron, with rarely a particle over 10 microns, dust control for hygienic reasons should be aimed at particles in the size range found to have been breathed and retained. Again quoting: ". . . if one could avoid use of the dusts of 1 micron or less or exclude them from the dust which passes a 325-mesh screen, nearly all dust diseases would be eliminated."

Dust Elimination

Obviously, it is better, when possible, to purchase equipment already supplied with exhaust hood, rather than to have to worry to fit one to equipment not designed to be hooded. Thus the responsibility for potential efficiency is upon the manufacturer.

There is available comparatively little information upon which to base the scientific design of hoods. The Preventive Engineering Committee of Air Hygiene Foundation includes in its recent report a table of minimum air velocities to capture certain industrial dusts (for use in granite cutting, grain elevators, paint spraying, sand pulverizing and electric welding).

For protective equipment such as dust respirators, air supplied masks, sand blast helmets, and goggles, very complete information is available, because of the work of the U. S. Bureau of Mines, the Bureau of Standards, and the American Standards Association in preparing and issuing specifications to be met if the equipment is to be used under conditions where approval is necessary.

Of course, all agree that, where possible, dust should be controlled at the source, and protective equipment used where this action cannot be accomplished.

Permissible Dustiness

There are various figures that have been and are being used as guides to permissible dustiness where free silica is present. It should be noted that many of the data were not determined as the medical requirement, but as being attainable in good practice and apparently satisfactory from a safety standpoint.

In South Africa the figure is 1 milligram per cubic meter (or 300 particles per cubic centimeter, or approximately 8.5 million per cubic foot).

Dr. Lanza found in 1917 in the Joplin, Mo., district that, with good engineering practice, a figure of 1 milligram per 100 liters of air could be attained.

The U. S. Public Health Service, in its study in the anthracite region of Pennsylvania, found that 50 million particles per cubic foot with 5 per cent quartz in the coarse dust and 10 million particles per cubic foot with 35 per cent quartz were apparently satisfactory and often were attained.

The figure of 10-20 million particles per cubic foot for granite dust with 35 per cent quartz content is often quoted from the Vermont granite studies of the U. S. Public Health Service.

Some metal-mining companies have gone further, setting the maximum of permissible dustiness at 5 million particles per cubic foot.

Certainly, there is a degree of air cleanliness that is safe, from the standpoint of concentration of harmful dust. But the engineer may find himself in the position of practically being forced to control any dust, harmful or otherwise, if he would protect his employers against suits at common law and the possibility of award of damages to men who have breathed dust containing little or no free silica. A dusty workplace is difficult to defend in court. Neither courts nor compensation boards, and certainly not juries, have seemed to be greatly impressed with a low silica dust count in an otherwise dusty atmosphere.

Quoting from one of the reports referred to: "Each state is a unit—a sovereign—and it handles its problems in its own way. Uniformity is lacking, although of course the statutes of many states are similar. The courts of the various states follow such precedents as appeal to them; consequently, on any important question, there is likely to be a divergence of opinion among the courts, and often the courts fall into two or more groups, each group following a different theory with respect to the same legal problem."

Workmen's Compensation Acts

Workmen's compensation acts have been passed in 46 states (all except Arkansas and Mississippi) and the District of Columbia. These acts are compulsory as to private employers in 15 states and elective in 31 states. Insurance to cover the risk is compulsory in seven states.

A state fund, out of which compensation is paid, is maintained in 18 states; in two of these the employer may, by proving financial responsibility, carry his own risk with limited contribution to the state fund for the expense of administration; in 11 more of this group of states the employer is not required to avail himself of the privileges of the state fund and may provide compensation otherwise. In 28 states there is no provision for a state compensation fund.

Administration of the compensation act is vested in a commission, board, or single

commissioner in 40 states; in six states the acts are administered by the local courts.

Again from the report: "The guiding principle in the early acts was the awarding of compensation for accidental injury, meaning thereby traumatic injury." (Traumatic means of or pertaining to a wound or wounds.) "In those years, the importance of disability due to occupational disease was not generally recognized. It however became increasingly apparent that 'injury' might be suffered gradually, and that the result of such gradual breaking down of the strength and resistance of the employee was more serious in many instances than traumatic injury. Courts therefore, in some states, wrestled with the problem of construing 'injury' so as to include disease and bring disease within the compensation acts."

In one state a diseased condition is compensable under the act if caused by the negligence of the employer. Occupational disease is compensable, to some extent, in 16 states and the District of Columbia; in five of these states silicosis is not included among the compensable diseases: in one state silicosis is the only occupational disease made compensable.

There is a legal obligation on the part of the employer to provide a safe place to work, and usually the matter of ventilation is featured. The mining laws approach uniformity as to air quantity and as to equipment for mechanical ventilation.

The right, at common law, to recover for occupational disease due to negligence of the employer, is important. In three states it has been held by the courts that the right never did exist; in three states the right is extremely doubtful; in 12 states it probably exists, although there is some doubt; in 12 other states, the right seems well settled, but is limited in eight of this group; in the remaining states and the District of Columbia, no court decisions can be found which decide the question as to whether or not such common law right exists. It should again be noted that occupational disease, is compensable in three states in this last group.

"With the adoption of Occupational Disease Acts, new medical problems arise and more adequate provision is required for medical examination and treatment. This is especially true with respect to dust diseases, which call for diagnosis by skilled specialists experienced in that field."

Examination Before Employment

1. **Under Compensation Acts:** The New Mexico Act contains a provision requiring the workman, at the time of his employment, or thereafter at the request of the employer, to submit himself to an examination.

The New York Act of 1936, covering silicosis and other dust diseases, provides, in the opening paragraph:

"It is hereby declared to be the policy of the legislature of this state, in enacting this article, to prohibit through every lawful means available, any requirement as a prerequisite to employment which compels an applicant for employment in any occupation coming within the purview of this article to undergo a medical examination."

The North Carolina Act, effective March 26, 1935, contains a provision requiring examination both prior to employment and from time to time during employment.

In the compensation acts of no other states were found provisions with respect to examination prior to the time of employment.

2. **Under Other Statutes:** Five states (Louisiana, Maine, New Jersey, New York and Pennsylvania) have statutes requiring physical examination before an employee is permitted to work under compressed air or in caissons.

Examination During Employment

The five states mentioned in the preceding paragraph require periodic examinations during the course of employment under compressed air or in caissons.

Missouri statutes provide for examination, as often as once a month, by a competent licensed and reputable physician, of all employees who come into direct contact with certain poisonous agencies or injurious processes.

Three states (New Jersey, Ohio and Pennsylvania) require employers to cause to be examined at least once a month, employees engaged in any work or process exposing them to lead dust, lead fumes or lead solutions.

Examination After Claim for Disability Arises

No two state acts contain identical provisions, but in all (including the District of Columbia) that have compensation acts, there is provision for physical examination after claim for disability arises.

In five states (Kentucky, Massachusetts, New York, North Carolina, and West Virginia), definite recognition has been given to the importance of some sort of medical board composed of specially qualified physicians and surgeons, and charged with the duty of diagnosing occupational disease and of advising the administrative board or commission with respect thereto. The laws of these five states are quite different and should be studied separately for details, but in each occupational disease, including silicosis, is compensable.

The importance of roentgenograms in any thorough physical examination for pneumoconiosis is well known. This importance is recognized in the Acts of New Jersey, New York, North Carolina, and West Virginia.

Medical Treatment

In the 17 states (including Maryland) in which occupational disease is, to some extent, compensable, the acts usually entitle the claimant to a limited amount of medical, surgical, and hospital care, measured in money cost or length of time covered by treatment.

These points were raised in the discussion following the addresses:

1. How much time is required for completing a training course?

Mr. Davison said that the training course in their plant ordinarily covered a period of one and one-half years, but that some students completed it sooner. The time required depends upon the individual.

2. Is it advisable to limit the number of students per teacher?

Ten students per instructor is a good ratio.

3. Which gases present the greatest hazards in welding?

Silicon gases are the most harmful. The risk, however, has largely been overcome by manufacturers of welding supplies.

THURSDAY MORNING SESSION

October 8, 1936

Metals Section Safety Contest

Two hundred and two units were registered in the 1936 Contest of the Metals Section. During the Contest period 267,792 employees worked 561,788,579 man-hours with an average frequency rate of 8.030, a decrease of 4 per cent from the 1935 rate of 8.354. Ninety-five units completed the Contest with a frequency rate below the average, and 8 per cent of the units finished with perfect records. Nineteen plaques and eight certificates were awarded in the Contest.

The plaques were presented by John B. Gibson, Publicity Director, Hawthorne works, Western Electric Company, Chicago, and Vice President for Community Safety Councils, National Safety Council, as follows:

Steel Mills Division, Group A—Continental Steel Corporation, Kokomo Division, Kokomo, Indiana, 4,141,806 man-hours, 12 injuries.

Steel Mills Division, Group B and C—Youngstown Sheet and Tube Company, South Chicago Works, Chicago, Illinois, 1,198,735 man-hours, 1 injury.

Rolling, Finishing & Fabricating Division, Group A—The Chase Brass and Copper Company, Cleveland, Ohio, 2,245,286 man-hours, 5 injuries.

Rolling, Finishing & Fabricating Division, Group B—Six tied for first place—Revere Copper and Brass, Inc., Baltimore Division, Baltimore, Md., 1,042,599 man-hours, no injuries; Central Tube Company, Ambridge, Penn., 1,037,084 man-hours, no injuries; Continental Steel Corporation, Chapman Price Division, Indianapolis, Indiana, 833,146 man-hours, no injuries; Republic Steel Corporation, Grand Crossing Plant, Chicago, Illinois, 603,234 man-hours, no injuries; Union Drawn Steel Company, Beaver Falls, Penn., 443,363 man-hours, no injuries; Lehigh Structural Steel Co., Allentown, Penn., 319,353 man-hours, no injuries.

Foundries Division—Three tied for first place—Lycoming Manufacturing Company, Plants Nos. 2 and 3, Williamsport, Penn., 669,449 man-hours, no injuries; Haynes Stellite Co., Kokomo, Ind., 481,481 man-hours, no injuries; American Rolling Mill Co., Sixth Street Foundry, Ashland, Ky., 142,948 man-hours, no injuries.

Heavy Machine Shops Division, Group A—Lycoming Manufacturing Company, Plant No. 1, Williamsport, Penn., 1,842,474 man-hours, no injuries.

Heavy Machine Shops Division, Group B—Three tied for first place—C. Hager & Sons Hinge Manufacturing Company, St. Louis, Mo., 805,007 man-hours, no injuries; D & B Pump and Supply Company, Los Angeles, California, 208,253 man-hours, no injuries; Noera Manufacturing Co., Waterbury, Conn., 214,792 man-hours, no injuries.

Light Machine Shop Division—Three tied for first place—Western Clock Company, La Salle, Ill., 5,309,320 man-hours, no injuries; Ilg Electric Ventilating Company, Chicago, Ill., 370,222 man-hours, no injuries; Tite-Flex Metal Hose Company, Newark, New Jersey, 146,536 man-hours, no injuries.

New Developments in Safeguarding

By JOHN A. OARTEL

Safety Director, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

Safety kinks assembled by Mr. Oartel during the past year were presented as film strips, 56 views being shown.

The first strip dealt with prevention of falling of material; with good housekeeping; piling and storage; keeping loose material from crane runways and other elevated places; and similar safe practices. It included 30 views reproduced from photographs which originally appeared in the National Safety News during the past year.

The second strip illustrated new developments in safeguarding and ways of promoting safety. It included 13 views taken in the Ohio and Chicago District plants of the Carnegie-Illinois Steel Corporation and 13 photos received from other companies, including the Ashland and Butler Divisions of the American Rolling Mill Company; the Duluth Works of the American Steel & Wire Company; the Republic Steel Corporation; the Ford Motor Company; the National Tube Company; and the Pittsburgh Limestone Company.

The Thursday session closed with a round-table discussion, "Your Hour," led by H. J. Griffith, Jones & Laughlin Steel Corp., in the absence of T. H. McKenney, past general chairman of the section, who was unable to attend.

ADJOURNMENT

Mining Section

Officers 1935-36

General Chairman—J. W. Alt, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.
Vice-Chairman in Charge of Membership—C. W. Gibbs, Harwick Coal and Coke Co., Pittsburgh, Pa.
Vice-Chairman in Charge of Engineering—C. J. Barrett, Oliver Iron Mining Co., Duluth, Minn.
Vice-Chairman in Charge of Health—Lee Long, Clinchfield Coal Corp., Dante, Va.
Secretary—Daniel Harrington, United States Bureau of Mines, Washington, D. C.
Entertainment Committee Chairman—Wm. G. Metzger, Hudson Coal Co., Scranton, Pa.
Program Committee Chairman—R. N. Hosler, Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.
Poster and Slide Committee Chairman—J. J. Forbes, United States Bureau of Mines, Pittsburgh, Pa.
Publicity Committee Chairman—M. R. Budd, The Explosives Engineer, Wilmington, Del.
Statistics Committee Chairman—W. W. Adams, United States Bureau of Mines, Washington, D. C.
Members at Large—
P. M. Arthur, American Zinc Co. of Tennessee, Mascot, Tenn.
John L. Boardman, Anaconda Copper Mining Co., Butte, Mont.
Angus D. Campbell, McIntyre Porcupine Mines, Ltd., Schumacher, Ont., Canada.
W. H. Comins, National Pigments and Chemical Co., Potosi, Mo.
Thomas E. Lightfoot, Koppers Coal Co., Pittsburgh, Pa.
George Martinson, Pickands Mather & Co., Cleveland, Ohio.
D. D. Moffat, Utah Copper Co., Salt Lake City, Utah.
V. O. Murray, The Union Pacific Coal Co., Rock Springs, Wyo.
R. B. Paul, New Jersey Zinc Co., New York, N. Y.
L. T. Sicka, St. Joseph Lead Co., Bonne Terre, Mo.

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General Chairman—C. W. Gibbs, Harwick Coal and Coke Co., Pittsburgh, Pa.
Vice-Chairman in Charge of Engineering—G. J. Barrett, U. S. Steel Corporation Subsidiaries, Duluth, Minn.
Vice-Chairman in Charge of Health—Lee Long, Clinchfield Coal Corp., Dante, Va.
Vice-Chairman in Charge of Membership—Angus D. Campbell, McIntyre Porcupine Mines, Ltd., Schumacher, Ont., Canada.
Secretary and News Letter Editor—Daniel Harrington, United States Bureau of Mines, Washington, D. C.
Poster and Slide Committee Chairman—J. J. Forbes, United States Bureau of Mines, Pittsburgh, Pa.

Program Committee Chairman—L. C. CAMPBELL, The Koppers Coal Co., Pittsburgh, Pa.
Publicity Committee Chairman—M. R. REDD, The Explosives Engineer, Wilmington, Del.
Statistics Committee Chairman—W. W. ADAMS, United States Bureau of Mines, Washington, D. C.

Members at Large—

THOMAS ALLEN, Chief Coal Mine Inspector, State of Colorado, Denver, Colo.
J. W. ALT, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.
P. M. ARTHUR, American Zinc Co. of Tennessee, Mascot, Tenn.
FRED E. BEDALE, Consolidation Coal Co., Fairmont, W. Va.
JOHN L. BOARDMAN, Anaconda Copper Mining Co., Butte, Mont.
C. W. CONNER, Nellis Coal Corp., Nellis, Boone County, W. Va.
MAURICE COULTER, Clearfield Bituminous Coal Corp., Indiana, Pa.
H. T. HARPER, Tennessee Copper Co., Copperhill, Tenn.
H. C. HENRIE, Phelps Dodge Corp., Bisbee, Ariz.
RUSH N. HOSLER, Coal Mine Section, Pennsylvania Compensation Rating & Inspection Bureau, Harrisburg, Pa.
C. F. KECK, Jamison Coal Corp., Greensburg, Pa.
THOMAS E. LIGHTFOOT, The Koppers Coal Co., Pittsburgh, Pa.
WM. G. METZGER, Hudson Coal Co., Scranton, Pa.
D. D. MOFFAT, Utah Copper Co., Salt Lake City, Utah.
V. O. MURRAY, The Union Pacific Coal Co., Rock Springs, Wyo.
R. B. PAUL, New Jersey Zinc Co., New York, N. Y.
JOHN T. RYAN, Mine Safety Appliances Co., Pittsburgh, Pa.
L. T. SICKA, St. Joseph Lead Co., Bonne Terre, Mo.
JOHN TREWEEK, Homestake Mining Co., Lead, S. D.

TUESDAY MORNING SESSION

October 6, 1936

The first session was called to order by General Chairman J. W. Alt, Calumet & Hecla Consolidated Copper Co., Calumet, Mich., who summarized the progress of the Section during the year and introduced the speakers.

Coordinating Health Conservation With Safety in the Mining Industry

By FRED A. KRAFFT

Director of Employees' Service, Consolidation Coal Company, Inc., Fairmont, W. Va.

The average industrial worker is only about 75 per cent *physically* efficient. The principal reason for the missing 25 per cent is largely due to ignorance on the part of the worker of such important subjects affecting his mental and physical condition as dietetics, nutrition, the prudent purchase, the efficient preparation and the chemistry of foods, personal hygiene, control and cure of communicable diseases, treatment of diseases affecting the functional organs of the body and

kindred knowledge affecting the well-being and fitness of the human machine.

Along with the worker's ignorance of such matters, follows the employer's indifference to the worker's ignorance. Except as the employer maintains a modern employment and physical examination procedure and except as he maintains a medical and public health nursing program that should break down this ignorance of the workers, the average employer is extremely indifferent to the physical limitations and the functional or constitutional disorders of his employees.

Medical science, experts in management, industrial and human relations, safety and other functions of business can well take time out to take stock of what is being done in "Humanics" in the same manner that attention has been given to the mechanics of business and industry.

It is well known in industry that the "Monday morning blues" cannot alone be charged to John Barleycorn or other excesses. An overtaxed stomach and liver, with a let-up in physical activity, can just as easily give the worker a "Monday *head*" as is possible with an undue intimacy with "John Barleycorn." The answer to this problem, which involves absenteeism, loss of production, industrial accidents with all of the costs and misery attending *same*, is *to provide facilities in* collaboration with the worker that will *give him an outlet for his physical energies* during his spare time. Athletics in various forms, garden growing, and community outdoor activities will keep the inactive worker out in the air and sunshine and enable him to "burn up" whatever he eats or drinks, whereas physical inactivity for a period of two or three days with his customary consumption of "fuel" will send him back to work "clogged up" physically and therefore mentally. You have a fertile prospect for an accident or you have a worker only 75 per cent efficient, and up go your production costs and your lost time accident records.

The Mining Industry must learn from the experience of other basic industries that employee relationships involving activities of *this* type are *mutually* beneficial to employer and employee. The employer's participation in such activities need not be paternalistic or dictatorial. If such is the case the program will fail and may even be a boomerang to the employer's ultimate disadvantage.

It is better that such a program be mutually cooperative—the employer or his representative serving in a counseling capacity and the employees assuming the major responsibilities for organization and administration of the activities, and likewise furnishing the greater part of the money necessary to finance such recreational program. If the employees are encouraged to *organize* activities along these suggested lines, they will, individually and collectively, get behind the program in the matter of interest and financial support.

If the employer does not have at his disposal the facilities or personnel, there is no excuse for his failure to attempt the education of his employees in matters of this kind because there is any amount of literature available on these subjects published at nominal cost by government and private agencies.

Is it not better health and accident insurance to teach your employees how to eat and live correctly, by the distribution and explanation of *such reading matter* so that they are efficient and safe workers?

Old Mother Nature in the form of plenty of air, sunshine, the right foods, a balance of recreation and rest will, with the occasional advice of the doctor and dentist, develop a high degree of efficiency *and safety among your workers.*

In our judgment it is the employer's responsibility to see that his employees are informed in such matters and the employer's interest in the well being or physical efficiency of his employees will be returned proportionately in his production costs and accident record.

In the inauguration or administration of a medical program for a large mining operation or for an individual mine the first question to be solved is what is the company policy going to be.

1. The direct operating costs of a medical program should be supported entirely by the income received from the employees in the form of a monthly medical check-off. Where this arrangement prevails, the employees are inclined to be exacting—that is they will expect the best possible service because they are paying for it, and they do not look upon the service as a paternalistic gesture

seven-inning games are played each week before large attendance.

Change Rooms. Modern change rooms are provided for workmen. The change rooms at the two operating shafts are provided with tunnels or enclosed passages betwen change room and shaft to prevent exposure to weather. It is believed that these prevent many colds and more serious illnesses.

Employees Pensions. In 1917 the company instituted a pension plan. Employees are retired on pension on account of old age, physical disability or disease, on recommendation of the head of the department in which the man was employed. The maximum pension is $50 per month.

Employees Aid Fund. This was established in 1910. Dues of $1.50 per month are paid by each employee. The business of the Aid Fund is conducted by a board of nine directors including general manager, chief surgeon, mine superintendent, metallurgical superintendent, master mechanic, attorney and three days-pay employees. The company pays all administration expense. The Aid Fund pays $800 death benefit and $1 per day for three months and then $1.50 per day for another six months benefit in case of sickness or non-compensable accident.

Since the depression the Homestake Mining Company has recompensed the Aid Fund in the amount of $10,441.63 to make up losses sustained on securities owned by the Aid Fund.

Accident Records and Cost

Our accident records are not as good as those of some mining companies, nor have they reached the mark at which we are aiming. But our accident cost is probably as low as that of any mine in the country. During the last ten years the disability compensation cost has exceeded two cents per ton ore in only one year. The lowest year was $.0155. 1924 was the last year in which compensation cost exceeded one per cent of payroll. In 1935 it was 56/100 of one per cent of payroll.

This low cost is attained in spite of the fact that we have long followed a policy of settling every case. It has been many years since a single case was fought. And we are more liberal than the law in that we pay compensation from the first day while the State law requires payment only after the tenth day of lost time.

ADJOURNMENT

Paper and Pulp Section

Officers 1935-36

General Chairman—E. E. Grant, The Crystal Tissue Co., Middletown, Ohio.
Vice-Chairman in Charge of Membership—F. L. Irvin, St. Croix Paper Co., Woodland, Maine.
Secretary and Program Committee Chairman—George J. Adams, International Paper Co., Glen Falls, N. Y.
News Letter Editor and Publicity Committee Chairman—Fred W. Braun, Employers Mutuals, Wausau, Wis.
Contest Committee Chairman—A. Scott Down, The Paper Industry, Chicago, Ill.
Engineering Committee Chairman—J. H. Turner, Consolidated Paper Corp., Ltd., Montreal, P. Q., Canada.
Health Committee Chairman—Dr. E. W. Paine, Hollingsworth & Whitney Co., Waterville, Maine.
Poster Committee Chairman—Clayton Braatz, Marathon Paper Mills, Rothschild, Wis.
Statistics Committee Chairman—A. E. Winslow, Hollingsworth & Whitney Co., Waterville, Maine.

Members at Large—

Ernest Augustus, Mead Paper Corp., Chillicothe, Ohio.
W. J. Brennan, Maine Dept. of Labor and Industry, Augusta, Maine.
D. B. Chant, Ontario Pulp & Paper Maker's Safety Assn., Toronto, Ont., Canada.
T. L. Christensen, Continental Paper & Bag Corp., Marinette, Wis.
Kenneth L. Faist, The Champion Paper and Fibre Company, Hamilton, Ohio.
W. A. Gleason, Hammermill Paper Co., Erie, Pa.
J. J. Hastings, Port Huron Sulphite & Paper Co., Port Huron, Mich.
Don E. McDowell, Kalamazoo, Vegetable Parchment Co., Kalamazoo, Mich.
Arthur Murray, Container Corp. of America, Chicago, Ill.
W. J. Peacock, Northern Paper Mills, Green Bay, Wis.
J. J. Pleak, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.
Samuel Pruyn, Finch-Pruyn and Co., Inc., Glens Falls, N. Y.
F. A. Robinson, Kimberly-Clark Corp., Neenah, Wis.
B. D. Rogers, Bird & Son, Inc., East Walpole, Mass.
F. H. Rosebush, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

Officers Elected for 1936-37

General Chairman—George J. Adams, International Paper Co., Glens Falls, N. Y.
Vice-Chairman in Charge of Membership—Arthur E. Winslow, Hollingsworth & Whitney Co., Waterville, Me.
Secretary and Program Committee Chairman—F. A. Robinson, Kimberly-Clark Corp., Neenah, Wis.
News Letter Editor and Publicity Committee Chairman—Clayton Braatz, Marathon Paper Mills, Rothschild, Wis.

Contest Committee Chairman—A. Scott Down, The Paper Industry, Chicago, Ill.
Engineering Committee Chairman—D. B. Chant, The Ontario Pulp & Paper Makers' Safety Assn., Toronto, Ont., Canada.
Health Committee Chairman—Dr. Edward W. Paine, Hollingsworth & Whitney Co., Waterville, Me.
Poster Committee Chairman—J. H. Turner, Consolidated Paper Corp., Ltd., Grand Mere, P. Q., Canada.
Statistics Committee Chairman—Fred W. Braun, Employers Mutuals, Wausau, Wis.

Members at Large—

Ernest Augustus, The Mead Corporation, Chillicothe, O.
W. J. Brennan, Maine Department of Labor and Industry, Augusta, Me.
M. W. Dundore, Beloit Iron Works, Beloit, Wis.
K. L. Faist, The Champion Paper and Fibre Co., Hamilton, O.
W. A. Gleason, Hammermill Paper Co., Erie, Pa.
E. E. Grant, The Crystal Tissue Co., Middletown, O.
J. J. Hastings, Port Huron Sulphite & Paper Co., Port Huron, Mich.
C. O. Holmer, Minnesota and Ontario Paper Co., Minneapolis, Minn.
F. L. Irvin, St. Croix Paper Co., Woodland, Me.
D. A. McAlary, Fraser Companies, Ltd., Edmundston, N. B., Canada.
Don E. McDowell, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Arthur Murray, Container Corporation of America, Chicago, Ill.
H. G. Noyes, Oxford Paper Company, Rumford, Me.
J. J. Pizak, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.
Samuel Pruyn, Finch-Pruyn Co., Inc., Glens Falls, N. Y.
B. D. Rogers, Bird & Son, Inc., East Walpole, Mass.
F. H. Rosenush, Nekoosa-Edwards Paper Co., Port Edwards, Wis.
S. F. Shattuck, Kimberly-Clark Corp., Neenah, Wis., Representative, The American Paper and Pulp Association.
L. R. Simpson, The Brown Paper Mill Co., Inc., West Monroe, La.

MONDAY AFTERNOON SESSION

October 5, 1936

The opening session was called to order by General Chairman E. E. Grant, the Crystal Tissue Co., Middletown, Ohio, who presided. Chairman Grant reported on the progress of the Section during the past year, commending the various committee chairmen on their activities.

Report of Accident Experience Exchange

By A. E. WINSLOW

Manager of Personnel, Hollingsworth & Whitney Co., Waterville, Me.

In spite of the fact that 125 plants reported 1,513 accidents in the Paper Industry Safety Contest this year against 111 plants and 1,448 accidents in last year's contest, the number of reports submitted to our Experience Exchange dropped from 239 last year to 108 this year. We find but 24 plants, out of the 125 reporting in the contest, submitting reports for the Exchange. Of the 18 companies and 36 plants reporting in last year's Exchange, 9 companies and 18 plants were included in this year's tabulations.

The time lost as a result of the 108 accidents recorded for this year's study amounted to 10,160 days. This is approximately 4 per cent improvement over the average days lost per accident in last year's study. The accidents per plant this year range from 1 to 14, which is about a 39 per cent improvement over the preceding year and approximately 80 per cent over the first year's study.

This year the average time lost per individual is 94.1 days, or a reduction of about 6 per cent over last year, and 13.6 per cent over the preceding year. Excluding the standard time charges we find that the average per individual has increased to 24.3 days, or 22.1 per cent over last year's figures and 37.2 per cent over the preceding year's study. In spite of this increase we again find the frequency rate in the contest lower by 1.497, or 9.05 per cent.

We find but one fatality in this year's study compared with two last year and four the preceding year; four finger amputations and no loss of eyes against *ten finger* amputations last year and seven the previous year and one loss of an eye in each of the two years. 61 per cent of those injured were tour workers, 37 per cent day workers, and 2 per cent not classified.

The marital status of injured persons shows somewhat the same ratio as those reported in previous years, 63.9 per cent married, 33.4 per cent single, against 71.1 per cent married and 22.2 per cent single in 1935 and 72 per cent and 28 per cent in 1934.

The tabulation of accidents by months and days is of even less value than last year and so we merely record that February was high month with 17 accidents and October was low with but 3 accidents.

We find Thursday the fateful day with 21 accidents, and Wednesday with 20 is in second place. Last year Monday led with Friday second, and the first year's tabulations showed Tuesday high and Thursday in second place.

There is definite evidence to substantiate the theory of greatest accident occurrence between 9:00 and 12:00 in the morning and 2:00 and 4:00 in the afternoon. A study of our plant records shows no serious accidents and very few lost time accidents occurring during the night tour, which is 10:00 p. m. to 7:00 a. m. If employees can work in comparative safety during the night, why do we have so many accidents during daylight hours? Will our study eventually answer this question?

This year's tabulation of hours worked previous to time of injury does not coincide with those of the two previous years: nevertheless it does indicate we are substantially correct in our previous deduction that accidents are prone to occur following several hours of duty and at the conclusion of a tour.

While we cannot confine this year's accident prone age to a span of five years, 25 to 30, as we did in the two preceding studies, we can say without qualification that workers between 20 and 30 give every indication of being more susceptible to accidents than the older employee.

This year's tabulation, according to years of service, with 18.5 per cent of the accidents occurring among employees of less than two year's service and practically 26 per cent with two to four years, substantiates our deductions of the two previous studies that the tendency is for the young employees in terms of service to become injured. With the peak for 1934 in the one to six month class, and 1935 the one to two year class, this year's peak has risen still further to the two to three year class.

In studying the tabulation by departments, as in the two previous years, "machines" still account for the largest number of our accidents, with the repair and maintenance department a close second. The beaters show marked improvement over both of the preceding years and pulp mills improved greatly over 1935 although not doing as well as in 1934. For some reason the finishing departments ran into an extremely bad year, having about a 50 per cent increase over the 1935 figures.

As indicating where we may expect the most of our accidents to occur, we may safely use the total of all three years. The results of such a summation indicate that we may look to the laborers, wood handlers, and the millwrights for approximately one-third of our accidents in 1937.

This year we have only 39 different machines, tools, or appliances involved in the 108 accidents reported, as against 101 in

Refrigeration Section

Officers 1935-36

General Chairman—HAROLD M. TOOMBS, Armour and Co., Chicago, Ill.
Vice-Chairman—A. W. OAKLEY, Merchants Refrigerating Co., New York, N. Y.
Secretary—JOHN L. SPEERS, The City Ice & Fuel Co., Cleveland, Ohio.
News Letter Editor—A. A. RALL, Kansas City Power & Light Co., Kansas City, Mo.
Engineering Committee Chairman—H. L. LINCOLN, The Union Ice Co., San Francisco, Calif.
Membership Committee Chairman—L. T. MCARTHUR, Peoria Service Co., Peoria, Ill.
Poster Committee Chairman—COL. M. J. MCCOMBS, Texas Employers Insurance Assn., Dallas, Texas.
Program Committee Chairman—EMERSON A. BRANDT, National Association of Ice Industries, Chicago, Ill.
Publicity Committee Chairman—HARRY HUTCHENS, Kentucky Utilities Co., Lexington, Ky.
Statistics Committee Chairman—HERMAN HILLENBACH, Knickerbocker Ice Co., New York, N. Y.

Members at Large—

T. A. ADAMS, Union Terminal Cold Storage Co., New York, N. Y.
G. D. ALLMAN, United States Cold Storage Co., Chicago, Ill.
C. A. BOWEN, Cutler Ice Co., Binghamton, N. Y.
GEORGE B. BRIGHT, George B. Bright Co., Detroit, Mich.
L. W. DAWLEY, Southern United Ice Co., Jackson, Miss.
W.O. HAM, Southern Ice & Utilities Co., Dallas, Texas.
HURLEY G. HUST, City Ice Co. of Kansas City, Kansas City, Mo.
GUY W. JACOBS, The Steubenville Ice Co., Steubenville, Ohio.
S. R. KALLINS, C. Hoffberger Co., Baltimore, Md.
K. D. KNOBLOCK, American Utilities Service Corp., Savanna, Ill.
J. F. NICKERSON, American Institute of Refrigeration, Chicago, Ill.
P. J. NOLAN, Libby, McNeill & Libby, Chicago, Ill.
R. B. OAKLEY, Chicago Ice Producers Mutual Liability Co., Chicago, Ill.
W. M. O'KEEFE, American Warehousemen's Assn., Chicago, Ill.
GARDNER POOLE, American Institute of Refrigeration, Boston, Mass.
L. C. ROBERTS, Kelvinator Corp., Detroit, Mich.
R. M. SEEKER, Anheuser-Busch, Inc., St. Louis, Mo.
W. H. SENYARD, Louisiana Power & Light Co., Algiers, La.

Officers Elected for 1936-37

General Chairman—HAROLD M. TOOMBS, Armour and Co., Chicago, Ill.
Vice-Chairman—C. H. HARPER, Southern United Ice Co., Jackson, Miss.
Secretary—JOHN L. SPEERS, The City Ice & Fuel Co., Cleveland, Ohio.
News Letter Editor—A. A. RALL, Kansas City Power & Light Co., Kansas City, Mo.
Educational Committee Chairman—L. C. ROBERTS, Kelvinator Corp., Detroit, Mich.

Engineering Committee Chairman—H. L. LINCOLN, The Union Ice Co., San Francisco, Calif.
Membership Committee Chairman—L. T. MCARTHUR, Peoria Service Co., Peoria, Ill.
Assistant Membership Committee Chairman—RAY M. SEEKER, Anheuser-Busch, Inc., St. Louis, Mo.
Program Committee Chairman—EMERSON A. BRANDT, National Association of Ice Industries, Chicago, Ill.
Publicity Committee Chairman—IVAN L. SCOTT, Bureau of Safety, Chicago, Ill.
Statistics Committee Chairman—HERMAN HILLENBACH, Knickerbocker Ice Co., New York, N. Y.

Members at Large—

T. A. ADAMS, Union Terminal Cold Storage Co., New York, N. Y.
G. D. ALLMAN, United States Cold Storage Co., Chicago, Ill.
C. A. BOWEN, Cutler Ice Co., Binghamton, N. Y.
GEORGE B. BRIGHT, George B. Bright Co., Detroit, Mich.
*A. F. CARRIGAN, Monsanto Chemical Co., St. Louis, Mo.
L. W. DAWLEY, Southern United Ice Co., Jackson, Miss.
W. O. HAM, Southern Ice & Utilities Co., Dallas, Texas.
S. R. KALLINS, C. Hoffberger Co., Baltimore, Md.
K. D. KNOBLOCK, American Utilities Service Corp., Savanna, Ill.
J. F. NICKERSON, American Institute of Refrigeration, Chicago, Ill.
P. J. NOLAN, Libby, McNeill & Libby, Chicago, Ill.
R. B. OAKLEY, Chicago, Ice Producers Mutual Liability Co., Chicago, Ill.
W. M. O'KEEFE, American Warehousemen's Assn., Chicago, Ill.
GARDNER POOLE, American Institute of Refrigeration, Boston, Mass.
T. W. RODES, Carbide & Carbon Chemicals Corp., Whiting, Ind.
W. H. SENYARD, Louisiana Power & Light Co., New Orleans, La.
M. J. ULINE, The M. J. Uline Co., Washington, D. C.

TUESDAY MORNING SESSION

October 6, 1936

The session was called to order by General Chairman Harold M. Toombs, Armour & Co., Chicago, who presided. Chairman Toombs reported on the activities of the Section during the past year and introduced the speakers.

Accident Prevention in the Brewing Industry

By JOHN M. ROCHE

Engineer, Travelers Insurance Co., New York City

Mechanical and physical safeguarding is the first line of attack in any campaign to reduce brewery accidents. Machines, whether maintenance or production, should be equipped with the best guards the market offers. If no guards are available, then they should be designed and applied by brewery engineering departments. Belts, pulleys, gears, chains, sprockets, fly wheels, and other dangerous moving parts may be found in nearly all operating departments of the modern

*Deceased.

brewery. Wherever they are located, they should be completely enclosed with guards. In the mechanical departments, saws, jointers, shapers, stave machines, and punches should be provided with point of operation guards that will prevent the hands of the operators from entering the danger zone while the machines are running.

Hoistways and elevators, often the scene of serious injuries, can stand plenty of improvement in most breweries. Some of these antiquated devices have long outlived any possibility of efficient operation and should be replaced with modern equipment. Where they can be made safe, action should be taken immediately to eliminate the hazards.

Floors, stairs, and platforms in breweries take severe punishment because of the nature of the work, and often they are allowed to wear to the danger point. One of the best types of floors, both from a service and safety standpoint, is a concrete floor with carborundum particles worked into the surface. This type of floor, even when wet, will prevent most slips and falls.

The market now offers composition tile with a non-slip surface that may also be used for safe flooring. Safety treads for stairways, either metal or composition, may be obtained, using carborundum or some other suitable abrasive as a surface. These are far superior to the wood treads and, although higher in first cost, actually they are more economical because of their long life.

Stairways should be provided with substantial hand rails on both sides. Working platforms should also be provided with guard rails and in addition, a toe board, at least six inches high, should be installed to eliminate the chance of material falling to the floor below.

Ladders cause many accidents in breweries. Men often use make-shift ladders. The only real solution here is to destroy this substandard equipment. Substantial ladders, constructed of a hard wood properly cured, should be provided; these should have non-slip safety feet and if they are to be used around tanks or vats, the tops should be equipped with hooks. Where possible, a steel ladder should be securely bolted in position in preference to a portable ladder.

Conveyors are coming into more general use in the industry and they bring new hazards that should be controlled. All conveyors, live or dead, should have cross-over steps at every aisle. Sideboards should be so extended as to prevent the jumping of cases or barrels at turns or on down grades. Low headroom underpasses should be clearly shown by contrast painting and warning signs. Material, in case warehouses, should be piled so that at least a two foot aisle is maintained on both sides of the conveyor. This will make it unnecessary for men to walk on top of it or to try and ride the belt to reach the other end of the aisle.

Bottle filling machines, cappers, and labelers seem to be the points at which bottles may explode. These machines should have mesh barriers installed that will protect the operator from flying glass. This may be difficult, but it is well worth the effort if injuries are prevented.

Pitching machines are now provided with interlocks that prevent the application of air to the tank unless the barrel is in position. Those that are not equipped can easily be protected with a "home made" interlock.

Particular care should be taken to provide sufficient artificial ventilation for men who are engaged in cleaning or shellacing vats. Carbon dioxide gas may cause the suffocation of a workman in the former, while wood alcohol poisoning may cause permanent blindness in the latter. Positive feed air masks should always be supplied if natural ventilation is not obtainable. Gas masks should not be used where carbon dioxide is present in excess.

The air in the tank should be tested before an employee is allowed to enter and where tanks are being cleaned, even though the gas indication is negative, a life line should be supplied, controlled by an outside man. He should never enter the tank while the other man is inside.

These physical hazards are but a few of the many that need attention if accidents are to be decreased. Some of the others are: Grounding of electrical equipment, maintenance of clear aisles, removal of protruding set screws on moving machinery, supplying barrel skids for trucks, and providing gloves and goggles where caustic solutions are used.

Handling materials causes most injuries in the brewing industry, or about 45 out of every 100 cases. Hand and foot in-

which had been followed during the past year.

Report of Exhibits Committee. The Committee reported that definite steps had been taken to assure good attendance at the National Exposition in the Convention Hall, and that these measures included the following:

Routing of delegates through the Exhibit Hall; suitable notices in programs; luncheon and cloakroom facilities; an "Exhibit Day" in each Section program; a worth-while attendance prize, with eligibility limited to delegates who showed a real interest in the exhibits; cooperation of exhibitors in providing attractive displays; providing exhibitors with daily registration of delegates; publicizing the exhibits.

Report of Program Committee. The Committee reported that a series of talks on five different subjects had been prepared for presentation at the National Safety Congress. (A record of the Safety Equipment session will be found elsewhere in these proceedings.)

Other reports presented were those of the Publicity Committee, the Finance Committee, the Activities Committee and the Membership Committee.

Meeting of October 6, 1936

The meeting was called to order by Chairman T. A. Willson, who had been re-elected. Executive Secretary A. O. Boniface acted as secretary of the meeting.

George Shuff, J. B. Davies and C. H. Gallaway were appointed directors.

It was agreed that committee appointments would be made later by the Executive Committee and that members would be notified of the results by mail.

It was voted to continue the positions of executive secretary and assistant treasurer on the present basis.

ADJOURNMENT

Accident Prevention Equipment Manufacturers

Who Exhibited at the Twenty-Fifth National Safety Congress and Exposition

Atlantic City, N. J., October 5-9, 1936

Ballroom—Convention Auditorium

Aetna Casualty & Surety Company, Hartford, Conn.
Automobile Driving Tests.

American Abrasive Metals Company, Irvington, N. J.
Safety Treads for Walkways and Safety Gratings.

American La-France & Foamite Industries, Inc., Elmira, N. Y.
Fire Extinguishing Equipment.

American Mutual Liability Insurance Company, Boston, Mass.
Insurance, Workmen's Compensation, Property Damage, and General Automobile.

American Optical Company, Southbridge, Mass.
Head and Eye Protection Products.

Arntzen, Inc., Chicago, Illinois.
Auxiliary Emergency Stretcher and First Aid Equipment.

Arroway Traffic Signal Corporation, Kingsport, Tenn.
Traffic Control Signals.

Associated Guard Manufacturers, Chicago, Ill.
Dust Control Units and Mechanical Safety Guards.

Frank E. Barnes Company, Chicago, Illinois.
Electrician's Rubber Gloves.

Beacon Corporation, Minneapolis, Minnesota.
Direction and Danger Signals for Motor Transport Vehicles.

Bendix Products Corporation, South Bend, Indiana.
Automotive Equipment.

Robert A. Bernhard, Rochester, New York.
First Aid Supplies.

Blatchford Corporation, Chicago, Illinois.
Traffic Signals and Markers.

Bradley Washfountain Company, Milwaukee, Wisconsin
Group Washing Equipment.

Stewart R. Browne Manufacturing Company, New York City.
Safety and Special Purpose Lights and Lamps.

Brown Shoe Company, St. Louis, Missouri.
Men's and Women's Safety Shoes.

R. H. Buhrke Company, Chicago, Illinois.
Safety Equipment for Construction and Maintenance.

E. D. Bullard Company, San Francisco, Calif.
Industrial and Mining Safety Equipment.

Burroughs Wellcome & Company, (U. S. A.), Inc., New York City.
First Aid Kits and Medical Equipment.

H. Childs & Company, Inc., Pittsburgh, Pa.
Safety Footwear.

Cities Service Company, New York City.
Oils and Gasoline.

Columbus-McKinnon Chain Corporation, Tonawanda, N. Y.
Alloy Steel Sling Chains.

H. S. Cover, South Bend, Indiana.
Respirators and Safety Goggles.

Crouse-Hinds Company, Syracuse, New York.
Traffic Signals and Flood Lights.

Davis Emergency Equipment Company, Inc., New York City.
First Aid and Safety Equipment.

C. H. Dockson Co., Detroit, Mich.
Head and Eye Protection.

Do-More Chair Company, Elkhart, Indiana.
Posture-Health Chairs for Office and Factory.

Dual Parking Meter Company, Oklahoma City, Okla.
Parking Meter Equipment.

Donald S. Duncan, Inc., Chicago, Ill.
Parking Meter Equipment.

Eagle Signal Corporation, Moline, Ill.
Traffic Signals.

Elliott Service Company, New York City.
Elimination of Waste, Promotion of Efficiency and Safety.

Fairway Laboratories, Inc., Belleville, Ill.
Anti-fatigue and Heat Exhaustion Antidote Tablets and Dispensing Equipment.

General Electric Company, Schenectady, N. Y.
Electrical Equipment.
Louis Gerber, New York City.
BOON the Glove Invisible.
Harley Davidson Motor Company, Milwaukee, Wis.
Police Motorcycles and Equipment.
The Highway Safety Signal Company, Baltimore, Md.
Double Filament Traffic Lamps and Color Design Traffic Lenses.
Holcomb Safety Garment Company, Chicago, Ill.
Industrial Safety Clothing.
Hood Products Company, Chicago, Ill.
Motor Vehicle Speed Control Governors.
Huntington Laboratories, Inc., Huntington, Ind.
Disinfecting and Sanitation Products.
Hynson, Westcott & Dunning, Inc., Baltimore, Md.
Mercurochrome Antiseptic for First Aid Application.

Indian Motorcycle Company, Springfield, Mass.
Police Motorcycles and Equipment.
Industrial Gloves Corporation, Danville, Ill.
Steel Grip Gloves and Safety Apparel.
Industrial Products Company, Philadelphia, Pa.
Accident Prevention Equipment.
International Shoe Company, St. Louis, Mo.
Safety Shoes.

Keystone Coat & Apron Manufacturing Corporation, Philadelphia, Pa.
Service Uniforms for Industrial Purposes.
Keystone View Company, Meadville, Pa.
Visual Safety Tests.
Walter Kidde & Company, Inc., New York City.
Fire Extinguishing Systems and Portable Extinguishers.

Walter G. Legge Company, New York City.
Compounds for Cleaning and Treating Floors.
Lehigh Safety Shoe Company, Allentown, Pa.
Leather and Rubber Safety Shoes.
Liberty Mutual Insurance Company, Boston, Mass.
Automobile and Industrial Safety Service.
The Lima Cord Sole & Heel Co., Lima, Ohio.
Non-slip Soles and Heels.
Liquid Carbonic Corporation, Chicago, Ill.
Fumigant for Infestation Control.

Macwhyte Company, Kenosha, Wis.
Wire Rope and Braided Slings.
Martindale Electric Company, Cleveland, Ohio.
Dust Respirators and Highway Safety Signals.
Metropolitan Life Insurance Company, New York City.
Insurance, Industrial Group, etc.
Milburn Company, Detroit, Mich.
Protective Creams for Prevention of Occupational Skin Diseases.
Mine Safety Appliances Company, Pittsburgh, Pa.
Safety Appliances and First-Aid Materials.

Monarch Governor Company, Detroit, Mich.
Automobile Speed Control Devices.

National Bureau of Casualty & Surety Underwriters, New York City.
Casualty Insurance.
National Carbon Company, Inc., New York City.
Equipment for Battery-Operated Devices.
National Safety Council, Inc., Chicago, Ill.
Poster, Bureau of Information, Research and Education Divisions.

Parkrite Corporation, Houston, Tex.
Parking Meter Equipment.
Patent Scaffolding Company, Chicago, Ill.
Safety Ladders and Scaffolds.
Protectoseal Company, Chicago, Ill.
Safety Devices for Hazardous Liquids.
Pulmosan Safety Equipment Corporation, Brooklyn, N. Y.
Respiratory Protection and General Safety Equipment.
Pyrene Manufacturing Company, Newark, N. J.
Fire Protection Equipment.

Railway and Industrial Engineering Co., Greensburg, Pa.
Interlocking Systems.
Reece Wooden Sole Shoe Company, Inc., Columbus, Neb.
Wooden Sole Safety Shoes.
Rose Manufacturing Company, Denver, Colo.
Ladder Shoes, Window Cleaners' Safety Belts.

Safeguard Electric Company, Inc., Brooklyn, N. Y.
Shockproof Portable Lamp Guards.
Safety Engineering, Alfred M. Best Company, Inc., New York City.
"Safety Engineering," Insurance Publications and Reports.
Safety Equipment Service Company, Cleveland, Ohio.
Goggles and All Types of Accident Prevention Equipment.
Safety First Shoe Company, Holliston, Mass.
Safety Shoes.
Safety Shoe Company, New York City.
Safety Shoes.
W. H. Salisbury & Company, Inc., Chicago, Ill.
Linemen's Rubber Protective Devices.
W. W. Sly Manufacturing Co., Cleveland, Ohio.
Dust Control Equipment & Respiratory Protective Devices.
Spencer Turbine Company, Hartford, Conn.
Heavy Duty Vacuum Cleaners and Dust Collecting Equipment.
Standard Safety Equipment Company, Chicago, Ill.
Dust Protective and Safety Equipment.
Stonehouse Signs, Inc., Denver, Colo.
Accident Prevention Signs and Tags.
Strauss Company, Inc., Pittsburgh, Pa.
Safety Belts, Foot Guards, Safety Hats.
Sugar Beet Products Company, Saginaw, Mich.
Industrial Soaps.
Surety Rubber Company, Carrollton, Ohio.
Linemen's Safety Equipment and Synthetic Rubber Industrial Equipment.

John S. Tilley Ladder Company, Inc., Watervliet, N. Y.
Safety Ladders and Scaffolding.
Traffic Toy, Inc., Canton, Ohio.
Traffic Warning Signs.

U. S. Steel Corporation & Subsidiaries, Pittsburgh, Pa.
Steel Products and Cement.

Weaver Manufacturing Company, Springfield, Ill.
Automotive Testing Equipment.

West Disinfecting Company, Long Island City, N. Y.
Products for the Promotion of Sanitation.

Willson Products, Inc., Reading, Pa.
Personal Protective Devices.

Steam Railroad Meeting

WEDNESDAY MORNING SESSION

October 7, 1936

The Steam Railroad Meeting of the National Safety Congress was called to order by Chairman W. W. Wood, Superintendent of Safety and Welfare, The Baltimore and Ohio Railroad Company, Baltimore, Md., who presided, welcoming the delegates and introducing the speakers in turn.

Safety in Construction and Maintenance From the Viewpoint of a Chief Engineer

By C. H. PARIS

Chief Engineer, Chicago & Illinois Midland Railway Co., Springfield, Ill.

Accident Bulletin No. 103 of the I. C. C. reports, table No. 55, shows casualties by classes of employees and other persons for non-train accidents. For the 10-year period 1924-1934 the casualty rate for the maintenance of way department was greater than the rate for all employees on duty. For example, in 1930, this casualty rate was 11.07 while for all employees it was 9.36. In 1934, for maintenance of way employees it was 8.06 while for all employees it was 7.04.

In 1930, 70 roads out of 162 had rates in the maintenance of way department below the average for their group. In 1934, 62 roads out of 158 were below the average. This means that less than one-half of the roads have casualty rates in the maintenance of way department better than their rates for all employees.

In 1930 the spread between the lowest and the highest rate for the maintenance of way department was from 0 to 77.92. In 1934 the spread was from 0 to 89.11. This shows lack of uniformity of results and it is plain that the maintenance of way department has a safety problem. Its casualty rate is too high and this rate is too widely divergent as between the different carriers.

Now what about the nature of the accidents that go to make up the casualty rate? The four principal causes of injury are: 1. Handling rail, ties, timber, etc. 2. Falls. 3. Using hand tools, jacks, etc. 4. Motor and hand car accidents.

Why cannot employees handle rail, ties, timber, etc. safely? Is it because of improper methods, improper tools and equipment, poor quality of men, too much haste without regard to safety, or what? The majority of injuries are to hands and feet. Take the handling of creosote-treated ties for example. These ties may come loaded in flats, gondolas, box or stock cars. They are slippery if freshly treated, so this hazard is added to that of picking them up and throwing them out of the car. The elimination of injuries can only come through careful instructions as to exactly how the ties should be picked up, the assignment of the correct number of men, and their proper placement so they will not foul one another. This is true not only of the men in the car but also those on the ground.