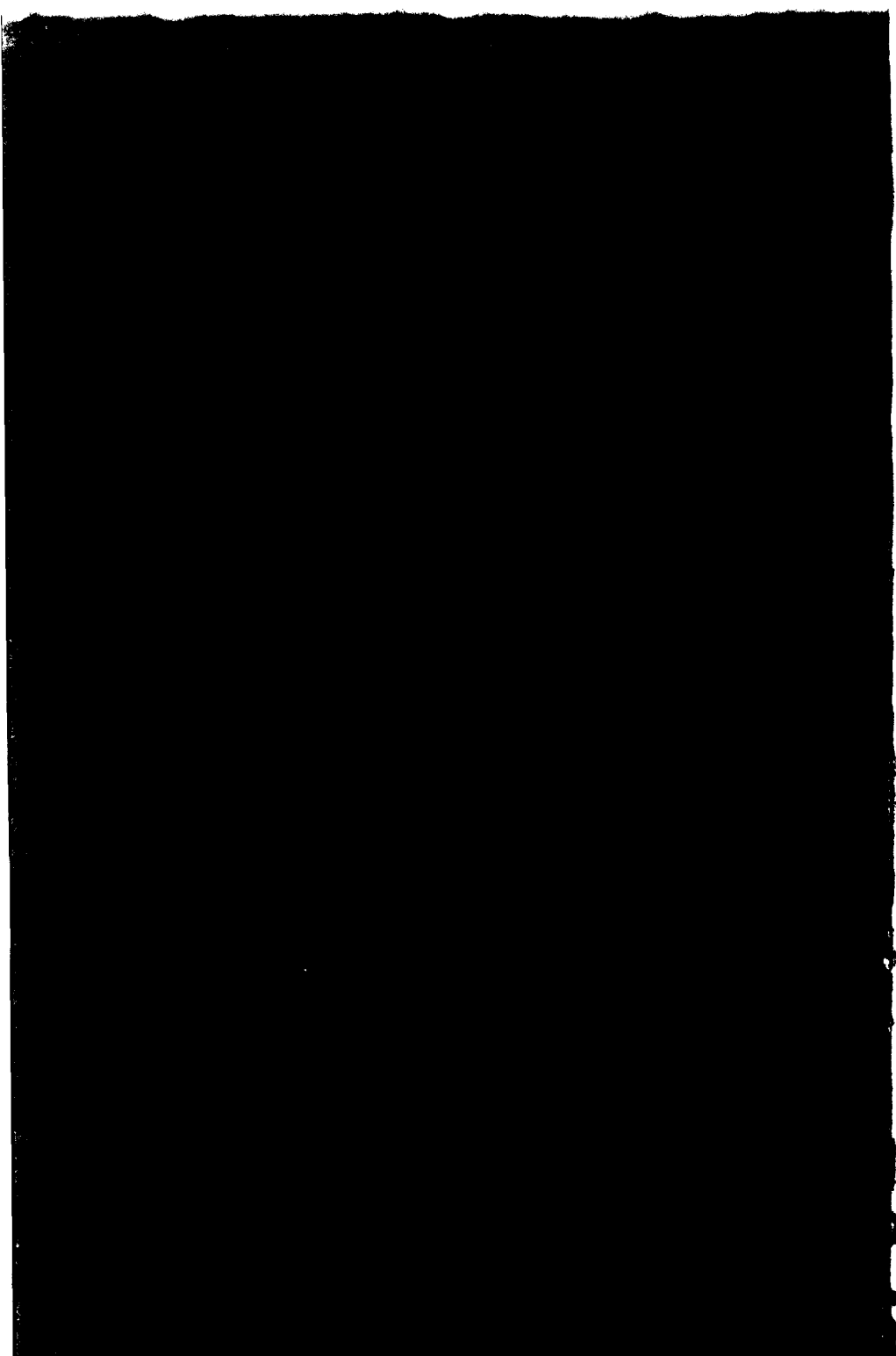
FILE NAME: McGraw-Edison (ME)

DATE: 1934 Oct

DOC#: ME005

DOCUMENT DESCRIPTION: NSC Transactions - Larchar of T.A. Edison listed as office on pg. 187



1934

TRANSACTIONS

National Safety Council

Incorporated

TWENTY-THIRD ANNUAL
SAFETY CONGRESS

Cleveland, Ohio

October 1 to October 5, 1934

The Cleveland, Carter and Statler Hotels

Publication Plan

THE TRANSACTIONS of the Twenty-third Annual Safety Congress, National Safety Council, 1934, are published in two volumes. The first, containing the General Sessions, the Special Subject Sessions, and the Industrial Section Sessions, is presented herewith. It is supplemented by a smaller volume containing the sessions of the Street and Highway Traffic Section, the Child Education Section, and Home Safety.

The large volume is being sent automatically to the Industrial members of the Council; the smaller volume is sent automatically to members who are believed to be chiefly interested in those sessions. It may also be secured on request by other Council members.

For the benefit of many members who have found it advantageous to distribute copies of these TRANSACTIONS to supervisors, foremen and others among their personnel, who may keep them for continuous reference, the following quantity prices are quoted: 1 to 10 copies of the large volume, $1.50 each; 11 copies and over, $1.25 each. Copies of the smaller volume, $.50 each.

THE PLAN OF PUBLICATION is the same as that followed for the last three years. It is a condensed record. The papers of each session or division of the Congress have been assembled, edited with care and discernment to eliminate extraneous matter and abbreviate the less essential portions, and the concise remainder is presented for study and reference. Although not "complete" in the sense that every word is reproduced, it is an interesting and valuable record which emphasizes the memorable parts of each paper or address. The original manuscripts are on file in the Council Library, available for additional reference as desired.

Although the National Safety Council endeavors to eliminate from discussion at its conventions matters which are not pertinent to its purposes or which are contrary to its policies, the Council cannot accept responsibility for the views expressed either in the papers presented or the discussions thereon.

NATIONAL SAFETY COUNCIL, INC.
20 North Wacker Drive, Chicago

CONTENTS

National Safety Council

Incorporated

HONORARY MEMBERS

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS
ROBERT W. CAMPBELL
ARTHUR WILLIAMS

OFFICERS (1934-1935)

JOHN E. LONG, President.
ROBERT I. CATLIN, Vice-President for Public Safety.
D. D. FENNELL, Vice-President for Public Relations.
LEW R. PALMER, Vice-President for Safety Councils.
ALBERT S. REGULA, Vice-President for Engineering.
C. W. SMITH, Vice-President for Industrial Safety.
R. T. SOLENSTEN, Vice-President for Membership.
DR. C. H. WATSON, Vice-President for Health.
A. W. WHITNEY, Vice-President for Education.
W. E. WORTH, Vice-President for Finance and Treasurer.
W. H. CAMERON, Managing Director and Secretary.

EXECUTIVE COMMITTEE (1934-1935)

A. L. ARMSTRONG, Eastman Kodak Company
C. B. AUEL, Past President.
J. I. BANASH, Past President.
C. W. BERGQUIST, Past President.
F. W. BRAUN, Wood Products Section.
W. H. CAMERON, National Safety Council.
ROBERT W. CAMPBELL, Past President.
T. H. CARROW, American Railway Association.
ROBERT I. CATLIN, Aetna Casualty & Surety Company.
J. E. CULLINEY, Bethlehem, Steel Company,
LEWIS A. DEBLOIS, Past President.
MARCUS A. DOW, Past President.
D. D. FENNELL, Consulting Engineer.
D. L. FENNELL, Kansas City Safety Council.
CAPT. E. W. FISKE, JR., Marine Section.
R. B. FORTUIN, Lehigh Valley Safety Council.
HARRY GUILBERT, The Pullman Company.
MERLE C. HALE, Automotive & Machine Shop Section.
G. T. HELLMUTH, Chicago, North Shore & Milwaukee Railroad Co.
HON. HAROLD G. HOFFMAN, Street & Highway Traffic Section.
THOMAS P. KEARNS, Industrial Commission of Ohio.
WALTER G. KING, Past President.

FRANKLIN M. KREML, Evanston Safety Council.
JOHN E. LONG, The Delaware & Hudson Railroad Corp.
THOS. H. MACDONALD, United States Department of Agriculture.
E. J. MEHREN, Portland Cement Association.
I. W. MILLARD, Accident Prevention Manufacturers' Section.
HAROLD L. MINER, E. I. duPont de Nemours & Co., Inc.
ARTHUR T. MOREY, Past President.
LEW R. PALMER, Past President.
C. E. PETTIBONE, Past President.
C. E. RALSTON, Western Pennsylvania Safety Council.
ALBERT S. REGULA, Industrial Relations Counselors, Inc.
LT. COL. H. A. RENINGER, Past President.
GEORGE E. SANFORD, General Eletcric Company.
ROBERT L. SCHMITT, Louisville Safety Council.
HARRY A. SCHULTZ, United States Steel Corporation.
CHARLES B. SCOTT, Past President.
LESTER D. SEYMOUR, Aeronautical Section.
C. W. SMITH, Standard Oil Company (Indiana).
WALTER DENT SMITH, Delaware Safety Council.
R. T. SOLENSTEN, Elliott Service Company.
CLARENCE P. TAYLOR, Massachusetts Safety Council.
C. P. TOLMAN, Past President.
J. A. VOSS, Metals Section
GEORGE H. WARFEL, Union Pacific Railroad Company.
DR. C. H. WATSON, American Telephone & Telegraph Company,
A. W. WHITNEY, National Bureau of Casualty & Surety Underwriters.
W. E. WORTH, International Harvester Company.
ARTHUR H. YOUNG, Past President.

DIRECTORS (1934-1935)

FREDERICK ARCHER, Child Education Section.
WILLIAM F. ARDERN, Safety Div., Milwaukee Association of Commerce.
A. L. ARMSTRONG, Eastman Kodak Company.
WILLIAM H. BAKER, Quarry Section.
J. I. BANASH, Consulting Engineer.
H. D. BANTA, Paper & Pulp Section.
ERNEST W. BECK, United States Rubber Products, Inc.
W. A. BENNETT, Worcester Safety Council.
C. W. BERGQUIST, Western Electric Company.
DAVID S. BEYER, Liberty Mutual Insurance Company.
E. F. BLANK, Jones & Laughlin Steel Corp.
C F. BORKENHAGEN, Kenosha Safety Counicl.
F. W. BRAUN, Wood Products Section.
COL. PHIL H. BROCKMAN, St. Louis Safety Council.
PRESTON D. CALLUM, Baltimore Safety Council.
W. H. CAMERON, National Safety Council.
T. J. CARNEY, Chicago Safety Council.
T. H. CARROW, American Railway Association.

ROBERT I. CATLIN, Aetna Casualty & Surety Co.
CARL C. CLEMENTS, Refrigeration Section.
ROSCOE D. CONLIN, Rahway Safety Council.
H. HERBERT CORSON, Safety Dept., Nashville Chamber of Commerce.
J. E. CULLINEY, Bethlehem Steel Company.
EDWARD DANA, Boston Elevated Railway.
E. A. DAVIDSON, Consulting Engineer.
RICHARD H. DAVIS, Blackstone Valley Safety Council.
CHARLES D. DAWSON, Grand Rapids Safety Council.
LEWIS A. DEBLOIS, Consulting Engineer.
JAY E. DECKER, Mason City Safety Council.
JAMES B. DOUGLAS, The Philadelphia Gas Works Company.
LOUIS I. DUBLIN, Metropolitan Life Insurance Company.
CHARLES H. EAMES, Textile Section.
D. D. FENNELL, Consulting Engineer.
D. L. FENNELL, Kansas City Safety Council.
DONALD A. FINKBEINER, Toledo Safety Council.
CAPT. E. W. FISKE, JR., Marine Section.
HOWARD B. FONDA, Burroughs Wellcome & Co. (U. S. A.) Inc.
R. B FORTUIN, Lehigh Valley Safety Council.
E. N. GOLDSTINE, Construction Section.
OTHO M. GRAVES, The General Crushed Stone Co.
HARRY GUILBERT, The Pullman Company.
ISAIAH HALE, The Atchison, Topeka & Santa Fe Railway Co.
MERLE C. HALE, Automotive & Machine Shop Section.
MAJOR BOLLING H. HANDY, Richmond Safety Council.
D. T. HARRINGTON, United States Bureau of Mines.
G. T. HELLMUTH, Chicagofi North Shore & Milwaukee R. R. Co.
CHAS. E. HILL, New York Central Lines.
HON. HAROLD G. HOFFMAN, Street & Highway Traffic Section.
CLAUDE J. HOLDING, Albany Safety Council.
JULIUS W. HORRE, Hudson County Safety Council.
HARRY D. IMMEL, Pennsylvania Dept. of Labor & Industry.
LEX JENSEN, Berkeley Traffic Safety Commission.
EDGAR P. KABLE, York County Safety Council.
THOMAS P. KEARNS, Industrial Commission of Ohio.
K. T. KELLER, Detroit Industrial Safety Council.
IRA V. KEPNER, Pennsylvania Salt Manufacturing Co.
E. J. KREH, Public Utilities Section.
FRANKLIN M. KREML, Evanston Safety Council.
C. L. LAFOUNTAINE, Great Northern Railway Co.
FRANK J. LANAHAN, Fort Pitt Malleable Iron Co.
JOHN LAUERMAN, Meat Packing, Tanning & Leather Industries Section.
SIMON LAZARUS, Safety Council, Columbus (Ohio) Chamber of Commerce.
JOSEPH LILLICH, Rochester Safety Council.
DR. R. M. LITTLE, New York Department of Education.
G. O. LOCKWOOD, Petroleum Section.
J. E. LONG, The Delaware & Hudson Railroad Corp.
W. R. LOYD, Safety Div., Birmingham Chamber of Commerce.

A. E. LUNDSTEADT, Delivery, Taxicab & Bus Section.
THOS. H. MACDONALD, United States Department of Agriculture.
L. T. MCARTHUR, Peoria Safety Council.
MILLER MCCLINTOCK, Harvard University.
T. H. MCKENNEY, Illinois Steel Company, South Works.
A. D. MCWHORTER, Safety Div., Memphis Chamber of Commerce.
H. T. MARTIN, Fisk Rubber Company.
J. O. MARTIN, Employees' Publication Section.
F. W. MATSON, Minnesota Safety Council.
E. J. MEHREN, Portland Cement Association.
T. O. MEISNER, Power Press Section.
WM. G. METZGER, Mining Section.
I. W. MILLARD, Accident Prevention Equipment Manufacturers' Section.
HAROLD L. MINER, E. I. duPont de Nemours & Co., Inc.
HENRY J. MINEUR, Elizabeth Safety Council.
LAWRENCE M. MOORE, Eastbay Safety Council.
R. B. MORLEY, Industrial Accident Prevention Associations.
JOHN A. OARTEL, Carnegie Steel Company,
GEORGE C. A. OPP, The Detroit Edison Company.
LEW R. PALMER, Equitable Life Assurance Society.
JOHN C. PARKER, Brooklyn Safety Council.
DAVID A. PATTON, Newark Safety Council.
C. E. PETTIBONE, American Mutual Liability Insurance Company.
GEN. GEORGE B. PILLSBURY, War Department.
J. B. POWER, Seattle Traffic & Safety Council.
C. E. RALSTON, Western Pennsylvania Safety Council.
ALBERT S. REGULA, Industrial Relations Counselors, Inc.
LT. COL. HENRY A. RENINGER, Lehigh Portland Cement Company.
MARINUS RITER, Paterson Safety Council.
G. E. SANFORD, General Eletcric Company.
HENRY G. SCHAFFNER, Erie Safety Council.
T. A. SCHENDEL, Food Section.
ROBERT L. SCHMITT, Louisville Safety Council.
H. V. SCHREIBER, Transit Section.
HARRY A. SCHULTZ, United States Steel Corporation.
CHARLES B. SCOTT, Bureau of Safety, Inc.
LESTER D. SEYMOUR, Aeronautical Section.
EARL S. SHARTZER, Utica Safety Council.
RAY H. SHEETS, Madison County Safety Council.
DR. L. A. SHOUDY, Bethlehem Steel Company.
ERNEST L. SIMONDS, New Haven Safety Council.
LEE E. SKEEL, Cleveland Safety Council.
C. W. SMITH, Standard Oil Company (Indiana).
WALTER DENT SMITH, Delaware Safety Council.
R. T. SOLENSTEN, Elliott Service Company.
E. C. SPRING, Lansdale, Pa.
GEORGE R. STEPHENS, Safety Bureau, Buffalo Chamber of Commerce.
LUCIUS S. STORRS, United Railways & Electric Co.

Dr. F. M. Sulzman, Troy Safety Council.
Alfred H. Swayne, General Motors Corporation.
Clarence P. Taylor, Massachusetts Safety Council.
Arthur M. Tode, Consulting Marine Engineer.
W. W. Trench, Schenectady Safety Council.
W. D. Turbeville, San Antonio Safety Council.
J. A. Voss, Metals Section.
H. A. Walker, Rubber Section.
George H. Warfel, Union Pacific Railroad Company.
Dr. Cassius H. Watson, American Telephone & Telegraph Company.
Harry M. Webber, Illinois Bell Telephone Company.
Albert C. White, Jr., Springfield Safety Council.
S. E. Whiting, Liberty Mutual Insurance Company.
A. W. Whitney, National Bureau of Casualty & Surety Underwriters.
W. H. Winans, Union Carbide & Carbon Corp.
Dr. C.-E. A. Winslow, Yale Medical School.
Harry Wise, Sr., Chattanooga Safety Council.
J. M. Woltz, Youngstown Sheet & Tube Company.
W. E. Worth, International Harvester Company.
E. J. Zauft, Safety Bureau, Duluth Chamber of Commerce.
Earl W. Zimmerman, Safety Div., Syracuse Chamber of Commerce.
J. B. Zook, Cement Section.

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 lines of hazardous activity, and directly or indirectly reaches our 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 big 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 is an absorbing story. Unfortunately it cannot be detailed here. Suffice to say that 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 went to work on the sound premise that accidents were an unnecessary part of our social order 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 reductions in many different 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 42 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—1933 witnessed a slight increase, and the rise has been so accentuated during the first three-quarters of 1934 that the year will probably represent a new all-time high. 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 wtih 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 75 per cent during the past ten years. A group of our largest steel industries have cut their accidents 90 per cent since 1913. Every year, scores of industrial establishments go through the entire year without a single disabling injury among their employees.

Along with these reductions the whole psychology of accidents has changed. Employer and employee both look at the proposition from a different viewpoint than they did some two decades ago. Accidents now are really out of date. In many

WHEREAS, there is such pressing need for prompt executive action to put these measures into effect and stop these needless tragedies;

THEREFORE BE IT RESOLVED: That the National Safety Council respectfully urges the President of the United States to call the Governors of the several States into conference as early in the new year as practicable, to lay before them the seriousness of the situation, the remedies which have been developed for correcting these conditions and the necessity for prompt and united action in all the States to adopt and more energetically carry on an effective program for the protection of life and limb on our streets and highways.

*

By formal motion, and by a rising vote, the entire audience of delegates and guests approved this action of the Council Executive Committee.

Following this, Lt.-Col. Reninger read the following letter received from the President of the United States:

THE WHITE HOUSE
WASHINGTON

September 27, 1934

My dear Mr. Long:

I wish to extend to the members of the National Safety Council, in session at the twenty-third Annual Safety Conference, my most cordial greetings and my heartiest good wishes for the success or your endeavors.

The fact that you are concerning yourselves with saving life, that you are keeping in view human values and personal security commends your program to the entire country.

I am greatly impressed and pleased with the constructive steps already taken toward the elimination of accidents, especially highway disasters, which, because avoidable, are doubly tragic. This is a problem which we must attack with the utmost energy and persistence. Ultimately we may expect to reach the solution of highway safety, provided complete cooperation on the part of all citizens is given to concerted efforts of groups such as yours. At present the rising toll of fatalities on roads and city thoroughfares indicates in a manner all too grim that we are still far from the goal.

American automotive developments and our unequalled system of highway communications which have given signal contributions to our convenience, pleasure, and commerce, must not be permitted to devolve into instruments of death and disaster.

I assure you of my keen personal interest in your efforts and commend your splendid program to induce cooperation among every citizen in our nation with the movement looking to the prevention of needless fatalities—a drain upon our most precious natural resource which must be ended.

Very sincerely yours,
FRANKLIN D. ROOSEVELT.

Mr. John E. Long,
President, National Safety Council,
c/o Cleveland Hotel,
Cleveland, Ohio.

President John E. Long then arose and introduced Mr. Harold G. Hoffman, Commissioner of Motor Vehicles of New Jersey, who presided as Toastmaster. His witty introduction of the speaker of the evening, Dr. John L. Davis, of New York City, was highly appreciated by the big audience; and was only surpassed, perhaps, by the brilliant address of Dr. Davis, himself.

Dr. Davis was listed in the program to speak on "The Spirit of America." Despite this handicap, he seized the opportunity to present a highly popular monologue—so popular in fact that his success mounted steadily throughout the evening; and it was readily agreed, after an hilarious session, that no banquet of the Council had approached this for many a year.

ADJOURNMENT

Dust in Industry

FRIDAY AFTERNOON SESSION

October 5, 1934

The session devoted to a discussion of Dust in Industry was called to order by Dr. E. G. Meiter, Director, Industrial Hygiene Laboratory, Employers Mutual Liability Insurance Co., Milwaukee, who presided. Dr. Meiter briefly welcomed the delegates and then introduced the first speaker.

Types of Dust That Cause Occupational Diseases

By LEROY U. GARDNER, M.D.

Director, Saranac Laboratory for the Study of Tuberculosis, of the Edward L. Trudeau Foundation, Saranac Lake, N. Y.

The speaker said in part: Experience has demonstrated that the lung tissues can tolerate very large amounts of most kinds of foreign dust particles without serious interference with function. The lung may be intensely pigmented by colored dusts with no evidence that respiration is impaired. But dusts composed, in whole or in part, of silica have been shown to be dangerous because they stimulate the growth of the connective tissues of the lungs and bring about the formation of scar tissue. This destroys the normal elasticity of the organ which is necessary for respiration and it thickens the delicate membranes so that a free interchange of gasses is impeded. Fortunately, these results only follow the prolonged inhalation of very large quantities of silica.

Experiments have demonstrated that the injection of silica into the tissues of animals kills the cells where the substance lodges and excites an inflammation. When healing takes place a very dense and characteristic kind of scar tissue forms. Most non-siliceous dusts produce no inflammation and very little scar. It has been shown that such changes do not follow the injection of silica unless the particles are very fine, three microns or less in diameter, and unless enough of them localize in one area. With larger particles the rate of reaction is so slow that little change occurs within a year. As a general rule, the finer the particles, the more rapid the cellular response. The reaction to fine silica begins within four or five hours and it continues for a period of years.

If the silica is combined with bases in the form of silicates, it rarely produces such active and progressive changes. The silicate of magnesium, asbestos, does cause the formation of scar tissue in experimental animals and in the human lung, but most other silicates are not generally recognized as irritating. Recently it has been claimed that a hydrated silicate of aluminum and potassium, called sericite, is responsible for most of the cases of silicosis. This silicate, a transformed feldspar, is often associated with quartz and it has been identified in the lungs of persons suf-

fering from silicosis. However, at least two types of sericite have failed to excite significant changes when injected into animals. Experiments with this substance are still in progress. Kaolin, an alumino-silicate of potash, has also produced quite characteristic changes in the lungs of rabbits. But our present knowledge does not permit us to assume that silicates as a class will produce serious tissue damage.

Most observers now believe that uncombined silica, or quartz, is poisonous to the tissues because it is slowly dissolved in the fluids of the body. Certainly the majority of the experimental observations suggest a chemical injury, but it is difficult to understand how enough of such an insoluble substance as quartz could be dissolved within eight hours to produce a well marked, acute inflammation. If solubility were the only factor one should discover a more active response after the injection of the more readily soluble silicates, but such is not the case. Formerly it was held that silica produced its effect mechanically. The hard sharp quartz particles were believed to abraid the lung surfaces and excite the formation of scar tissue as a manifestation of healing. This theory is no longer tenable for when animals are injected with other hard, sharp particles like diamond, carborundum or aluminum oxide, there is no inflammation and practically no formation of scar tissue. Ultimately it may be shown that the irritation of silica is due to some unrecognized property possibly related to its atomic structure.

When quartz particles are inhaled they produce three specific effects which are not excited by any other type of dust yet studied. They alter the behavior of the pulmonary phagocytes; they stimulate the formation of circumscribed nodules of scar tissue; and they subsequently increase the susceptibility of the lung to infection, especially tuberculous infection.

Phagocytes that ingest too many quartz particles are killed by this irritating substance. As the cells die they liberate their burden and several new phagocytes come out to take it up again. By a repetition of this process enough phagocytes accumulate so that many of them ingest only a few particles. Under such circumstances the stimulus is not strong enough to kill but merely accelerates the motility of the cells. They naturally tend to leave the air spaces, enter the lymphatic vessels and accumulate in the lymph nodes. This process becomes more rapid under the influence of the irritating silica and very considerable numbers of particles are consequently localized in the nodes.

After six or eight years the quartz in the nodes has caused a marked overgrowth of the fibrous elements in these structures. Ultimately the reaction develops to such an extent that the node is entirely replaced by a mass of coarse, glassy scar tissue fibres, often several times as large as the original node. Such nodules encroach upon and compress the lymphatic vessels. The drainage system of the lung is choked and effective removal of subsequently inhaled dust is gradually diminished. Dust now accumulates around the lymph vessels and sheets of scar tissue develop in this location.

These preliminary changes do not constitute the disease, silicosis; they involve only the lymphatic system. The respiratory tissues are not appreciably affected. In good stero X-ray films these preliminary changes may be visualized as a thickening and beading of the shadows cast by the blood vessels together with a widening of the shadow of the root of the lung. The blood vessels are thickened because the most important lymphatic vessels course through their walls. The beading is due to the minute nodules of silicotic scar tissue in the lymph nodes within the lung. The root shadow is widened because of the silicotic reaction in the lymph nodes in this location.

If still more dust is inhaled it can no longer be effectively carried off through the lymph vessels. The phagocytes now carry it into the walls of the air spaces. Often the cells group themselves in nodules but sometimes they are scattered. In these locations the silica again stimulates the formation of scar tissue. The result is a general thickening of the septa between the spaces and nodulation throughout the functional portion of the lung. This change seriously interferes with function as interchange of gas cannot take place through the thickened walls of the air spaces and the tissues lose their normal elasticity. Less involved air spaces dilate and their walls stretch, producing the condition known as emphysema, which is also incompatible with effective respiration.

With the formation of silicotic nodules in the functioning parts of the lung the

disease, silicosis, is said to begin. On the X-ray film such nodules cast clear cut, round shadows. As they increase in number and size they blot out the formerly accentuated linear shadows of the blood vessels. In a well marked case both lung fields may be thickly seeded with hundreds of such sharply defined, rounded, nodular shadows. Where there is emphysema, often at the bases, no markings are visible and the film appears black.

The condition of silicosis is a progressive one and it continues to develop after a man has left his dusty occupation. Serious results only follow, however, when he leaves with many nodules in the lung tissue itself. As such nodules increase in size they replace important functional elements. Obviously the continued growth of only a few nodules situated in the lymphatic system could have little effect other than to increase the obstruction already present.

The serious part of silicosis is its frequent complication by tuberculosis. This may arise from reactivation of a pre-existant latent infection or it may result from a new infection from without. The danger of infection increases with the amount of silicosis present. The course of the infection in the silicotic is usually chronic and it often fails to produce characteristic symptoms for months or years after its onset. Many times it is accidentally discovered in routine X-ray examination of groups of active workmen. However, evidences of disability are much more marked in silicotic individuals with infection than in those with uncomplicated disease. Occasionally tuberculosis may run a very acute course in the silicotic subject but this is also true in other persons. The cause of the susceptibility of the silicotic lung to tuberculosis is not perfectly understood, but it would seem that the action of the silica on the tissues creates a medium favorable for the growth of the bacteria. The tubercle bacilli multiply and a slowly progressive tissue reaction ensues, but the usual clinical symptoms of tuberculosis are often held in abeyance for a long time because the chances for absorption of poisonous products of infection are minimized by the obstructed lymphatic system. It is also possible that some of these poisons may be absorbed on the silica particles, as Cummins has suggested. Ultimately the infection gains the upper hand, symptoms develop and death from tuberculosis ensues.

The only other type of dust which is generally recognized as a cause of severe pulmonary injury is asbestos, a silicate of magnesium. This substance is fibrous in character and is more readily soluble than quartz. Apparently the protective upper respiratory mechanisms seem inadequate to prevent the inhalation of many such fibres and even quite long ones may penetrate into the finer bronchial tubes. These structures have irregularities in their walls which seem to hold the fibrous dusts. In this location the asbestos particles are surrounded and ingested by phagocytes. The cells do not seem to be particularly irritated for they are not especially numerous nor do they migrate rapidly into clumps as in the case of phagocytes dealing with quartz. Apparently most of them carry their burden of asbestos fragments directly into the walls of the tubes in which they lie. The mildly irritating dust sets up a proliferation of the connective tissue cells in the walls resulting in collar-like thickening of the tubes. Contraction of the new connective tissue narrows or closes the tube and thereby shuts off the ingress of air to the more peripheral air spaces. These spaces then collapse, a condition known as atelectasis. This in itself is a cause of fibrosis or scarring of lung tissue. The result is a fibrosis of numerous relatively small areas in the lung due to the collar-like constricting fibrosis about many small terminal bronchial tubes. The lymphatic system seems to play little part in disposing of asbestos dust and very insignificant amounts of this dust are found in the lymph nodes.

Not a few cases of asbestosis die of tuberculosis or bronchopneumonia but the prevalence of the former infection is probably much less common than in silicosis. Surveys of large groups of asbestos workers fail to reveal such a high incidence of tuberculosis as found in similar studies on silica workers.

The inhalation of unusual amounts of non-siliceous dusts apparently fails to produce significant alterations in the lung. It is of course possible that injurious ones may ultimately be discovered, but none are recognized today. The non-siliceous particles enter the lung and are ingested by phagocytes as in the case of quartz. The cells are not stimulated to move very rapidly and as a consequence many of them remain within the air spaces for a long time. Some, particularly those con-

taining relatively few particles, make their way into the lymphatic system and accumulate in the lymph nodes. In sufficient concentration, or perhaps because they are mixed with small amounts of silica, they set up a low grade, non-progressive chronic inflammation. But this reaction results only in a little thickening in the lymph nodes and about the lymphatic vessels. The lung tissue may be variously pigmented, black from coal or red from iron, but there is no formation of scar tissue that interferes with function. The susceptibility to tuberculosis of the person with such pigmentation is not increased but it is apparently quite definite that pneumonia is unduly prevalent in coal miners and that chronic bronchitis results from the inhalation of cement. The X-ray films of men working in non-siliceous dusts shows either nothing at all or a more or less marked accentuation of the linear shadows cast by the blood vessels. This, of course, is due to the chronic inflammatory changes about the lymphatic trunks in walls of blood vessels.

The effects of mixtures of free silica and non-siliceous materials are less clearly defined and should receive more serious attention. It would seem unwise to assume, as has been done in the past, that the non-siliceous substances serve only as inert diluents and that only the quartz component of a dust is of significance. Experimental and clinical data are accumulating which suggest that at least some other dusts may materially modify the action of quartz, both in its capacity to produce nodular fibrosis in the lungs and to increase the susceptibility to tuberculosis. For example, animals inhaling heavy concentrations of a mixture of equal parts of pure silica and hematite dust for eight hours a day over a period of 14 months have shown not even the slightest indication of nodule formation in the lung, whereas pure quartz dust, inhaled for only two hours a day, produces definite nodulation. It also seems to be true that animals inhaling such a mixture are much less susceptible to tuberculosis than those exposed to pure quartz. In the case of the human iron miner, some lungs show definite silicotic nodulation, others only a very few nodules and many no nodules at all. All exhibit heavy deposits of iron particles with a cellular connective tissue reaction. When these findings can be correlated with chemical analysis of the lung tissues and the approximate amount of rock work which these miners have performed, some relationship between the exposure to silica and the fibrous nodule formation may be established. Tuberculosis in these iron miners is apparently less prevalent and much less severe than in men exposed to pure silica. What has been said of iron miners is also probably true of foundry workers and coal miners. It is generally accepted that men in the latter occupation have less tuberculosis than the average for the age period; Cummins believes that they have the infection but that it is so atypical and benign in its manifestations that it escapes diagnosis.

Mention should also be made of mixed dusts like certain slates and granite containing large amounts of free silica in combination with silicates. Experimentally these substances behave atypically and do not produce nodular fibrosis unless there is complicating infection. The same may also be true in human beings. Unquestionably such dusts are capable of producing typical silicotic nodules and they predispose to tuberculosis. From a theoretical standpoint they should receive much more intensive study to clarify our views on the whole subject. At the present time it appears that the action of their quartz component is modified and partially neutralized by the other substances which they contain.

Using Exhaust Systems and Respiratory Equipment To Protect Workers Exposed to Dust

By STUART W. GURNEY and DAVID S. BEYER

Liberty Mutual Insurance Company, Boston

The speaker said in part: A number of our states have had references to dust elimination in their labor laws for a good many years, but no state has as yet thoroughly enforced these laws. The codes of five states which we investigated provide that grinding, buffing and polishing wheels should be exhausted, although two of the states exempt from these provisions wheels on which water is used.

This seems ill-advised, since a study of wet and dry grinding in Connecticut by Winslow and Greenburg has shown that the application of water does not by any means eliminate the dust hazard.

It may be remarked that, with everything else equal, a high static suction will give a higher velocity at the point of origin of the dust, fume or gas than a low one; but this alone is not a measure of the effectiveness of any exhaust system. Wisconsin has adopted the principle of specifying a limit to the number of dust particles of respirable size per cubic foot of air. After all, this is what we are primarily interested in, to keep the dust contamination down to a point where it will not be harmful.

These variations and conflicting provisions in state codes merely reflect the general lack of authoritative standards. It is accordingly fortunate that definite steps are now being taken by the American Standards Association to develop the proper basis for such codes. There are two committees working on this problem; the Ventilation Code Committee, sponsored by the American Society of Heating & Ventilating Engineers, and the Exhaust Code Committee, sponsored by the International Association of Industrial Accident Boards and Commissions. It is also arranged to appoint sub-committees to take up five specific subjects: Abrasive cleaning, chromium plating, granite cutting, rock drilling, and spray coating. In addition, a Sub-Committee on Fundamental Principles of Design and Operation and Maintenance of Exhaust Systems will be appointed.

The two most important considerations in an effective exhaust system are: 1. Velocity of air flow; 2. Arrangement of the inlets (from the standpoint of nearness to the dust source, shape, etc.).

Many an installation that is otherwise all right fails to remove the dust successfully merely because there is not enough air being drawn through the system. In a series of tests that were conducted under actual working conditions by Theodore F. Hatch, Department of Industrial Hygiene, Harvard School of Public Health, a machine used in dressing stone was employed, and it was noted that with an air flow through the hood of 230 cubic feet per minute, there were over one hundred million dust particles in the surrounding air. When the air flow was increased to a little over 250 cubic feet per minute, the dust concentration had dropped to forty million, a marked improvement. As the air flow was further increased, the drop in dust concentration was relatively slower, and it took a volume of about 380 cubic feet per minute to bring the dust concentration down to ten or fifteen million particles per cubic foot, which was considered reasonably safe for this type of dust.

It is accordingly possible sometimes to take an installation that is not satisfactory and, if the remainder of the system is well designed, by merely speeding up the blower or adding a larger one, to bring about the desired results.

Another very important consideration is to get the inlets of the exhaust system as close as possible to the source of the dust. The drop in efficiency as we get further away from the inlet is really surprising to one who has not studied the principles involved. It should be remembered that if we have the open end of an exhaust pipe or air duct in operation, the air tends to flow in from all sides, even from behind the opening. As we move away from the end of the pipe, the velocity drops very rapidly, so that even at a distance of five inches from the hood the velocity may be less than 10 per cent of that right at the hood inlet. This is the most important consideration to keep in mind and one which is frequently lost sight of in designing exhaust systems. It is not uncommon to see an exhaust inlet a few inches in diameter with which the person making the installation hoped to draw dust from a distance of several feet, but the air flow even a foot or two away from the entrance to the inlet may be negligible.

Still another important consideration having to do with the design of the inlet, is the addition of a flange. The effect of this flange is to cut down the air that would flow in from behind the opening, thus drawing it nearly all from the front. Thus the efficiency of the system is substantially increased and the scope of the exhaust extended appreciably, without increasing the power consumption or otherwise adding to the expense of keeping up the system.

There are also other considerations of perhaps lesser importance. For example, air cannot be "pulled" from a distance by merely directing an exhaust pipe toward the point in question, but it can be "pushed" or blown, directionally, for a consider-

able distance. This principle may be used advantageously in directing the dust toward the opening of the exhaust inlet and thus getting the desired results with a lower exhaust velocity and power consumption than would be required if suction alone were depended upon. This principle has been applied effectively in drilling material containing asbestos, where the exhaust inlet is placed at one side of the drill and a small air jet at the opposite side of the drill, blowing across the table turns the particles that would fly out from this side and directs them back into the exhaust system. It is also being applied to foundry shake-out work.

Other considerations in designing exhaust systems include the elimination of unnecessary bends or curves, the provision of clean-out doors, and the proper construction of joints. Where there is a general ventilating installation and one or more exhaust systems, care must be taken to see that they do not conflict with each other.

After an exhaust system has been installed it should be tested by taking actual dust counts to see that the dust is really being cut down to the desired point, and such counts should be taken at intervals after the installation has been made, to see that it is still functioning properly.

The fact that the dust particles that cause the trouble are so small that they are invisible under ordinary conditions (less than 10 microns or 1/2500th of an inch in diameter) often makes it hard to convince the practical plant manager that there is any dust present; it also makes it impossible to tell, without the use of special instruments, whether the completed exhaust system is actually removing the dust.

It might seem like an insult to one's intelligence to say that after an exhaust system has once been installed it should be maintained in good operating condition. However, the numerous cases one encounters in the plants where this obvious necessity is not carried out, indicates that it is really one of the major considerations in connection with the elimination of dust or fumes. Cases are not unknown where the blower has in some manner become reversed so that the air is being ejected and diffusing the dust, rather than drawing it in; other instances where the efficiency of the system has been lowered or its value nullified by clogging up, disconnection or wearing out of the piping, etc., are all too common.

One concern, of which the writers have knowledge, has a "U" tube permanently installed in one of its main exhaust systems so that the foreman or safety man can tell at a glance whether there are any changes that would indicate a break-down in the system. All such installations should have regular inspections by some competent person as a routine part of their upkeep.

It will be sufficient here to discuss respiratory equipment very briefly. The simplest form of this equipment is the filter respirator. Such respirators have a definite value for temporary use such as sweeping up, cleaning out bins, shoveling materials, etc., but they require careful fitting and constant supervision to see that they are being properly used.

It is our opinion, after watching the sincere efforts in a number of plants to enforce the use of these respirators, that it is rather impracticable to require them to be used on full-time operation. One notices the men, under these conditions, surreptitiously pushing the respirator aside and gasping in free air like a fish out of water. Certainly, if they are to be used any considerable length of time, frequent rest periods should be allowed where the men can get out into the free air for a few minutes refreshment.

There are also the large air-fed helmets, with which most of us are familiar, used for sandblasting, etc., which have been carried to a high state of perfection for the purposes to which they are adapted.

We believe, however, that much more use could be made advantageously of the type of apparatus that lies midway between the filter respirator and the air-fed helmet, namely, the light, air-fed respirator which covers the nose and mouth and leaves the rest of the face exposed. With a light hose attachment, this device offers considerable freedom of movement, and if air outlets were supplied so the hose could be quickly transferred from one outlet to another it would seem to be practicable to use them over a considerable area. They afford the advantages of a pure air supply without excessive weight and without the restriction to breathing that is imposed by the filter respirator.

The Medical Supervision of Workers Exposed to Dust

By W. J. McCONNELL, M.D.

Assistant Medical Director, Metropolitan Life Insurance Co., New York City

The speaker said in part: The harmfulness of dusts varies widely in accordance with the physical and chemical natures of each individual substance. Certain dusts are soluble or slightly soluble in the body fluids and their harmful effects are proportional to the toxicity of the compounds formed. Lead, mercury, and arsenic are examples of poisonous dust. Other dusts exert their harmful effects locally on the skin and mucous membranes and through irritation to the respiratory passages. Chronic acid and alkalies are examples. Attention recently has been called to the probably harmful effect of dusts arising from radio-active ores. A fourth group of dusts which are insoluble or very difficultly soluble in the body fluids may initiate harmful pathological lung conditions. These may be subdivided into non-fibrosis and fibrosis producing dusts. The organic dusts, mainly the vegetable fibers, such as cotton, jute, hemp, etc., are non-fibrosis producing dusts. The fibrosis producing dusts are limited, so far as we have evidence, to a few of the inorganic mineral dusts, such as free silica, crystalline silicon, quartz, and certain combined silicates. Of the fibrosis producing dusts, those having a high percentage of free silica are admittedly the most important because exposure over a period of years to such dusts distinctly predisposes the individual to tuberculosis.

The effectiveness of dust control measures in preventing diseases produced by dusts can be determined only by careful physical examination of the workers so exposed under the guidance of competent medical supervision. The benefits which accrue to the employer and employee, alike, as a result of the physical examination of all applicants for employment, as well as periodical examination of those already engaged, would indicate very careful consideration by industry of a program for control of sickness. Such a procedure protects the employer from engaging an applicant already physically or mentally impaired who later may claim disability for a condition either not associated with employment or contracted during a previous employment. The applicant's physical and mental condition is established and by keeping record of his subsequent illnesses and accidents, the question of responsibility for injuries and sickness need never arise.

The applicant is protected from engaging in work for which he is physically ill adapted which, if undertaken, might easily bring about serious impairment of his health. For example, an applicant with an arrested tuberculosis who seeks work in a certain dusty occupation, if allowed to engage in such work might readily convert an inactive tuberculosis into an active one; thereby endangering life or at least seriously impairing the applicant's future efficiency and earning capacity. Whereas the same applicant if assigned to a position that involves no such exposure, might be expected to continue for years as a useful and productive workman. The examination of applicants for employment likewise protects those that are already employed from the risks of communicable diseases such as tuberculosis and various acute respiratory and other infections being introduced into their midst by a new applicant.

Many of the younger individuals who seek employment have never before received a thorough physical examination and consequently are unaware of the defects from which they suffer. As a result of physical examinations, many defects are located which may be removed or corrected before they have caused irreparable damage, thereby increasing the efficiency of the worker and often averting definite and finally chronic diseases. Furthermore, incipient tuberculosis, unsuspected diseases of the heart, kidneys, and a host of other diseases of a similar nature, are discovered and the applicant referred for proper medical care and treatment which otherwise might have been postponed until too late.

Of even more importance than the initial physical examination of applicants is the periodic examination and care of old employees by an industry. Such a procedure serves to check the efficiency of preventive measures designed to prevent occupational diseases. It offers the most effective way of controlling the health of

large groups of workers by discovering early not only occupational diseases, but many other conditions that go undiscovered until the worker is acutely ill or becomes disabled. If the various contagious conditions go unrecognized others become infected, thereby causing serious economic loss, as well as endangering the health of a group of individuals.

The information obtained from physical examinations affords the medical supervisor the opportunity to make certain that employees are engaged in suitable work out of which they are getting maximum results, to correct the effects of undue exposure to harmful environmental conditions, and generally to lessen all occupational hazards. As a public health measure, it is impossible to over-estimate the value of periodic examinations in establishing interest in sickness prevention.

The set-up of a proper program for medical control of workers exposed to dust depends upon the number of employees involved and individual plant conditions. A series of articles under the title of "The Medical Department Manual" by Dr. Hart E. Fisher, appearing in current numbers of "Industrial Medicine," gives a comprehensive account of the organization and operation of a medical department.

1. The establishment of a medical department with adequate facilities and medical personnel who have qualified in the field of industrial medicine. A process analysis of all operations in the plant should be made and the medical supervisor should list all possible health hazards and familiarize himself with their physiological effects. If necessary, he should conduct research studies to determine the harmful effects of new substances introduced into plant processes about which little is known. In cooperation with other departments, he should investigate the extent of the hazards and devise measures of control.

2. The routine examination of all applicants for employment. The procedure should include a detailed history of the applicant's previous illnesses and accidents classified under (a) diseases of childhood, (b) general infectious diseases, (c) respiratory diseases, (d) venereal diseases, and (e) accidents and resulting physical defects. A detailed history of previous occupations engaged in is very important. A mere statement of the type of industry in which the applicant was engaged has slight value, if any. The exact duties performed in each occupation should be noted and information ascertained as to the probable length of exposure to hazardous substances. After the history has been taken and a photograph for identification purposes (if part of routine) is made, the applicant should be directed to the examining room where he is instructed to remove his clothing for physical examination. This examination should be made as complete as is considered necessary to determine the applicant's physical condition.

If the applicant has been or will be exposed to dusts which induce lung diseases, an X-ray picture of the chest is an important part of the examination. This part of the examination may be referred to an experienced roentgenologist, as the value of this method of diagnosis depends upon the type of pictures taken and the experience of the reader who interprets them. The examining physician also may need additional information obtained by laboratory analyses of the blood, sputum, and the urine. These aids to diagnosis should be provided or made available when desirable.

3. The rating and placement of applicants. In cooperation with the personnel department, the applicant should be rated and placed, not only on his training and past experiences, but also on his physical and mental abilities to fill vacancies occurring from time to time. The record of his physical and mental examination should be the confidential property of the medical department.

4. Periodical physical examinations. The frequency of periodical examinations necessarily must depend upon individual circumstances according to the need for such examinations as determined by the supervising physician. Where physical examinations are made for the first time, the employees of long standing should be given ample explanation of the benefits of such examinations and be given assurances that their jobs are secure.

5. Provision for the disabled. Employees who develop disabilities during the course of employment should be re-assigned to occupations which will not interfere with or aggravate the disability, or they should be provided for in other ways.

ADJOURNMENT

Fire Prevention

THURSDAY AFTERNOON SESSION

October 4, 1934

The Fire Prevention Session convened in the Statler Hotel with Chairman Harold L. Miner, Manager, Safety and Fire Protection Division, E. I. duPont de Nemours & Co., Wilmington, Delaware, presiding. After briefly welcoming the delegates, Chairman Miner introduced the first speaker.

How Home Fires Are Caused

By R. B. CRISWELL

Ohio Inspection Bureau, Columbus, Ohio

Speaking extemporaneously, Mr. Criswell gave a demonstration of the devices employed and the arguments advanced by himself and other members of the Ohio Inspection Bureau in bringing to the attention of school children the serious hazards of flammable substances in the homes. His object was to inform safety engineers, and perhaps others in his audience who might be interested in becoming safety speakers, how to use simple devices in convincing the school children of the necessity for caution to avoid fires and explosions. Each device and method was outlined briefly, but with striking detail, some of the demonstrations being as follows:

A match, still blazing, was thrown carelessly into a small waste basket, as so many persons still continue to do, and the waste paper immediately flared into a dangerous blaze. With a short talk about the forest rangers and their watchfulness in putting out smoldering camp fires in the North Woods, he next carefully broke a match to make sure the match had gone out completely before he tossed it aside. Said he, "Chaperone your matches; they shouldn't go out alone."

A small doll house, wired in similar fashion to a comfortable home, was exhibited, and after an explanation outlining the many light and lamp fixtures coupled with electrical devices, which might be loaded onto the electric circuit in any home, the speaker attached these devices one after another until the fuse blew out; then he used a copper penny to plug the circuit until a fire developed in the attic of the doll house.

Strangely enough, an ordinary fish bowl, with the goldfish swimming about, if exposed in a sunny nook of the living room, with a flimsy curtain in the right spot beside it, or even a flammable rug underneath, can cause a disastrous fire. The circular fish bowl and the water act as a lens to concentrate the sun's rays. This has happened repeatedly, said the speaker.

A pretty little doll, made of pyroxylin, or some other flammable material, has often become ignited in the hand of a child and has burned the child severely before

why the hazard of unsafe walkway surfaces must be eliminated if falls from this source are to be prevented.

How, then, shall safety in walkway surfaces be defined? What is safe or unsafe, as applied to them?

That is the fundamental question on which opinions differ as much as there are types of materials to sell and maintain. There is just one answer and that is experience. Until adequate data from disinterested sources is developed, no universally acceptable answer can be formulated. The U. S. Bureau of Standards has devised a machine simulating the action of a person slipping, with which to measure the frictional resistance of walkway surface materials. Another machine was developed under the same auspices to reproduce in new materials by laboratory methods the frictional resistance of such materials under normal service conditions. And with these machines over 150 different types of materials have been prepared and their frictional resistance measured and recorded.

Even with that data, who can say what is the point of frictional resistance that under certain conditions of service is safe or unsafe? The marble dealer, the tile setter, the steel manufacturer and everyone with something to sell claims his product is safe, and his claim cannot be effectively proved or disproved because safety engineers, insurance companies and others involved have not developed intelligently their records to show the causes of falls with relation to the type of material on which slipping occurred. Such data must be developed extensively before a definite and just decision can be reached. No more valuable contribution can be made to safety than by such effort.

Management is waiting for counsel, but it wants that counsel backed by knowledge based on facts, not presumptions. It wants to know, not what someone considers safe frictional resistance for its factory floors, office corridors, shower baths, etc., not what someone thinks is the danger point, but what is unsafe and safe in the light of wide experience and authenticated facts. Sometimes management has taken the trouble to develop this data for itself with astonishingly satisfactory results, but it is our duty to develop it for universal use.

ADJOURNMENT

All Ohio Day

GENERAL SESSION

October 2, 1934

The General Session of the All Ohio Day program was called to order by Chairman Thomas P. Kearns, Superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, who presided. After welcoming the large audience in characteristic manner, and outlining the purposes of this meeting in cooperation with and as a part of the Annual Safety Congress of the National Safety Council, Chairman Kearns introduced the first speaker.

Management's Opportunities and Responsibilities for Winning Employee Cooperation in Accident Prevention Work

By CHARLES R. HOOK

President, The American Rolling Mill Co., Middletown, Ohio

The speaker said in part: While a foreman in a sheet mill plant, back in the early 1900's, I became convinced that the best way to prevent accidents and reduce costs was to win the cooperation of the men. I learned through experience that once you had convinced the men of your sincerity, the hardest part of your task was done. You could put your problems up to them—make them a part of management—and usually they would find the solution. During the intervening years I have never had any cause to change those convictions.

Confidence is the basis of cooperation. You can't have effective cooperation without it. The men must be convinced that the management is fair, honest and sincere, and acting always in the interest of the greatest good. The management must be convinced that the men are willing to respond and will put forth their best efforts once their confidence is won.

How are we going to create understanding and win cooperation? By stripping away the mystery which envelopes most businesses, by being frank, by permitting men to see, and explaining to them what makes the wheels go round. The management of the American Rolling Mill Company believes it is their responsibility to cut away the wrappings of their business, to be frank, to make facts about the business available to all interested parties. We believe that certain ideals and principles must be established. We believe the general management must indicate what it wishes to be done; it must act in a legislative capacity, for the administrative powers must of necessity be vested in the supervisory organization. At Armco we have a published platform which was written by our Chairman of the Board, Mr. George M. Verity, and officially adopted by our Board of Directors. Everyone in an execu-

tive capacity, including our president, is expected to make his decisions and his actions harmonious with the principles incorporated in this pamphlet, which is known as Armco Policies.

Armco policies are distributed not only to the supervisory organization, but to the workman. In this way they serve as a pledge to the public and there is a standing guarantee that any employee who does not feel that he has been treated in accordance with Armco policies may carry his case through each ranking supervisor successively, if necessary, to the president of the Company. You can well imagine the valuable intangible benefits Armco policies bring to us in winning employee cooperation in all their work

Armco once acquired a plant which had been operated under different policies for a good many years. Several weeks after we took this plant over, I asked to see the accident report. It actually made me shudder. The matter was important enough to cause me to make an immediate visit to that plant. I talked with the Works Manager, and explained that we believed that a good safety record and a good cost and production record went hand in hand. I told him that it was good business to get those accidents down.

He replied: "Mr. Hook, I agree with what you say, but the old company operated under different policies. You can't change the thinking of even the superintendents over-night. If I call them in here one at a time, will you talk to them privately?"

I agreed, and I well remember the attitude of one superintendent. He was the head of an important new department, a brilliant fellow, but erratic and headstrong, and his accident record was especially bad. I could see my talk to him was making little impression, so finally I said: "John, the directors of this company represent the owners and the sotckholders. They are all outstanding business men of long experience. You and I both work for them. They want you to make accident prevention a part of your job as much as production. Whether we agree with them or not, they want this plant operated under certain policies which experience has shown them to be profitable, and they've even published these policies in pamphlet form. Here is a copy. I want you to read it and if there is a single policy contained in this book that you cannot conscientiously support, just let me know."

I'd like to say that this superintendent changed his viewpoint over-night, but human nature doesn't operate that way. But it does give me a great deal of pleasure to say that he sincerely tried and today he is one of the most outstanding superintendents we have.

A number of years ago we noticed that the departments which had the best accident records also had the best cost records, and this led us to believe that there was a definite relationship between accidents and cost. Carrying on this line of reasoning, we observed that the departments with the best cost and safety records were those in which the men had been most thoroughly trained. Therefore it seemed logical to the general management that it was our responsibility to maintain training facilities adequate to the needs of each of our manufacturing units and to organize our training activities in such a way that they would be concerned mainly with the problems of operation rather than academic theory.

As we see it at Armco, the general problem of winning employee cooperation in accident prevention work must be broken up into three separate and distinct sections. 1. Training the supervisory group. 2. Job training the worker. 3. The exchange of information from management to men and from men to management.

As the supervisory group is not particularly susceptible to accident, it must be approached from another angle. The approach that has seemed most logical to our personnel division is that of management. Their line of reasoning is simply this. The company may provide splendid equipment and fine raw materials with which to work, but the conversion of the products of the business into a finished article of high quality and at a reasonable cost is in the hands of the supervisors. A business grows as men grow, and no company can grow unless it has well-trained, interested supervisors. The foreman has responsibilities greatly similar to the works manager, but differing widely in degree and scope. All too frequently he does not live up to these responsibilities merely because he didn't realize they were attached to his job. The first task, then, is to cultivate in him a managerial viewpoint; next provide

him with the necessary information and training to enable him to manage; and finally to assist him in organizing his work so that he can manage.

The supervisory training program is created by the general staff personnel department and sent to the works managers. This permits all plants to conduct a program which is synchronized at all times. The general subject of each year's program is established at a conference of works managers and the personnel staff. Different subjects are selected each year. For instance, the program has been based on the general themes of Conservation, Prime Output per hour, Prime Yield, and so on, but each years' work has been prepared from the angle of management. Costs have always played a predominant part, and the wastes and costs of accidents have come in for their full share of discussion and study. The relation of sickness to accidents and the cost of illness has also had preferred attention.

A few years ago we developed an incentive plan for supervisors based on departmental performance. To bring home the cost aspect of accidents, we penalized every department for its injuries. In operations we set certain reasonable standards for rejections, output, and so on; but in the case of accidents the standard was set at zero. Every accident reduced the supervisor's bonus, and that had a most favorable influence upon accident prevention.

During the years I have spent out in the mill, I have always found that safety is easy to sell to the men. And it should be, because no one really wants to get hurt. But equipping men with the necessary skill and knowledge to avoid injury was a matter far more difficult. Here again Armco turned to experience for guidance, and observed that the best workmen not only turned out the greatest output of quality product, but they suffered the smallest number of injuries. One of our safety advisors went so far as to assert that if every man in the mill did his job perfectly at all times, we would entirely eliminate accidents. So our safety training department decided to job train every man in every plant. A typical operation was selected as a proving ground. We were then experiencing a number of major accidents in our roller leveling departments. Job training simply erased those accidents and for several years we did not have a single major accident among the roller leveling crews in any of the plants. Encouraged by this success, the job training program was pushed on all fronts. We found that a willingness to cooperate existed almost universally, but knowing how to cooperate was the missing link—a link which was management's responsibility to supply.

Job training is the most elementary form of training. It is simply a demonstration of how the job should be performed according to the best accepted practice, and is aimed at improving technique. In our industry we have operating, or production, foremen and maintenance foremen. Both take part in these classes, which if possible are held in the mill beside the equipment the men operate. The production foreman explains how the equipment should be operated, the quality, product defects, and so on. The maintenance foreman goes into the mechanical details. The safety and training adviser then goes into the hazards of the job and explains how they can be avoided. The men are not only shown how each operation or motion is performed, but they are told why. Job training has proved invaluable in winning employee cooperation. Where we have a job on which we are having difficulty, whether it is production, quality, or accidents, we take immediate steps to correct the difficulty by training the group responsible.

The Personal Equation

By BERNARD M. ROBINSON

General Counsel, Firestone Tire & Rubber Co., Akron, O.

The speaker said in part: I am told that the word "safety" is derived from the Latin word "salvum," which means "whole." It is easy, therefore, to see why the English speaking race selected the word "safety," for the problem of safety is the problem of keeping one's self whole.

It occurs to me, however, as I look over this great audience and see competitors in steel sitting down together, competitors in rubber assembled here side by side,

solve them wisely and permanently. We need leaders with the vision to avoid extremes and to build solidly upon the foundation of the whole of human nature and need. Our democratic institutions are flexible and responsive to us and we can so build if we have wise leadership. There will be many kinds of leaders needed for this task and the human leaders within industry are among them.

Accident Prevention Equipment Manufacturers' Section

Officers 1933-34

General Chairman—BUELL W. NUTT, Safety Equipment Service Company, Cleveland, Ohio.
Vice-Chairman—I. W. MILLARD, Industrial Gloves Corporation, Danville, Ill.
Secretary—GEORGE S. SHULL, Safety First Supply Company, Pittsburgh, Pa.
Treasurer—L. J. BOWKER, Mine Safety Appliances Company, Pittsburgh, Pa.
Executive Committee at Large—
E. W. BULLARD, E. D. Bullard Company, San Francisco, Calif.
FREDERICK WAHLERT, Pulmosan Safety Equipment Corporation, Brooklyn, N. Y.
CHARLES H. GALLAWAY, American Optical Company, Southbridge, Mass.

BUSINESS SESSION

September 30, 1934

The annual business meeting of the Accident Prevention Equipment Manufacturers' Section was called to order after a pleasant dinner by General Chairman Buell W. Nutt, Safety Equipment Service Company, Cleveland, who presided. Reports were heard from the General Chairman and the Chairmen of Standing Committees on activities during the past year. The report of the Nominating Committee was then called for, and new officers for the Section were nominated and elected as follows:

Chairman:—Irwin W. Millard, Secretary, Industrial Gloves Corporation, Danville, Ill.

Vice-Chairman:—George Shull, President, Safety First Supply Co., Brady Bldg., Pittsburgh, Pa.

Secretary:—William Wahlert, Pulmosan Safety Equipment Corp., 176 Johnson St., Brooklyn, N. Y.

Treasurer:—L. E. Dickson, Vice-President, Standard Safety Equipment Co., 75 East Wacker Drive, Chicago, Ill.

Executive Committee-at-Large:—
J. T. Ryan, V-Pres., Mine Safety Appliances Co., 201 N. Braddock, Pittsburgh, Pa.
F. R. Davis, President, Davis Emergency Equipment Co., 55 Van Dam St., New York City.

R. T. Solensten, V-Pres., Elliott Service Company, 242 W. 55th St., New York City.

B. W. Nutt, President, Safety Equipment Service Company, 1228 St. Clair Ave., NE, Cleveland, O.

ADJOURNMENT

Accident Prevention Equipment Manufacturers

Who Made Exhibits at the Twenty-Third Annual Safety Congress and Exposition, Statler and Cleveland Hotels, Cleveland, Ohio, October 1-5, 1934

American-La France & Foamite Industries, Inc., Elmira, New York
Fire protection equipment

American Optical Company, Southbridge, Massachusetts
Industrial eye protection service

Bendix Products Corporation, South Bend, Indiana
Automotive testing equipment

Robert A. Bernhard, Rochester, New York
Saf-T-top applicator bottles for antiseptics

Binney & Smith Company, New York City
Emulsified carbon black for concrete pavements

Bishinger-Koehler Manufacturing Company, Pittsburgh, Pennsylvania
Oxygen equipment products

Bradley Washfountain Company, Milwaukee, Wisconsin
Group washing equipment

Brown Shoe Company, St. Louis, Missouri
Safety Toe Shoes

R. H. Buhrke Company, Chicago, Illinois
Safety belts, straps, buckets, and tool guards

E. D. Bullard Company, San Francisco, California
Safety equipment for mines and industry

Burroughs Wellcome & Company (U. S. A.), Inc., New York City
First aid and medical equipment

Godfrey L. Cabot, Inc., Boston, Massachusetts
Emulsified carbon black for concrete pavements

Chicago Eye Shield Company, Chicago, Illinois
Head and eye protection equipment

H. Childs & Company, Inc., Pittsburgh, Pennsylvania
Safety footwear

Cunningham-Hall Aircraft Corporation, Rochester, New York
Sand blast helmet and suit

Davis Emergency Equipment Company, Inc., New York City
First aid, gas masks and safety equipment

Eagle Signal Corporation, Moline, Illinois
Traffic signal equipment and industrial timing equipment

Elliott Service Company, New York City
Elimination of waste, promotion of efficiency and safety

Evans Products Company, Detroit, Michigan
Railroad grade crossing and barrier and traffic signals

The Gerson-Stewart Corporation, Cleveland, Ohio
Soaps, disinfectants and cleaners for planned sanitation

Harley-Davidson Motor Company, Milwaukee, Wisconsin
Special police motorcycles and equipment

Hunter Auto Equipment Company, Inc., New York City
Fleet specialties, rubber mirrors, stop and tail-lights

Hynson, Westcott & Dunning, Inc., Baltimore, Maryland
Mercurochrome and Thantis lozenges

Industrial Commission of Ohio, Columbus, Ohio
Accident record charts and graphs, educational safety literature

International Shoe Company, St. Louis, Missouri
Safety shoes

Junkin Safety Appliance Company, Louisville, Kentucky
Safety guards for punch presses

Walter Kidde & Company, Inc., New York City
Permanently piped fire systems and portable extinguishers

Lehigh Safety Shoe Company, Allentown, Pennsylvania
Safety shoes and boots

Lima Cord Sole & Heel Company, Lima, Ohio
Non-slip soles and heels for footwear

Liquid Carbonic Corporation, Chicago, Illinois
Fumigant for infestation control

Macwhyte Company, Kenosha, Wisconsin
Wire rope and braided slings

Martindale Electric Company, Cleveland, Ohio
Protective masks, safety roadway signals

Metropolitan Life Insurance Company, New York City
Insurance, industrial group, etc.

Mine Safety Appliance Company, Pittsburgh, Pennsylvania
Mine and industrial safety equipment

National Automatic Safety Signal Company, Chicago, Illinois
Safety flash signal for rear of trucks

National Safety Council, Chicago, Illinois
Poster, Library, Research and Education Divisions

The Patent Scaffolding Company, Chicago, Illinois
Ladders and scaffolds for industry and construction

Portable Lamp & Equipment Company, Pittsburgh, Pennsylvania
Electric mine lamps and safety equipment

The Positive Safety Manufacturing Company, Cleveland, Ohio
Power press safety devices

Protectoseal Company, Chicago, Illinois
Safety cans for washing, bench, storage, etc., tank fittings

Pulmosan Safety Equipment Corporation, Brooklyn, New York
Respiratory protection and general safety equipment

Pyrene Manufacturing Company, Newark, New Jersey
Hand fire extinguishers and systems

Reece Wooden Sole Shoe Company, Inc., Columbus, Nebraska
Wooden sole safety footwear

The Safety Clothing Company, Cleveland, Ohio
Safety clothing and equipment

The Safety Equipment Service Company, Cleveland, Ohio
Goggles, safety clothing and other safety equipment

Safety First Shoe Company, Holliston, Massachusetts
Safety shoes

Safety Signal Devices, Inc., Chicago, Illinois
Safety stop-light for cars, trucks and buses

The Service Recorder Company, Cleveland, Ohio
The Servis Recorder for trucks and buses

Shepherd Safety Shoe Corporation, Chicago, Illinois
Safety shoes

The Sight Light Corporation, New York City
Instruments for measuring light in industries, etc.

Standard Safety Equipment Company, Chicago, Illinois
Dust protective equipment and general safety devices

Stonehouse Signs, Inc., Denever, Colorado
Metal accident prevention signs

The Surety Rubber Company, Carrollton, Ohio
Rubber safety equipment for linemen and industry

Weaver Manufacturing Company, Springfield, Ill.
Automotive testing equipment

West Disinfecting Company, Long Island City, New York
Disinfectants, insecticides and sanitary supplies

Willson Products, Inc., Reading, Pennsylvania
Eye, head and respiratory protective devices

Wil-X-M'f'g Corporation, Brooklyn, New York
Fire extinguishers and equipment

Aeronautical Section

Officers 1933-34

Chairman, Lester D. Seymour, President, American Airways, Inc., Chicago, Illinois.
Vice-Chairman, Captain E. V. Rickenbacker, North American Aviation, Inc., New York City.
Secretary, W. Dean Keefer, Director, Industrial Safety Division, National Safety Council, Chicago, Illinois.

WEDNESDAY MORNING SESSION

October 3, 1934

The Aeronautical Section session was called to order by Mr. Paul Wright, of the American Airways, Inc., Chicago, who presided. Chairman Wright introduced Mr. John W. Burton, who made a brief address of welcome on behalf of the Convention City. Chairman Wright then introduced the first speaker.

Safety in Aviation

By J. H. DOOLITTLE

Aviation Manager, Shell Oil Company, St. Louis, Mo.

The speaker said in part: There are few of us who appreciate the great care that is exercised in the operation of a modern air transport line to assure safety and a degree of comfort as well. Any normal man or woman having average eyesight and no physical disabilities, and being possessed of average intelligence, can learn to fly an airplane in a relatively short time; but it is a far cry from the mere fact that one knows how to fly an airplane to the art of flying as practiced by airline pilots who have made it their profession. These pilots are not only masters of every branch of the art of ordinary flying, but must take a post graduate course in blind or instrument flying. This training is given in special airplanes equipped with a hooded cockpit and the pilot is obliged to fly by means of his instruments alone, as he cannot see outside the airplane.

Probably unknown to the vast majority of air travelers, there exists in every modern air transport company today a complete medical division which closely examines the physical and mental qualifications of all their pilots once every month or six weeks. The examination is strict and thorough, and is given by physicians trained in aeronautical work. These examinations are in addition to those required semi-annually by the United States Department of Commerce. The eye examination requires that the pilot have not only normal vision, but that his judgment of

The only other risk which I can conceive of is that of fire and here American, helium-inflated airships have a definite advantage. No matter how carelessly helium is treated it will never become combustible and the pilot on a helium-inflated ship undoubtedly rests easier than his colleague who flies with hydrogen.

ADJOURNMENT

American Society of Safety Engineers–Engineering Section

Officers 1933-34

General Chairman—S. E. WHITING, Liberty Mutual Insurance Co., Boston, Mass.
Vice-Chairman—E. F. BLANK, Jones and Laughlin Steel Corp., Pittsburgh, Pa.
Vice-Chairman—A. S. REGULA, Industrial Relations Counselors, Inc., New York, N. Y.
Secretary—W. DEAN KEEFER, National Safety Council, Chicago, Ill.

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.
E. W. BECK, United States Rubber Co., New York, N. Y.
H. R BIXLER, Union Carbide and Carbon Corp., New York, N. Y. (Metropolitan Chapter).
C. B. BOULET, Wisconsin Public Service Corp., Milwaukee, Wis.
J. E. CULLINEY, Bethlehem Steel Co., Bethlehem, Pa.
R. E. DONOVAN, Standard Oil Company of California, San Francisco, Calif.
W. M. GRAFF, National Bureau of Casualty & Surety Underwriters, New York, N. Y.
HARRY GUILBERT, Pullman Company, Chicago, Ill.
A. P. HUCKESTEIN, Pennsylvania Department of Labor and Industry, Pittsburgh, Pa. (Western Pennsylvania Chapter).
R. McA. KEOWN, Industrial Commission of Wisconsin, Madison, Wis.
G. A. KUECHENMEISTER, Dominion Forge & Stamping Co., Limited, Walkerville, Ont., Canada.
M. G. LLOYD, United States Bureau of Standards, Washington, D. C.
JOHN P. MCCANN, New England Power Engineering and Service Corp., Worcester, Mass. (Boston Chapter).
W. S. PAINE, Aetna Life Insurance Co., Hartford, Conn.
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.
W. R. SMITH, United Engineers and Constructors, Inc., Newark, N. J. (Northern New Jersey Chapter).
R. F. THALNER, Buick Motor Company, Flint, Mich.

WEDNESDAY LUNCHEON SESSION

October 3, 1934

The annual meeting of the ASSE—Engineering Section of the National Safety Council followed a luncheon, and convened with S. E. Whiting, General Chairman, presiding.

Attention was called to the fact that all reports had been mimeographed and copies distributed at the luncheon table.

The following resolution was passed unanimously:

"The Annual Meeting of the American Society of Safety Engineers—Engineering Section of the National Safety Council has just heard with deepest regret of the death of Dr. Calvin Winsor Rice, well known engineer and for the past 28 years Secretary of the American Society of Mechanical Engineers, in New York City, on Tuesday, October 2, 1934.

"Dr. Rice has always had a deep and sincere interest in organized safety engineering work and has been ever ready to lend his aid and that of the A.S.M.E. to the furtherance of our objectives.

"Therefore, be it resolved, that we formally record our deep sympathy in the loss to us of Dr. Rice, and that this resolution be made a part of the record of this meeting, and that a copy be transmitted to the A.S.M.E. and to the family of Dr. Rice."

The Science of Seeing and Safety

By DR. M. LUCKIESH

Director, Lighting Research Laboratory, General Electric Company, Nela Park, Cleveland, O.

The speaker said in part: In the course of civilized progress increased burdens go hand in hand with increased convenience and comfort. Artificial conditions are substituted for natural ones without full knowledge of the consequences. Mankind came indoors and imposed new tasks and new environments. It was obvious to human beings that they needed light, but unobvious penalties remained hidden. Modern civilization has imposed upon eyes and human seeing-machines unnaturally severe prolonged critical visual tasks under greatly restricted light and altered lighting. Hours of close work are now the rule under meager light and unnatural lighting for eyes and human beings that evolved under an abundance of natural light outdoors when close visual work was casual. Convergence of eyes requires effort and so does concentration of attention. Abnormal visual tasks under sub-normal conditions is a combination of circumstances worthy of deep suspicion. This and many other facts and analyses eventually led us to develop a new and extended viewpoint which, in turn, opened a new vista of research. The chief result has been the development of the new science of seeing from which is being born a new science of lighting.

The science of seeing was born of radically new concepts. A science of vision has been evolving for a long time but it deals with the eyes or, more broadly, the visual sense. The science of vision is concerned with the abilities and limitations of eyesight as a tool. Seeing involves this tool and another tool—lighting. But seeing is much more than this. It is an activity of human beings operating as *human seeing-machines*. Seeing is work that a human being does. It requires lighting and vision but also human effort. It involves muscular activity, the nervous

system, and mental reactions. In other words, seeing is an activity of the human body and mind. It utilizes human energy and other resources just as any other task does. These new concepts have opened a vast new vista for thought, research and analysis. They reveal the extreme narrowness and inadequacy of the older viewpoints and practices which were erroneously assumed to deal adequately with seeing. They have cleared the way for the development of a science of seeing which in turn is laying the foundation for a science of lighting.

The major new concepts have given rise to many others. The *human* seeing-machine no longer need be merely satisfied to barely see but has a right to see easily. Studies of vision are concerned with thresholds, that is with limiting visibility. As long as study and consideration were confined to vision, practices were more or less anchored to the realm of barely seeing. However, when seeing is properly considered as work which human beings do we are immediately concerned with seeing easily. Therefore, the science of seeing is concerned with optimum conditions for easy seeing instead of being confined to minimum conditions of barely seeing or threshold visibility.

This human aspect of seeing, firmly entrenched through the new conception of human seeing-machines, shows that old ideas must succumb to their own inadequacy. The efficiency of a worker is no longer measurable by the useful work he does per dollar or per hour. His welfare as a seeing-machine is determined by the useless work he does—not merely externally in blundering due to poor seeing but internally through waste of energy and other human resources. The difficulty of a visual task assumes a new importance. It is obvious that it is more difficult to see a small object of low contrast than a large one of high contrast. But no longer is this merely an external factor. The new viewpoint directs the attention to internal penalties paid by human seeing-machines. Research must relate the external visual tasks to the internal costs of seeing—and it is doing so. The science of seeing places lighting in the class of labor-saving devices and also elevates it to the level of things which affect the entire human being.

The conception of the *human* seeing-machine requires revision of old ideas of visibility. A traffic sign or an advertisement on a bill-board may have high visibility to a person doing nothing else but looking at it. However, when that person is doing something else simultaneously, such as driving an automobile, his efficacy as a human seeing-machine is reduced. The science of seeing reveals that any other activity of a human being reduces his ability to see. Therefore, a new concept of visibility arises. A human seeing-machine, being human, has a certain total sense capacity. His efficacy as a seeing-machine depends upon how much of his sense-capacity is devotable to seeing. Distractions of every kind must be taken into account in appraising seeing conditions. This applies to human beings in the work-world, in traffic or even when leisurely reading in their own libraries. The science of seeing has emphatically introduced the human element into seeing and therefore into lighting. Not only the physiological aspects but the psychological aspects assume a decisive importance.

The old ideas of visibility must be expanded to include seeing quickly, accurately and with certainty. The requirements should not be merely sufficient under ideal conditions. Factors of safety must be developed for seeing and for lighting just as they have been applied to inanimate things such as bridges, which are much less subject to vagaries, subtle influences and uncertainties than human seeing-machines.

An appreciation of the adaptability of the eyes to various conditions for seeing leads directly to the minimization or elimination of many abuses imposed on the visual sense. The science of seeing introduced experiments which proved that the ability to perform a visual task under certain conditions was not necessarily an indication that the conditions were satisfactory to the eyes. Thus, production of work, which has been a criterion for dictating the conditions under which exacting seeing was done, is no longer a logical or justifiable criterion. These experiments clearly indicated that the eyes were frequently penalized by their willingness and ability to function under handicaps. Experiments which seek to indicate the relative influence of various conditions for seeing by measuring production are usually significant only when the subjects are expending the maximum energy and are near the point of exhaustion. This is a rare condition and unjustifiable excepting in emergencies.

Statistical analyses of the prevalence of defective vision establish the fact that

the eyes become defective through age, use and abuse. It is apparent from these data that although the eyes have the ability to compensate for severe or unnatural visual conditions, they are eventually injured in doing so. That the eyes are slow to complain of abuse is a fundamental reason why a consciousness of the costs of seeing would be a valuable asset to a half-seeing world.

In this sketch of the new science of lighting it is seen that human welfare is emphasized. In fact, the science of seeing is largely the extension of the older viewpoint of lighting and vision as tools into the psychophysiological realm of human beings; and, therefore, into the realm of end-products such as human efficiency, behavior, health, safety and welfare. Lighting for seeing aims to reduce the costs of seeing to human beings. These costs are not only in impaired eyesight and bodily disorders resulting from eyestrain. These have long been known but the recently extended viewpoint from vision as a tool, into seeing as an activity which affects the neural, muscular and mental processes of human organisms throws new light upon them. It reveals a goal which encompasses the unobvious as well as the obvious. To see most easily instead of to barely see is the new goal. This means the minimization of heretofore hidden wastes as well as eye-strain disorders. It means human welfare in an all-inclusive sense.

The social scientist has heretofore ignored or inadequately considered the costs of poor seeing in his elaborate studies of work conditions, rest-periods, hygiene, and other welfare aspects of human beings. The new knowledge already added to those older aspects of the science of seeing, which have been developing for a long time, will not continue to be ignored. Seeing in its broader aspects is now shown to be a drain upon human resources in ways heretofore hidden or unobvious. As seeing in this new and more extensive sense is comprehended by the social scientist, light and lighting will receive the consideration they deserve. Thus lighting becomes a part of social science. There are powerful indications that civilization is entering an era in which social science will be very important.

A new science of lighting calls for a new economics of lighting—an economics founded upon the welfare of human beings. Lighting should no longer be appraised by the useful output of the worker. This involves the welfare of the employer rather than that of the worker. Lighting must be appraised by the hidden costs or savings in human resources in homes and in schools, in traffic and in the work-world, and everywhere throughout civilized activity. Obviously the extended viewpoint of seeing reveals a widespread need for scrapping old ideas of cost of lighting and for revising lighting economics in terms of newly revealed *values* of light and lighting in the realm of human welfare.

Report of Nominating Committee

Mr. C. B. Auel presented the report of the Nominating Committee, the personnel of which included C. B. Auel, Chairman, R. F. Thalner, and E. W. Beck. The following officers were elected for the coming year:

General Chairman—A. S. Regula, Industrial Relations Counselors, Inc., New York City.

Vice-Chairman—E. F. Blank, Jones and Laughlin Steel Corporation, Pittsburgh, Pa.

Vice-Chairman—C. W. Smith, Standard Oil Company (Indiana), Chicago, Ill.

Secretary—W. Dean Keefer, National Safety Council, Chicago, Ill.

Members of Executive Committee for Three Years—

Cyril Ainsworth, American Standards Association, New York City.

C. E. Ralston, Pittsburgh Plate Glass Company, Pittsburgh, Pa.

R. C. Stratton, The Travelers Insurance Company, Hartford, Conn.

Member of Executive Committee for One Year—

D. L. Royer, The Ocean Accident and Guarantee Corporation, New York City.

ADJOURNMENT

Automotive and Machine Shop Section

Officers 1933-34

General Chairman—M. J. McCarthy, Fisher Body Corp., Detroit, Mich.
Vice-Chairman—K. A. Callam, Detroit, Mich.
Secretary—G. E. Sanford, General Electric Co., Schenectady, N. Y.
News Letter Editor—E. C. Walker, Dodge Brothers Corp., Detroit, Mich.
Engineering Committee Chairman—W. W. Janzer, Seaman Body Corp., Milwaukee.
Health Committee Chairman—Dr. A. F. Lecklider, Fisher Body Corp., Detroit.
Membership Committee Chairman—Nils Juell, Hayes Body Corp., Grand Rapids.
Poster, Slides and Safety Kinks Committee Chairman—M. A. Kroger, Chevrolet Detroit Plants, General Motors Corp., Detroit, Mich.
Program Committee Chairman—M. A. Clark, United States Rubber Co., Detroit.
Publicity Committee Chairman—W. A. Bechill, Chrysler Corporation, Detroit.
Statistics Committee Chairman—C. W. Bishop, Lycoming Manufacturing Co., Williamsport, Pa.
Members at Large—
L. E. Averill, C. H. Dockson Co., Detroit, Mich.
Hoyt L. Fracher, Detroit Steel Products Co., Detroit, Mich.
R. F. Thalner, Buick Motor Co., Flint, Mich.
R. A. Shaw, The Murray Corporation of America, Detroit, Mich.
Carl L. Storck, Delco Products Div., General Motors Corp., Dayton, Ohio.

MONDAY AFTERNOON SESSION

October 1, 1934

The opening session of the Automotive and Machine Shop Section was called to order by General Chairman M. J. McCarthy, Fisher Body Corporation, Detroit, who presided. Chairman McCarthy introduced Mr. Charles H. Hazelton, Directing Manager, Foote-Burt Co., Cleveland, who made a brief address of welcome on be-

There is another angle in the 1-29-300 ratio that may be misleading. That is the part relating to the 29 cases where the victim is "hurt only a little bit." We used to talk about minor and major injuries. We have quit doing that. We have learned that any and every injury may very quickly become a major injury resulting in serious disablement or death.

The statistician of the Workmen's Compensation Board of Ontario called my attention to that fact very forcibly one day when he said: "Gus, you name any injury you want to and I'll guarantee to find, in compensation records somewhere, where that injury you name has already caused a death." He did not say—You name the injury and I'll prove that it *may* cause a death. He said, "You name the injury and I'll show you that it has *already* caused a death"—and probably many of them.

Report of Nominating Committee

At this point General Chairman McCarthy called for the report of the Nominating Committee, and officers for the ensuing year were elected as follows:

General Chairman—Merle C. Hale, General Motors Corp., Detroit, Mich.

Vice-Chairman—C. T. Winegar, Dodge Brothers Div., Chrysler Corp., Detroit, Mich.

Secretary—M. A. Clark, United States Rubber Co., Detroit, Mich.

News Letter Editor—W. J. Denniston, Hyatt Bearings Div., General Motors Corp., Newark, N. J.

Engineering Committee Chairman—G. E. Sanford, General Electric Co., Schenectady, N. Y.

Health Committee Chairman—Dr. A. L. Brooks, Fisher Body Detroit Div., General Motors Corp., Detroit, Mich.

Membership Committee Chairman—C. W. Bishop, Lycoming Manufacturing Co., Williamsport, Pa.

Posters, Slides and Safety Kinks Committee Chairman—Nelson Kiser, Studebaker Corporation, South Bend, Ind.

Program Committee Chairman—Marvin A. Heidt, Budd Wheel Co., Detroit Mich.

Publicity Committee Chairman—C. A. DeMonge, Kelsey-Hayes Wheel Corp., Detroit, Mich.

Statistics Committee Chairman—R. F. Thalner, Buick Motor Co., Flint, Mich.

Members Executive Committee at Large—

L. E. Averill, C. H. Dockson Co., Detroit, Mich.
C. M. Dotterrer, Revere Copper and Brass Inc., Detroit, Mich.
H. L. Fracher, Detroit Steel Products Co., Detroit, Mich.
M. J. McCarthy, Fisher Body Detroit Div., General Motors Corp., Detroit, Mich.
R. A. Shaw, The Murray Corp. of America, Detroit, Mich.
Carl L. Storck, Delco Products Div., General Motors Corp., Dayton, Ohio.

The Safety Man's Responsibility in Industry

By T. P. ARCHER

President, Terndstedt Manufacturing Co., Detroit, and Vice President, Fisher Body Corporation

The speaker said in part: I want to take, in discussing this subject, what may appear to some of you as a somewhat unorthodox position. The Safety Man's responsibility in industry to me is one thing; safety supervision of responsibility for safety supervision in industry is another thing; and I have never believed that they could ever be successfully considered as one and the same thing.

Let me define that a little. Safety supervision will not be successful safety supervision unless it includes all supervision. Safety supervision can never suc-

cessfully be placed in the hands of one man or two men, or of three men. It cannot be the job of one little group. Safety supervision, to be successfully adequate and efficient, must be the responsibility of all supervision.

So when I talk to you about safety supervision, I am not speaking particularly of the man whose title is Safety Engineer, Safety Man, or Safety Director, or Vice President in charge of Safety. When I speak of safety supervision, I am speaking of all supervision. When I speak of a safety man, I speak of the man whom we consider should supervise safety supervision. There is a real difference. I do not want to feel that a sound safety man can successfully supervise safety in a plant of any considerable size. He is not big enough; he cannot cover enough territory; he does not know enough, and he can never learn enough. But any safety man who has the right fundamentals and the proper understanding of what makes up a safety supervisor, can successfully supervise safety supervision, so long as the entire organization realizes and understands the fact that safety supervision is the responsibility of the entire supervisory board.

We did a little investigating a few weeks ago of just what this matter of successful supervision could mean, and we came out with a definition which I am going to try to repeat to you. "Successful Safety Supervision will consist of an unique understanding of applied mechanics, combined with a sound appreciation ot the psychological factors, psychological forces, which motivate an operating personnel."

Now, there is a mouthful of words for you to digest. Let us look at it in another way, like this: Sound safety supervision also must, to a degree at least, define a sound and successful safety supervisor; and if that defines a sound and successful safety supervisor according to our definition, it defines a safety supervisor of any operation and any industry; and it also defines the responsibility and the place of the safety man in industry.

In plain language, it just means this: That a good safety man will be a "jack-of-all-trades," with an unholy gift of gab and the oily persuasiveness of the champagne salesman.

It is my opinion that a safety man does not necessarily have to be a sound mechanic. He has to have an appreciation of applied mechanics, yes. I am almost certain that he won't be successful if he is an unsound mechanic. He must know mechanics. He must know and appreciate what operations are necessary and how those operations are applied and whatever processes are involved in the operation of an industry. Those things he must know, but he must know the majority in a little different way than we would understand as sound mechanics.

We have in all our industries experts to develop process. We have mechanical engineers, die engineers, tool engineers, and all sorts of engineers to determine sound mechanical practice, sound mechanical results, and to assure ourselves that we are going to get a pre-determined production.

But our safety engineer must approach his job from a different angle. His job is not to determine before hand what a product will be. His job is to determine before hand what a problem might be. It is not his job to determine what will be the results when all mechanical movements and processes are going entirely right. His job is to determine what are going to be the reuslts when mechanical movements and processes go entirely wrong. And thus, in my estimation, it is one of the prime places of the safety man in industry not to look upon our operations and the application of our processes from the ordinary standing of an engineer, but to look at them from the unordinary outloook of a man who is not looking for certainties at any time, but is always searching for the uncertainties.

But now I want to talk to you a little, not so much about the safety man's present place in industry as about his new place in industry. Everything we pick up nowadays is new; everything we read is new; everything we think about is new. So our whole thought, our whole set-up of conditions today revolves around something new. If we haven't already got something new we are searching for something new every day. We are in a state of flux, we are in a state of constant change, searching for a sound foundation on which we can again begin to build; and that has developed, it seems to me, an unique opportunity for the safety man if he realizes and appreciates the fact that he has a place in this new order of things and that he has a new responsibility in serving industry.

1. That the cost element of safeguarding a machine at its source is not of great consequence.
2. That the manufacturer is conscious of the desirability of safeguarding machinery when it is built.
3. That the manufacturer will appreciate suggestions as to methods of guarding
4. That the purchaser must assume his share of the responsibility if he fails to specify safety devices on machines that he is purchasing.
5. That the safety engineers of machine purchasers be given authority to okey or reject machines and tools that do not meet reasonable safety standards.
6. That the high-grade manufacturer of machines is up against a state of competition, making it difficult to collect the slightest differential in price for safety features.
7. That there must be willingness on the part of the purchaser to pay these differences.

ADJOURNMENT

Cement Section

Officers 1933-34

General Chairman—J. B. Zook, Great Lakes Portland Cement Corp., Buffalo, N. Y.
Vice-Chairman—W. W. Hamilton, Alpha Portland Cement Co., Easton, Pa.
Secretary—A. J. R. Curtis, Portland Cement Association, Chicago, Ill.
News Letter Editor—Jack Dempster, Canada Cement Co., Ltd., Port Colborne, Ontario, Canada.
Engineering Committee Chairman—Frederick B. Hunt, Nazareth Portland Cement Co., Nazareth, Pa.
Membership Committee Chairman—H. A. Reninger, Lehigh Portland Cement Co., Allentown, Pa.
Poster Committee Chairman—M. P. Greer, Marquette Cement Manufacturing Co., Cape Girardeau, Mo.
Program Committee Chairman—D. B. Coleman, Missouri Portland Cement Co., St. Louis, Mo.
Members at Large—
R. B. Fortuin, Pennsylvania-Dixie Cement Corp., Nazareth, Pa.
E. Posselt, International Cement Corp., New York, N. Y.
C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
F. E. Town, Manitowoc Portland Cement Co., Manitowoc, Wis.
H. Vanderwerp, Medusa Portland Cement Co., Cleveland, Ohio.

TUESDAY MORNING SESSION

October 2, 1934

The opening session of the Cement Section was called to order by General Chairman J. B. Zook, Great Lakes Portland Cement Corp., Buffalo, New York, who presided. Chairman Zook introduced Mr. Edward J. Maguire, Vice President and Treasurer, Medusa Portland Cement Co., Cleveland, who made a brief address of welcome on behalf of the City of Cleveland. The General Chairman then presented, under the heading, "Our Work—Today and Tomorrow," some brief thoughts on the future activities of the section and followed with brief reports from the chairmen of standing committees. He then called for the report of the Nominating Committee, and new officers for the section were nominated and elected as follows:

Report of the Nominating Committee

General Chairman—J. B. Zook, Great Lakes Portland Cement Corp., Buffalo, N. Y.

Vice-Chairman—W. W. Hamilton, Alpha Portland Cement Co., Easton, Pa.

Secretary—A. J. R. Curtis, Portland Cement Association, Chicago, Ill.

News Letter Editor—Jack Dempster, Canada Cement Co., Ltd., Port Colborne, Ontario, Canada.

Engineering Committee Chairman—Frederick B. Hunt, Nazareth Portland Cement Co., Nazareth, Pa.

Membership Committee Chairman—H. A. Reninger, Lehigh Portland Cement Co., Allentown, Pa.

Poster Committee Chairman—M. P. Greer, Marquette Cement Manufacturing Co., Cape Girardeau, Mo.

Program Committee Chairman—D. B. Coleman, Missouri Portland Cement Co., St. Louis, Mo.

Members at Large—

R. B. Fortuin, Pennsylvania-Dixie Cement Corp., Nazareth, Pa.
E. Posselt, International Cement Corp., New York, N. Y.
C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
F. E. Town, Manitowoc Portland Cement Co., Manitowoc, Wis.
H. Vanderwerp, Medusa Portland Cement Co., Cleveland, Ohio.

Analysis of Accidents in the Cement Industry

By A. J. R. CURTIS

Assistant to General Manager, Portland Cement Association, Chicago

The speaker said in part: Since 1924 lost time accidents in the Cement Industry steadily decreased through 1933. In the first eight months of 1934, however, we find that all accidents have increased 55.5 per cent over the corresponding period of 1933, with an increase of 42.8 per cent in fatalities. In actual number this is 154 accidents, including 10 fatal, in eight months of 1934, as against 99 accidents with 7 fatal for the same period of 1933. For the entire year of 1933 there were only 148 accidents, including 7 fatalities.

It seems clear that good safety records in the past offer little protection for the present and poor safety records get much worse when neglected.

You have all regularly received the monthly accident reports and those of you who took the pains to analyze them perhaps found some unpleasant implications. The statement that many of these accidents clearly point to lack of supervisory interest bears repeating. Eye injuries in packing departments show lack of interest in having men wear goggles. These injuries are inexcusable. Accident after accident to men of long experience in the mill, but engaged in duties foreign to their training, indicate an assumption that is dangerous to the safety record. Accidents are occurring to new men blundering in a way that indicates no introduction to safety and no specific instruction in doing the job safely.

Study the chart comparing cement production and accidents and you will find that up to and including 1931, the two were fairly constant except during the June No-Accident Campaign. In 1932 the accident line levels off and shows a spotty variation, and in 1934 there is apparently no relationship between the two. It would seem that under operating conditions of the past three years we should find a direct relationship between accidents and production, but it looks very much as though accidents were now going their own way, quite independent of production.

What have we to do?

In general, we must make an appraisal of our past activities and compare them with a complete, well rounded program to determine the weakness, if any. We must set up a definite schedule of safety activities and then follow through to see that each activity is carried out. The following outline may serve as a guide and check list.

1. *Safety Committees.* Have they met regularly? Have the meetings become pure routine? Is every person asked to express himself? Have any company officials participated in the meetings? Has the committee personnel rotated? Are the P.C.A. accident reports discussed and acted upon? Are plant and departmental safety inspections made regularly. Is a written report required and is it acted upon? Have any recommendations been overlooked or neglected or does every suggestion receive careful consideration?

2. *Foremen.* What effort has been made to get action from foremen and supervisors? Have they been called together as a group, irrespective of the safety committee, and charged with safety responsibility? Have they had individual meetings with the superintendent to discuss safety? Have they been encouraged to discuss specific cases of safety rule violations? Are all foremen requested to analyze accidents occurring in their department and the cause thereof? Is it common practice for foremen to talk to new men about safety? Are they charged with the responsibility of instructing men on safe way of performing all duties? If so, is this procedure followed when men are shifted from one department to another?

3. *General Plant Program.* Have any general safety meetings or gatherings been held during the past year? When plant is reopened following shut-down, are employees reminded of safety? Is it possible to call all employees together at time of reopening of plant for a brief safety meeting led by superintendent? Have any contests been conducted? Are plant publications of any kind used? What general educational work is conducted? Are bulletin boards kept interesting by frequent change? Has any disciplinary action been taken for rule violation? Is recognition given to good departmental accident records? How are accidents and near accidents and infections publicized? Are accurate records kept of minor injuries? Are employees' families interested in the safety program? Are employees encouraged to report serious illness or other trouble in their families? Do you make physical examinations of your employees? Have you a first aid team in your plant? Do you encourage safety suggestions from all employees?

When we have answered all of these questions honestly, we are ready to set up an activity program for every month to include the following essentials:

1. Regular plant inspections to uncover physical hazards. Foremen should participate and be charged with responsibility of following through on every recommendation.

2. Regular safety committee meetings. Rotate the membership on these committees. Divide into sub-committees to report on such things as good housekeeping, bulletin board publicity, fire prevention, first aid, sanitation, sickness, etc. See that company officials appear before the committee frequently.

3. Reports and investigations. See that every accidental injury whether lost time or not, is reported fully and the real cause determined. Accept no reports that do not arrive at a definite conclusion as to cause. Publicize every report with photos or drawings. Hammer away at first aid reporting by publicizing possibility of serious infections.

4. Safety education. Plan your bulletin board material far in advance. Decide on a central theme for each month; for example, have a first aid month, a housekeeping month, etc.

Arrange interesting informal safety meetings without side speeches. Pep them up with boxing or wrestling matches between plant employees.

See that every new man is personally instructed in safety by his foreman.

Use contests which will allow participation of every man on an equal basis.

5. General. Conduct a series of foremen round table discussions for six weeks, one evening a week. Much foremanship training material is available. Make the final meeting a dinner and let the foreman do the talking.

See that the attitude of every employee toward safety is known to the foreman and the superintendent.

At least twice a year, see that the plant safety program is brought to the attention of employees' families.

wages of each employee in all departments that completed a month without a lost-time accident. This plan has proved to be very effective in stimulating interest. It is especially effective in making each individual employee interested in seeing that his fellow employees work safely.

3. Our officials have always given their full cooperation to anything of merit for preventing accidents, and have unstintingly appropriated money to provide adequate guards, good quality tools, properly fitted goggles, first aid equipment, etc.

4. We use, with very good results, the Judge and Jury system that has been used in several other industries. We built an impressive judge's stand, jury box, witness stand, etc. A judge, sheriff, prosecutor, and jurors were elected. The sheriff selected deputies in each department that were truly undercover men, as no one but the sheriff knew who they were. It is the duty of every employee to turn in charges for violations of safety rules. These charges are filed and once a month court is convened. The defendants are advised of their charges several days before their trial, and they select anyone they choose to defend them, witnesses for both sides are picked and court is really in session. Various penalties are given to those found guilty.

5. Good quality and properly designed tools, we believe, rank second only to the operator's knowledge of the proper way to use them in preventing accidents.

Much has been written about the hazards of using hand chisels, punches, etc., that have become mushroomed, and many suggestions have been made for reconditioning these tools. Our method is to make tools that will withstand severe use and even misuse without mushrooming.

Round Table Discussion

This general discussion was led by General Chairman J. B. Zook. He submitted as a subject the question "What Effect on Employees' Attitude Does the Present Necessary Economy Measures Have, Particularly Relating to Company Loyalty and Safety?" It was the general feeling that the employer's own attitude is of extreme importance and that sincerity and fairness in dealing with employees will always reflect back in their attitude toward the management. It was also emphasized that proper individual training of the employee in the simplest details and the checking of every job are of extreme importance in these times when many new employees are being hired and also when older employees are returning to unfamiliar jobs. This special training program must also be carried on to what would appear to be extreme, at least, for a considerable time, if a satisfactory control of accidents is to be hoped for.

ADJOURNMENT

Chemical Section

Officers 1933-34

General Chairman—John Roach, Deputy Commissioner of Labor, Trenton, N. J.

Vice-Chairman in Charge of Program—A. L. Armstrong, Eastman Kodak Co., Rochester, N. Y.

Vice-Chairman in Charge of Engineering—G. H. Miller, E. I. duPont de Nemours & Co., Wilmington, Del.

Secretary—Ralph O. Keefer, Aluminum Company of America, Massena, N. Y.

News Letter Editor—John Moroney, Aluminum Company of America, Massena, N. Y.

Occupational Disease Committee Chairman—Dr. Leonard Greenburg, Yale Medical School, New Haven, Conn.

Membership and Publicity Committee Chairman—S. D. Kirkpatrick, Chemical and Metallurgical Engineering, New York, N. Y.

Statistics Committee Chairman—Ira V. Kepner, Pennsylvania Salt Manufacturing Co., Menominee, Mich.

Members at Large—

Dr. Elizabeth B. Bricker, Lititz, Pa.
F. E. Clancy, Jr., Mathieson, Alkali Works, Inc., Niagara Falls, N. Y.
F. W. Dennis, Hooker Electrochemical Co., Niagara Falls, N. Y.
E. F King, Lever Brothers Co., Cambridge, Mass
S. F. Larchar, Thomas A. Edison Industries, West Orange, N. J.
H. L. Miner, E. I. duPont de Nemours & Co., Wilmington, Del.
E. L. Root, Celluloid Corporation, Newark, N. J.
C. E. Sevrens, Merrimac Chemical Co., Inc., Boston, Mass.
John S. Shaw, Hercules Powder Co., Wilmington, Del.
R. C. Stratton, The Travelers Insurance Co., Hartford, Conn.
Plummer Wheeler, American Cyanamid Co., Linden, N. J.
S. E. Whiting, Liberty Mutual Insurance Co., Boston, Mass.

MONDAY AFTERNOON SESSION

October 1, 1934

The opening session of the Chemical Section was called to order by General Chairman John Roach, Deputy Commissioner of Labor, State of New Jersey, Trenton, N. J. Chairman Roach introduced Dr. W. R. Veazey, head of the Chemical

Members Executive Committee at Large—

F. E. Clancy, Jr., Mathieson Alkali Works, Inc., Niagara Falls, N. Y.
F. W. Dennis, Hooker Electrochemical Co., Niagara Falls, N. Y.
Ira V. Kepner, Pennsylvania Salt Manufacturing Co., Menominee, Mich.
E. F. King, Lever Brothers Co., Cambridge, Mass.
H. P. Lewis, E. I. duPont de Nemours & Co., Wilmington, Del.
John Roach, Deputy Commissioner of Labor, Trenton, N. J.
C. E. Sevrens, Merrimac Chemical Co., Inc., Boston, Mass.
John S. Shaw, Hercules Powder Co., Wilmington, Del.
Plummer Wheeler, American Cyanamid Co., Linden, N. J.
S. E. Whiting, Liberty Mutual Insurance Co., Boston, Mass.

Round Table Discussion

The final feature of the Chemical Section program was a general Round Table Discussion of the subject "Preventing Injuries to the Hands and Feet of Workers in the Chemical Industry," which was led by A. L. Armstrong General Supervisor of Safety and Fire Protection, Eastman Kodak Company, Rochester, N. Y. This was an informal extemporaneous discussion, and although interesting and of value to those who took part, no record is available.

ADJOURNMENT

Construction Section

Officers 1933-34

General Chairman—JOHN RUSSELL, JR., United Engineers & Constructors, Inc., Newark, N. J.

Vice-Chairman—W. G. WHEELER, Building Trades Employers' Association, New York, N. Y.

Vice-Chairman for Engineering Projects—P. R. MANETTA, JR., Thompson Starrett Co., New York, N. Y.

Vice-Chairman for Utility Construction—C. H. BLACK, Stone & Webster Engineering Corp., Boston, Mass.

Vice-Chairman for U. S. Engineer Department—CAPT. ELLIOTT VANDEVANTER, C. of E., Office of the Chief of Engineers, Washington, D. C.

Secretary—ROBERT MCKINLEY, General Accident Fire & Life Assurance Corp., Detroit, Mich.

News Letter Editor—EDGAR N. GOLDSTINE, (State Compensation Insurance Fund of Calif.), San Francisco, Calif.

Engineering Committee Chairman—J. C. FORESTER, The L. E. Myers Co., Chicago, Ill.

Membership Committee Chairman—NORMAN WELLINGS, Booth & Flinn, Ltd., Pittsburgh, Pa.

Poster Committee Chairman—JAMES N. DOYLE, James N. Doyle Adjustment Bureau, Reg'd., Montreal, Quebec, Can.

Program Committee Chairman—R. J. REIGELUTH, C. W. Blakeslee & Sons, New Haven, Conn.

Publicity Committee Chairman—THOMAS W. WALTON, Henry W. Horst Co., Philadelphia, Pa.

Statistics Committee Chairman—W. A. SNOW, Associated General Contractors of America, Inc., Washington, D. C.

Members at Large—

W. F. AUSTIN, Detroit, Mich.

MISS E. S. GHEE, McLaury Marble Corp., New York, N. Y.

W. R. RICHARDS, Bureau of Contract Information, Inc., Washington, D. C.

GEORGE WIDUA, Builders and Manufacturers Mutual Casualty Co., Chicago, Ill.

Marine Section

Officers 1933-34

General Chairman—FRANK H. COGAN, Railroad Marine Service, New York, N. Y.

Vice-Chairman (in Charge of Posters and Slides)—ROBERT F. HAND, Standard Shipping Co., New York, N. Y.

Vice-Chairman (in Charge of Publicity)—ARTHUR M. TODE, Consulting Marine Engineer, New York, N. Y.

Vice-Chairman (for the Pacific Coast)—A. O. WOLL, General Petroleum Corp. of Calif., Terminal Island, Calif.

Secretary—E. C. HOLDEN, JR., United States P. & I. Agency, Inc., New York, N. Y.

News Letter Editor—HENRY BLACKSTONE, United States P. & I. Agency, Inc., San Francisco, Calif.

Engineering Committee Chairman—B. C. EDWARDS, Consulting Engineer, New York, N. Y.

Membership Committee Chairman—W. E. STEWARDSON, Colombian Steamship Co., New York, N. Y.

Program Committee Chairman—J. S. HUNTER, The Atlantic Refining Co., Philadelphia, Pa.

Statistics Committee Chairman—BENJAMIN H. SELF, Travelers Insurance Co., New York, N. Y.

Stevedoring Committee Chairman—F. C. GREGORY, United States Employees' Compensation Commission, Washington, D. C.

Members at Large—

FRANK E. AMES, Lykes, Bros.-Ripley Steamship Co., New Orleans, La.
W. P. BIGGS, Navy Department Safety Engineer, Washington, D. C.
C. F. BLACKTON, Erie Railroad Co., Jersey City, N. J.
A. R. BUSH, International Flare-Signal Co., New York, N. Y.
E. W. FISKE, JR., Standard-Vacuum Transportation Co., New York, N. Y.
CHARLES H. FLATHERS, Eastern Steamship Lines, Inc., Boston, Mass.
F. P. FOISIE, Shipping Federation of the State of Washington, Seattle, Wash.
J. M. GRISIER, Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.
WM. GROUNDWATER, Union Oil Co. of Calif., Los Angeles, Calif.
WM. F. JONES, Gulf Refining Co., New York, N. Y.
W. P. KAIN, Marine Surveyor, New York, N. Y.
R. K. KELLY, Tide Water Oil Co., New York, N. Y.

J. L. LUCKENBACH, American Bureau of Shipping, New York, N. Y.
DANIEL J. MURPHY, Murphy, Cook & Co., Philadelphia, Pa.
BYRON O. PICKARD, Pacific American Steamship Assn., San Francisco, Calif.
E. J. ROBESON, JR., Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
J. K. ROBISON, Sinclair Navigation Co., New York, N. Y.
J. C. ROHLFS, Standard Oil Company of Calif., San Francisco, Calif.
H. L. SEWARD, Yale University, New Haven, Conn.
ARTHUR R. SAVAGE, Peninsular & Occidental Steamship Co., Port Tampa, Fla.
A. J. SMITH, Marine Office of America, New York, N. Y.
J. H. TOMB, New York State Merchant Marine Academy, New York, N. Y.
ELLIOTT VANDEVANTER, Capt., Office of the Chief of Engineers, Munitions Bldg., Washington, D. C.
JOHN WRIGHT, American Export Line, New York, N. Y.
G. D. ZEH, Associated Oil Co., San Francisco, Calif.

TUESDAY MORNING SESSION

October 2, 1934

The opening session of the Marine Section was called to order by General Chairman Frank H. Cogan, the Delaware, Lackawanna and Western Railroad Co., Hoboken, N. J., who presided. Chairman Cogan introduced Mr. Herbert C. Jackson, of the Interlake Steamship Co., Cleveland, who cordially welcomed the delegates in the name of the City of Cleveland.

Chairman Cogan then presented a brief review and preview of Marine Section activities during the past year, including the work of sectional officers and chairmen of committees. The chairman then introduced the first speaker.

The Economics of Accident Prevention in Handling Marine Cargo

By H. W. HEINRICH

Asstistant Superintendent, Engineering and Inspection Division, The Travelers Insurance Co., Hartford, Conn.

The speaker said in part: According to data provided by the U. S. Department of Commerce, 342,489 tons of cargo valued at $10,910,429,000 were handled for export and import in the United States in 1932. This includes cargo handled on the rivers and lakes as well as at ocean ports. The payroll required was $188,000,000. Estimated payments for compensation and employers' liability claims and for medical and hospital services amounted to approximately $14,000,000. In addition to this, the indirect costs of accidents in stevedoring work is approximately four times as much as the direct costs, or $56,000,000.

From these data accident costs may be expressed in terms of tons and payroll, as follows:

Total cost per ton, 20c. Total cost per $100 of payroll, $37.

Part of total cost per ton not covered by insurance, 16c. Part of total cost per $100 of payroll not covered by insurance, $29.60.

It is fair to compare accident costs with other so-called overhead costs in handling cargo in order that a true picture of its relative importance may be had. Stevedoring operators in the Port of New York provide the following estimates: Overhead costs, .068; labor costs, .68; bid price, .90; profit, .13; accidents, .20.

From the above it appears that the cost of accidents is nearly twice the total profit and almost three times the amount of overhead, and about one-third as much as labor. A reduction of accident cost to the extent of 50 per cent, which, by the way, is wholly reasonable and possible, would seem to be decidedly worth while. To the entire industry the saving would approximate $35,000,000 annually.

A further interesting fact related to accident cost is that compensation insurance rates, which directly reflect the frequency and severity of accidents, are getting higher. From 1928 to 1932 the rates in the State of New York increased 22 per cent.

The relation of incidental cost of accidents to the direct cost is very well known; however, the following cases will serve as examples:

Case No. 1. An unboxed Lincoln automobile was being loaded into No. 2 hatch. The boom-head was not guyed far enough outboard and when the car was raised clear of the dock it swung against the ship's side with considerable force, smashing the front of the car. The car could not be shipped and had to be replaced from the factory in Detroit. Also when the car suddenly swung toward the ship, a longshoreman, who was holding the guy lines, was thrown violently to the ground, injuring his arm.

The direct injury cost to this man was $6, the medical bill being paid by the insurance company. But the indirect cost of the accident included the following: Property damage to car, $2000; tonnage loss $20; labor loss $10; freight loss $300. The total indirect cost was, therefore, $2330, or a ratio of 388 to 1. Obviously, however, this is not an average case.

Case No. 2. Oil cake was being loaded into a ship in Brooklyn. The injured man, a hatch tender, was standing by the ship's rail and had signaled the winch man to hoist the draft. He then walked from the rail to the hatch coaming and started giving instructions to employees in the hold to stand clear of the draft. The job was being worked with a low boom and the hatch tender was not standing clear of the draft, for when it swung it struck him across the shoulders and he was thrown into the hold. He sustained a broken collar bone, two broken legs and various other injuries. The medical bills amounted to $800, and although the accident happened four years ago, the man is still receiving compensation for partial disability.

There was no property damage in this accident, but even so the employer found additional cost. Before the accident occurred, the boat was being loaded at the rate of 50 tons per hour, the men producing to capacity. The accident happened and immediately 20 employees stopped work. It was necessary to secure a canned goods skid to lift the injured man out of the hold. There was more delay until the ambulance patrol arrived and in all it was nearly one hour before the job got under way again. The first hour after the accident the men moved 35 tons, the next hour 40 tons, and the final hour of the day 42 tons. Thus, in the day's work there was incidental accident cost due to a production shortage of nearly 60 tons, and the loss of an hour's payroll for the twenty men on the job, which was paid by the employer.

It has been established by careful research, therefore, that the cost of claims and medical and hospital care is but one-fifth of the total cost of an average accident. The remaining four-fifths must be paid by the employer and absorbed under other heads.

The prevention of employee accidents—and incidentally of accident costs—is not difficult once the elements of accident prevention are understood. Most accidents, fortunately, are of a preventable nature.

An accident can occur only because of the existence of one or both of two basic conditions: (a) The unsafe acts of some person, or (b) an unsafe physical or mechanical condition. These conditions must be found and corrected if accidents are to be prevented.

The unsafe physical conditions are usually obvious. They can be readily found and therefore should be the first to be corrected. The unsafe acts of persons can be determined by intelligent observation of the performance of men at work. Once it has been determined that a man is doing a job in an unsafe manner, he must be made to understand the right and safe way to do the job, and then it

wares have tremendous force and play a great part in breaking down the public's resistance. These advertisers have not the least bit of doubt that these media render a material service in helping them to remove from their shelves the innumerable products which, as manufacturers and producers, they have to offer. It does not necessarily follow that advertising media need be pictorial in design. Some of the lettered posters are just as effective as those bearing illustrations. Color attracts the eye quicker, of course. Certain advertisers adopt slogans which are kept before the public constantly and these slogans frequently become part of the observers' colloquial vocabulary. In each respect, nevertheless, the public, whether consumer or not of the articles advertised, is "visualizing" the product which it sees advertised on the highways and by-ways.

Now, if it is true that we humans can visualize the news through mental images and can be made to dig down in our pockets because of the irresistible power created by attractive messages contained in advertising media, is it not equally true that safety-consciousness—the will to do away with all accidents—can be instilled in our minds by this same process?

There is no doubt that the majority of us agree that this can be accomplished. We believe that the employees of an industrial concern are bound to perform their work with a progressively lessening number of mishaps to themselves if they receive the proper kind of education in the science of accident prevention. This same compelling power which causes men, women and children to buy things which they see advertised will, in the opinion of every member of the Marine Section Poster Committee of the National Safety Council, influence the workmen in the manner desired. They are certain in time to take notice of the timely messages and cultivate a habit of working safely.

An individual will say to himself that this or that practice which he has been following for years is foolhardy. He will ponder inwardly, "I noticed somewhere, sometime, that some other man lost his leg by taking a chance, or underwent some terrible suffering, or perhaps lost his life and his family underwent the suffering, simply because he took the same chance that I am about to take." He will be restrained from taking that chance; he will become a more efficient worker because the visualization of the suffering of another man will make him more safety-minded. An accident and inefficiency often are partners. The attribute of safety-mindedness will eliminate the direct, as well as the indirect losses which follow all personnel accidents.

In order to show our line of reasoning and how indisputable it is that safety can be visualized by employees just as assuredly in the maritime field as in a factory, I am submitting for your inspection a sample bulletin board such as can be seen on each and every one of the 70 vessels of the fleets of the Standard Shipping Company and Pan American Foreign Corporation, which are in operation today. These boards are installed on the ships in places where they are ever conspicuous to members of the crew. A sailor would have to be blind not to see these boards frequently during the course of a voyage. The boards are adequately illuminated, and the ships' Safety Committees are directed to keep them neat and clean looking. They must be always "newsy," to excite curiosity. Sailormen are naturally inquisitive; they are living in a small world, to themselves, so to speak, for weeks without anything save sparse radio news from outside civilization. In this way, appreciating that they may miss something worth while if they ignore the boards, they scrutinize them carefully. They are attracted to the boards almost involuntarily by their colorful appearance, and by their news articles, and "catchy" items which the Ship's Safety Committee makes it a business to post thereon. These committees vie with one another to present the best looking bulletin boards.

Now, what is being experienced on the vessels of these fleets, undoubtedly, can be repeated elsewhere in marine operations—on the docks where stevedores perform their duties, in the shipyards where vessels are under construction or under repair, on harbor and inland water equipment, and in every other conceivable marine activity. The theory is the same. Well illuminated bulletin boards, colorful posters and items of interest attract the workmen. Anything at all pertinent which is placed where the workmen are bound to observe the appealing safety messages embodied in the posters will produce the effect which the employer wishes.

Some men's minds, of course, are more sluggish than others in absorbing ideas of this nature; but safety can be visualized and is being visualized every day in almost every shop, plant, dock, ship and quarry in the country. It is being "sold" to the workmen through the medium of posters as certainly as by verbal instruction and every other means, such as the Safety Instruction Cards obtainable through the National Safety Council. It must be borne in mind, however, that the posters should not be allowed to become common-place.

Report of the Nominating Committee

At this point Chairman Cogan called for the report of the Nominating Committee, and new officers for the Section for the ensuing year were nominated and elected as follows:

General Chairman—E. W. Fiske, Jr., Scony Vacuum Co., Inc., New York, N. Y.

Vice-Chairman (in Charge of Posters and Slides)—Robert F. Hand, Standard Shipping Co., New York, N. Y.

Vice-Chairman (in Charge of Publicity)—Arthur M. Tode, Consulting Marine Engineer, New York, N. Y.

Vice-Chairman (for the Pacific Coast)—A. O. Woll, General Petroleum Corp. of Calif., Terminal Island, Calif.

Secretary—John S. Hunter, The Atlantic Refining Co., Philadelphia, Pa.

News Letter Editor—Henry Blackstone, United States P. & I. Agency, Inc., San Francisco, Calif.

Engineering Committee Chairman—B. C. Edwards, Consulting Engineer, New York, N. Y.

Membership Committee Chairman—E. C. Holden, Jr., United State P. & I. Agency, New York, N. Y.

Program Committee Chairman—Frank E. Ames, Lykes Bros.-Ripley Steamship Co., New Orleans, La.

Statistics Committee Chairman—Benjamin H. Self, Travelers Insurance Company, New York, N. Y.

Stevedoring Committee Chairman—F. C. Gregory, Waterfront Employers Union, San Francisco, Calif.

Members at Large—

W. P. Biggs, Navy Department Safety Engineer, Washington, D. C.
C. F. Blackton, Erie Railroad Co., Jersey City, N. J.
Frank H. Cogan, The Delaware, Lackawanna and Western Railroad Co., Hoboken, N. J.
F. P. Foisie, Shipping Federation of the State of Washington, Seattle, Wash.
J. M. Griser, Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.
Wm. Groundwater, Union Oil Co. of Calif., Los Angeles, Calif.
Henry J. Heidorn, Standard Shipping Company, New York, N. Y.
Willard F. Jones, Gulf Refining Co., New York, N. Y.
W. P. Kain, Marine Surveyor, New York, N. Y.
T. F. Kavanagh, Grace Lines, Inc., New York, N. Y.
R. K. Kelly, Tide Water Oil Co., New York, N. Y.
Stewart Lee, Jr., New York Shipbuilding Co., Camden, N. J.
J. L. Luckenbach, American Bureau of Shipping, New York, N. Y.
Daniel J. Murphy, Murphy, Cook & Co., Philadelphia, Pa.
Carl E. Petersen, Newport News S. B. & D. D. Company, Newport News, Va.
Byron O. Pickard, Pacific American Steamship Assn., San Francisco, Calif.
H. W. Proom, Black Diamond Lines, New York, N. Y.
J. K. Robison, Sinclair Navigation Co., New York, N. Y.
J. C. Rohlfs, Standard Oil Company of Calif., San Francisco, Calif.
Arthur R. Savage, Peninsular & Occidental Steamship Co., Port Tampa, Fla.
H. L. Seward, Yale University, New Haven, Conn.
A. J. Smith, Marine Office of America, New York, N. Y.
J. H. Tomb, Capt. USN Rtd., New York State Merchant Marine Academy, New York, N. Y.
E. Storm Trosdal, Jr., South Atlantic S. S. Line, Savannah, Ga.

skin infection. Unnecessary roughness will cause unnecessary pain and both of these the patient will resent even though the injury itself be successfully treated from a scientific viewpoint.

In order that the proper confidential relationship may exist between the doctor and the injured employee, it is of the utmost importance that no suspicion of discrimination or unfair dealing arise in respect to the right to receive compensation and to have ample time for a proper recovery. Taking ordinary human nature into consideration, it follows that a certain amount of this suspicion is bound to occur. A few patients infer that because the doctor is paid a salary by the company he is going to seize every opportunity to discriminate against the employee and in favor of the company in compensation cases. There should be no just grounds for suspicions of this nature. The corporation rightfully expects the doctor to keep his eyes open for imposition and malingering, but is not looking for any unfair favors from the doctor to save a few dollars in compensation. If the corporation physician adopts an habitual hard-boiled and cynical attitude in these compensation cases, he will eventually be of no more use to his employers than to his patients, simply because he has cast away the human side of industrial medicine.

True malingering is extremely rare, which adds to our optimism. Exaggeration is occasionally met with. Most of this is unintentional and due to the patient's hypersensitive reaction to injury. The lower percentage of intentional exaggeration of an injury for the purpose of obtaining excessive compensation or prolonging the return to duty has to be handled firmly.

In discussing the human side of our work we consider next those patients who come to us for illness. In many respects this is possibly the most difficult and trying work that confronts us in the plant dispensary. Too much is expected of us in a large percentage of cases. We rarely have sufficient time for a thorough diagnostic examination, and we are often confronted with vague and obscure complaints which the private practitioner, who expects his fee, never sees. In many instances we see illness in a much earlier stage than does the family doctor, before some definite sign or symptom has developed, and it is difficult for us to tell the patient just what his complaints indicate or what they might develop. A few of our fellow employees are possibly rather too apprehensive about their various aches and pains, and I confess that it takes a certain amount of patient resignation to listen to these oft repeated complaints.

Our patients seek us, however, in good faith; they want and expect something from us, and unless we cling tenaciously to the human side and cast away the temptation of indifference or carelessness, some embarrassing or even tragic mistake might happen sooner or later.

Diagnosis, rather than treatment, must remain the essential part of our efforts for the sick employee. We must try to separate those who are really ill or about to become ill, from those who only suspect that they are ill. To an extent necessarily limited by our time and equipment, we must actually examine these patients. By taking advantage of an acquired judgment of human appearance and human nature, plus the use of eyes, hands, stethoscope and thermometer, we can be of some service in many of these cases.

As might be expected, our fellow employees quite often seek information and assistance concerning medical matters entirely aside from the routine company business. They come to us with an infinite variety of questions concerning not only themselves but also any member of the immediate family, other relatives and friends. An employee whose child needs a tonsil operation and who cannot afford the necessary expense, seeks our assistance to secure admission of the child into the tonsil clinic. The young husband asks us to recommend some physician to care for his wife in confinement. Someone else hurries down from his work and asks us to call the hospital and inquire about his mother who has just been operated upon. The human side of our work demands that we be ready and willing at all times to act as a medical information bureau to the best of our ability. All this comes to us because there is nothing formal about the plant doctor's office. It is usually not necessary to interview a secretary before the doctor can be seen. The door is open and the service is gratis.

ADJOURNMENT

TWENTY-THIRD ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL

Metals Section

Officers 1933-34

General Chairman—E. F. Blank, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Vice-Chairman—J. A. Voss, Republic Steel Corporation, Youngstown, Ohio.
Vice-Chairman—H. W. Darr, Bethlehem Steel Company, Johnstown, Pa.
Secretary and News Letter Editor—A. Berquist, The Youngstown Sheet and Tube Company, East Chicago, Ind.
Engineering Committee Chairman—J. E. Culliney, Bethlehem Steel Company, Bethelehem, Pa.
Health Committee Chairman—Dr. R. C. Engel, The Corrigan, McKinney Steel Company, Cleveland, Ohio.
Membership Committee Chairman—R. A. Chaffin, Continental Steel Corp., Kokomo, Ind.
Poster Committee Chairman—W. D. Speight, Keystone Steel & Wire Co., Peoria, Ill.
Program Committee Chairman—C. M. Allen, The American Rolling Mill Co., Middletown, Ohio.
Publicity Committee Chairman—A. M. Lytle, The Newton Steel Company, Newton Falls, O.
Statistics Committee Chairman—C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Slides and Safety Kinks Committee Chairman—J. A. Oartel, Carnegie Steel Company, Pittsburgh, Pa.
Foundry Committee Chairman—F. G. Bennett, The Buckeye Steel Castings Company, Columbus, Ohio.
Railway Car Builders Committee Chairman—P. J. Brand, Pullman Car & Manufacturing Corporation, Pullman, Chicago, Ill.
Members at Large—
L. S. Adam, Hubbard Steel Foundry, East Chicago, Ind.
J. A. Coltrin, National Radiator Corporation, Johnstown, Pa.
H. M. Croghan, Inland Steel Company, East Chicago, Ind.
G. A. Davis, Illinois Steel Company, Chicago, Ill.
John P. Eib, Illinois Steel Company, Joliet, Ill.
E. A. Ellis, Wheeling Steel Corp., Wheeling, W. Va.
W. T. Filmer, The Youngstown Sheet and Tube Co., Youngstown, Ohio.
A. C. Gibson, Spang, Chalfant & Company, Inc., Pittsburgh, Pa.

CHARLES W. HANKO, Pittsburgh Steel Co., Monessen, Pa.
O. F. HARVEY, American Car and Foundry Co., New York, N. Y.
S. E. HAWKES, MacWhyte Company, Kenosha, Wis.
HARVEY G. HENSEL, The Youngstown Sheet and Tube Company, Chicago, Ill.
W. J. IRELAND, Kohler Co., Kohler, Wis.
W. A. JARVIS, The Chase Companies, Waterbury, Conn.
F. A. LAUERMAN, Republic Steel Corporation, South Chicago, Ill.
T. H. MCKENNEY, Illinois Steel Company, South Chicago, Ill.
D. V. MEDALIE, Interlake Iron Corp., Chicago, Ill.
W. E. MEGRAW, H. H. Robertson Company, Pittsburgh, Pa.
ROBERT L. SCHMITT, Louisville Car Wheel and Railway Supply Company, Louisville, Ky.
J. K. STAFFORD, Mississippi Valley Structural Steel Co., Decatur, Ill.

MONDAY AFTERNOON SESSION

October 1, 1934

The opening session of the Metals Section was called to order by General Chairman E. F. Blank, Jones & Laughlin Steel Corporation, Pittsburgh, Pa., who presided. Chairman Blank introduced Mr. Donald B. Gillies, President, Corrigan, McKinney Steel Co., Cleveland, who made a brief address of welcome on behalf of the Convention City.

General Chairman Blank then presented a brief "Resumé of the Year's Activities" of the Metals Section, giving in some detail the activities of officers and chairman of standing committees, whose work for the Section was highly valued. Chairman Blank then introduced the first speaker.

Practical Safety from an Operating Standpoint

By G. D. TRANTER

General Superintendent, Middletown Division, The American Rolling Mill Co., Middletown, Ohio

The speaker said in part: If we seek the solution of the accident problem by the same methods used for operating control, we will more quickly improve the plant safety record. For example, safety rules must be regarded in the same manner as operating rules and practice. Some years ago, safety gates had been installed in the rear of open hearth furnaces for the protection of men working on tap holes and runners in a certain plant. The safety appliance was not accepted wholeheartedly by the furnace men until a helper fell off the backstanding and was fatally injured. But after this accident, the gates were always in place.

Here is another case. A gas maker was seriously injured during the burn-out of a gas producer. Investigation of the accident disclosed that the man had previously received a number of minor injuries while working on this particular job. It further developed that he was unsuited to this type of work because of age and previous training. If this man's foreman had considered these minor injuries in the light of a danger signal and transferred the man to a less hazardous job, this accident would have been prevented.

Discipline in accident prevention as well as in operation should be resorted to only when other means fail. Men usually respond willingly to proper inspiration and leadership. In case of a violation of safety rules, a word from the superintendent to the person who committed the act goes a long way. In going about the

shop or department the superintendent may note a practice which has escaped the attention of the foreman. Unsafe practices should be handled at the moment and not allowed to continue. It is an indication of lax supervision when an accident occurs due to unsafe practice of long standing. Acting on safety violations only after an accident occurs is on a par with "locking the stable door after the horse is stolen."

Industry is now confronted with the problem of absorbing many new and inexperienced workers. Many former employees, who were re-hired, had lost their skill through months, and even years, of inactivity in their particular line of work. On the other hand, many young persons have been employed who were without any previous manual or industrial experience. Their desire to turn out a good day's work through fear of not rendering satisfactory service has often resulted in personal injury to themselves or their fellow workers.

We cannot simply throw the new men into the rapidly moving stream of production and expect him to carry on by sheer native ability. It is the job of the superintendent and the foreman to train these newcomers. The new man needs job training, not only in the manual performance of his work, but also job training from the standpoint of how to do the work safely. Job training and safety training are closely related subjects that apply not only to the newcomer, but also to the more experienced worker.

The question arises as to the best method for training the worker. (a) Individual instruction by the foreman, including a talk to the new man during which the hazards connected with his particular job will be pointed out. (b) Additional instruction by the skilled fellow worker, who will offer the new man the benefit of his long experience and conviction of the value of safety work. (c) The example set by the foreman himself, whose attitude and conduct with respect to safety rules have a great influence on the men. In addition, introductory meetings, in which groups of new men are called together, offer an excellent opportunity to impress the new employee with the importance of personal safety. Such meetings may be addressed by the Personal Service Director, Safety Supervisor, and a plant executive. In addition to the safety discussion, a talk on company policies, opportunities for advancement, and general information pertaining to the company's products will give the new member a broader perspective of his job.

When the new man reports for the first time, he should be thoroughly instructed as to the hazards and safety features of the work. As a reminder to the foreman, a printed slip or form may be given to the new man, stating that he has been properly instructed on safety. This slip should be signed by the foreman and returned to the Safety Department after the man has received the necessary instructions.

Training an organization cannot be accomplished over night. Months and years are required to develop a highly trained and skilled group of workers. Neither can training be accomplished by posting the works with a lot of printed "don'ts," in the expectation of stopping accidents. Effective safety training requires a more personal and direct appeal. Neither will books of published rules stop accidents. Men must learn to work in a safe manner instinctively, just as they learn to operate a machine or other piece of equipment. Small group meetings for the discussion of the various safety problems of the department, in which the new man is encouraged to take part and ask questions, is usually an effective method.

Safety campaigns are of doubtful value. While they serve to stimulate the safety movement, it is usually only temporary and there is a relapse shortly after the campaign is over. A consistent safety policy is the surest means to a satisfactory accident record.

First aid training should be a feature of the program. Resuscitation, handling of the patient after an accident occurs and how to stop severe bleeding should be taught to every employee. The various first aid methods should be reviewed frequently in order to keep the organization in proper training. A well organized first aid training program arouses considerable interest in all phases of safety activity.

Health plays an important role in the safety program. The man who is not up to par in this respect is a fitting subject for an accident. Health examinations, which can be made a part of the company hospital service, often disclose minor conditions which, if corrected in time, may prevent physical disability later. They

are also invaluable in placing men having certain physical impairments on the proper job.

Due consideration should be given to safety devices, apparel and equipment. Equipment should be provided with safety guards where necessary. Keeping guards in place has been a rather vexing problem. Machines will be repeatedly started after repairs with the guards left off. The only solution is to insist that replacing the guard is a feature of the repair, just the same as lubrication or giving bolts the final turn.

The entire burden for accident prevention cannot be saddled on the shoulders of the Safety Director. Plant management, superintendents and foremen must back the Safety Director up and act promptly on suggestions. The foreman's responsibility in accident prevention should be strongly emphasized. He should be held accountable for the personal safety of his men in the same proportion that he is accountable for the equipment and material within his charge. The foreman is not only the shop executive, but also the instructor. His effectiveness lies not only in his ability to direct the operation, but also his ability to properly teach and train his men. Since accident prevention is largely a matter of training, it falls directly into the category of the foreman's responsibility. Furthermore, the safety program lends itself to the daily routine of the foreman. In going about the shop, making his regular check on quality and production, he should display a like interest in the safety features of the work.

Every means should be used to sell the idea of accident prevention to the organization. The superintendent must be sold on its value and through meetings and personal contact sell the foreman. Likewise, the foreman must pass the idea along to the men. An effective means for communication of ideas more directly to the working personnel is through the medium of the Employee Representative Group. Safety can be made one of the topics of the various meetings between employee representatives and management.

Safety trophies presented to various groups, where a month is completed without a lost-time accident, are a good publicity plan.

Plant order and clean-up play an important part in accident frequency. Scrap, rubbish and debris allowed to accumulate in aisleways and working areas present serious safety hazards. A clean and orderly plant is an inspiration to the personnel to turn out good workmanship. Occasional inspection of lockers and out-of-the-way places is effective in promoting good housekeeping in the shop.

Periodic safety inspections serve a very good purpose. The personnel of the inspection committee or group may vary according to local policies. An effective plan is to have a periodic inspection by a group consisting of the Safety Director, Company Physician, and the Works Police and Fire Chief. This group is augmented by a member of each departmental safety committee during the inspection of his particular department. In addition to the usual safety features, sanitary conditions and fire hazards are also included in the committee report.

The Foreman's Part in Accident Prevention

By M. P. GRADY

Foreman, Pennsylvania Railway Shops, Canton, Ohio

The speaker said in part: Any average foreman will agree that he must be qualified as a manager, a cost analyzer, a diplomat, a humanitarian, an educator, a leader, and a student, in order to successfully carry on the duties of his position. If he is properly qualified and functioning in all these different lines, then he would enjoy a perfect or nearly perfect record in accident prevention. That he fails in one of these essential qualifications is evident in almost every case where the cause of an accident that happens in his department is thoroughly investigated.

Many times I have heard foremen say, "What must I do? How must I carry on to keep down or eliminate the accidents in my department?" If I were to say what I consider the most necessary qualification a foreman must have to get that smooth warm cooperation that is so necessary from the workers in his department, I would say, first, "He must be a square shooter." A square shooter is a man who is primarily honest, not only honest with those with whom he comes in contact, but he must be honest with himself. And a second most important qualification for this foreman is that he shall be impartial. You may have known a foreman who was not impartial in the distribution of work, or who favored this man or that in order to boost the pay check of one man over another. But beating a man out of his pay check is not the only way he can be defrauded of his hire.

I firmly believe that the foreman who would not go the limit of his ability to give a man a safe and comfortable place in which to earn his living is just as guilty as the one who would steal a man's pay check.

Too many foremen become perfunctory in their work. They get in that well-worn groove of inefficiency which permits them to overlook details, wink at the violations of safety rules, etc. This recklessness on the part of foremen will roll up like a snowball, coming down hill, and when it hits him he will go down for the count.

A supervisor who winks at a violation of a safety rule is playing with dynamite. A man who violates a safety rule is insubordinate. He takes the law in his own hands. He kicks over the traces, he secedes from the union of safe workers.

I believe in discipline for rule violators, because it is the means of saving men from being maimed or killed. I am, in a measure, responsible for one one-eyed man in this country. It happened back about seven years ago. He was a fine, big six-foot Irishman, at that time about twenty-three years old. He was a boiler-maker's helper and he didn't wear his goggles. I told him to wear them many times, and he'd wear them when I was around, but then he'd remove them when I was some other place. This was back in the days when we said to men, "Please wear your goggles," back when our backbone was only a wishbone as to following safety rules. So one day when they were cutting off some five-eighths inch rivets, one carooned off and struck this man a direct hit. His goggles were in his back pocket and the rivet tore his eye out of his head.

In a few weeks he came back to work equipped with a hideous glass eye, and we gave him a broom to sweep up the shop. But bad times came along, and one day when I was walking through the scrap yard I found Jimmie sitting on a stool sorting scrap. He looked up when I tapped him on the back, and he said to me: "Mike, why didn't you fire me when I wouldn't wear my goggles?" I had no answer to make to him; but he is the last man who will ever indict me for permitting him to violate a safety rule. I am more human now; I fire them off the job and save their eyes and their lives when they won't obey the safety rules.

If I were to point out the place that most foremen are weak in accident prevention work, without hesitation I would lay my finger on his teaching ability. Why a supervisor will miss this important function of his business, I am at a loss to understand. It has been my experience that most men want to do their work in a safe manner, but the philosophy of a safe operation has never been put across to them so they thoroughly understand why.

Safeguards on machinery are essential, but they can't think. Safety posters and rule books are necessary, but they can't feel. Foremen can teach, foremen can find the unsafe worker and get him on or off the job. The foreman should do this first, because that is one of the things he gets paid for doing, and if he is not doing what he is being paid for, he is receiving money under false pretenses. Second, he is a potential menace to life, and his term in office is a monstrous travesty on management.

Report of the Nominating Committee

At this point the Chairman called for the Report of the Nominating Committee, and new officers for the section to serve during the ensuing year were nominated and elected as follows:

General Chairman—J. A. Voss, Republic Steel Corp., Youngstown, Ohio.

Vice-Chairman—H. W. Darr, Bethlehem Steel Co., Johnstown, Pa.

Vice-Chairman—A. Berquist, The Youngstown Sheet and Tube Co., East Chicago, Ind.

Vice-Chairman in Charge of Health—Dr. R. C. Engel, The Corrigan, McKinney Steel Co., Cleveland, Ohio.

Secretary and News Letter Editor—C. M. Allen, The American Rolling Mill Co., Middletown, Ohio.

Engineering Committee Chairman—J. E. Culliney, Bethlehem Steel Co., Bethlehem, Pa.

Foundry Committee Chairman—F. G. Bennett, The Buckeye Steel Castings Co., Columbus, Ohio.

Membership Committee Chairman—E. C. Schultes, Jr., C. Hager and Sons Hinge Mfg. Co., St. Louis, Mo.

Poster Committee Chairman—M. W. Dundore, Beloit Iron Works, Beloit, Wis.

Program Committee Chairman—R. A. Chaffin, Continental Steel Corp., Kokomo, Ind.

Publicity Committee Chairman—Mell E. Trammell, Gulf States Steel Co., Alabama City, Ala.

Railway Car Builders Committee Chairman—P. J. Brand, Pullman Car & Manufacturing Corp., Pullman, Chicago, Ill.

Slides and Safety Kinks Committee Chairman—J. A. Oartel, Carnegie Steel Co., Pittsburgh, Pa.

Statistics Committee Chairman—Charles W. Hanko, Pittsburgh Steel Co., Monessen, Pa.

Members at Large—

E. F. Blank, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
J. A. Coltrin, National Radiator Corp., Johnstown, Pa.
Irvin A. Brinkman, Macintosh-Hemphill Co., Pittsburgh, Pa.
H. M. Croghan, Inland Steel Co., East Chicago, Ind.
G. A. Davis, Illinois Steel Co., Chicago, Ill.
John P. Eib, Illinois Steel Co., Joliet, Ill.
E. A. Ellis, Wheeling Steel Corp., Wheeling, W. Va.
W. T. Filmer, The Youngstown Sheet and Tube Co., Youngstown, Ohio.
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 Co., Kenosha, Wis.
H. G. Hensel, The Youngstown Sheet and Tube Co., Chicago, Ill.
W. J. Ireland, Kohler Co., Kohler, Wis.
W. A. Jarvis, The Chase Companies, Waterbury, Conn.
F. A. Lauerman, Republic Steel Corp., South Chicago, Ill.
T. H. McKenney, Illinois Steel Co., South Chicago, Ill.
D. V. Medalie, Interlake Iron Corp., Chicago, Ill.
W. E. Megraw, H. H. Robertson Co., Pittsburgh, Pa.
J. A. Northwood, Bethlehem Steel Co., Sparrows Point, Md.
C. E. Ralston, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Robert L. Schmitt, Louisville Car Wheel and Railway Supply Co., Louisville, Ky.
J. K. Stafford, Mississippi Valley Structural Steel Co., Decatur, Ill.

WEDNESDAY MORNING SESSION

October 3, 1934

Hazards of Wire Mill Operations

By F. T. PULSE

Accident and Safety Inspector, American Steel & Wire Co., Chicago

The speaker said in part: The greatest single hazard in the wire business is the danger from the ends of wire and from snarls and loops of wire, which endanger the workers as wire is being made.

Most wire is drawn from round rods, the most common size being approximately

¼ inch diameter, made from billets or bars. The wire rod when it leaves the finishing roll of a rod mill, goes onto a revolving reel hot and is coiled into a round bundle with an eye, say 24 to 30 inches in diameter, and the various strands are, of course, circular in shape and when cool have a certain amount of set or spring.

These coils or bundles of rods are cleaned of scale by suspending them in tanks of hot acid, are washed with water, and coated by dipping in tanks of hot lime water, and baked in ovens until dry. They are then delivered to the drawing room and placed on a reel that will revolve, the end pointed in a machine, passed through the hole in a die, fastened on a bench, and attached to a firm cylindrical flanged drum called a block, a foot or so away from the die. The block revolves on a perpendicular spindle or shaft by means of a jaw clutch; the block is started or stopped by means of a treadle connected to the clutch to throw it in or out. This revolving block winds the wire on itself, the rod unwinding on the reel. It is drawn on successive blocks, through smaller holes, until it reaches the size desired.

During all of these processes from the rod down, the two ends of the bundle are free, or may become free, and due to the curvature and spring in the strands, are apt to fly, especially the last end coming from the reel. We estimate that on an 8-hour turn in the Chicago District Mills there is a possible exposure to 400,000 ends of wire, in the tonnage handled by 1000 men involved.

This makes necessary the continuous wearing of goggles by 70 per cent of the 3000 men employed in these plants; 20 per cent of the employees must wear goggles part of the time; and this leaves only 10 per cent of the men practically free from the danger of eye injuries. The goggle worn has an oxidized metal frame with side screen of 16-inch wire, annealed or armor plate lenses, and is held on by temples. We believe that head bands afford too great an opportunity to wear goggles on the cap or forehead. The goggles and necessary eye examinations are paid for by the company.

The following results have been obtained by the use of goggles: During the six years, 1910 to 1915 inclusive, when the use of goggles was largely optional with the employees, the vision of 42 eyes was completely lost and 12 partly lost in the Chicago District Mills. During the six years, 1916 to 1921, when goggles were compulsory for part of the employees, 20 eyes were lost and 12 partially destroyed, some of the latter because of no side shields. For the five-year period, 1922 to 1926, during which the compulsory use of goggles was further extended, only eight eyes were lost, and there were no partially lost cases. During the seven years, 1927 to 1933, the continuous use of goggles was made compulsory in all occupations where there was continual danger to eyes, and only eight eyes were completely lost, and the vision of one eye partially destroyed.

The serious problem in this business is not the matter of providing mechanical safeguards and the protection of dangerous conditions, but the hazard that arises from the careless acts of the human element exposed, which has to be offset by education and supervision. Briefly, our organization for this purpose is headed by the Department of Employment, Safety and Welfare, connected with the office of the Vice-President in charge of operations. In the District it is represented by the District Accident and Safety Inspector, connected with the District Manager's office; in the plants, by the Plant Accident and Safety Inspector, under the direction of the Superintendent, and reaching the rank and file through the various department foremen and their department safety committeemen, composed of their assistants and some key men. In this way the responsibility for safety is that of the operating executives, with the help of the safety assistants. As safety must be a part of the operating routine, the above organization is both natural and logical.

Safety Publicity. There is what we call an accident score board at each gate where employees enter the plant, which shows the number of accidents, the days of lost time, and the average number of men at each plant in the district for each month of the current year, and the total for the previous year. There is also a bulletin board at each gate, and in each department, on which safety bulletins, notices, and literature are posted. Above the gate is a blue sheet metal pennant eight to ten feet long, bearing the words SAFETY in large white letters. If an accident occurs the pennant is taken down for a certain time.

Over the aisles of the departments are hung printed framed banners eight feet

C. Hager & Sons Hinge Mfg. Co. (*Heavy Machine Shops Division—Group B*).
Chase Companies, Inc. Noera Mfg. Co. (*Heavy Machine Shops Division—Group B*).
Emsco Derrick & Equipment Co., D. & B. Pump & Supply Co. (*Heavy Machine Shops Division—Group B*).
Pittsburgh Steel Co., National Steel Fabric (*Heavy Machine Shops Division—Group B*).

"Your Hour"

The final feature of the program was the annual event entitled "Your Hour", led by T. H. McKenney, Supervisor of Labor & Safety, Illinois Steel Co., South Chicago, Ill. Mr. McKenney presented a number of questions in his characteristic manner, and a general discussion ensued which was participated in by all the delegates. The discussion was, of course, extemporaneous and no record of it is available.

ADJOURNMENT

Mining Section

Officers 1933-34

General Chairman—P. M. ARTHUR, American Zinc Company of Tennessee, Mascot, Tenn.

Vice-Chairman in Charge of Membership Coal Mines—FRANK B. DUNBAR, Pickands, Mather & Co., Mather, Pa.

Vice-Chairman in Charge of Membership Metal Mines—J. W. ALT, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.

Vice-Chairman in Charge of Engineering—WM. G. METZGER, Hudson Coal Co., Scranton, Pa.

Secretary and News Letter Editor—DANIEL HARRINGTON, United States Bureau of Mines, Washington, D. C.

Entertainment Committee Chairman—J. T. RYAN, Mine Safety Appliances Co., Pittsburgh, Pa.

Poster and Slide Committee Chairman—J. J. FORBES, United States Bureau of Mines, Pittsburgh, Pa.

Program Committee Chairman—R. N. HOSLER, Coal Mine Section, Pennsylvania Compensation Rating & Inspection Bureau, Harrisburg, Pa.

Publicity Committee Chairman—M. R. BUDD, Explosives Engineer, Wilmington, Del.

Statistics Committee Chairman—W. W. ADAMS, United States Bureau of Mines, Washington, D. C.

Members at Large—

W. H. COMINS, National Lead Co., St. Francois, Mo.
M. F. FAIRLIE, The Mining Corporation of Canada, Ltd., Toronto, Ont., Canada.
C. W. GIBBS, Harwick Coal and Coke Co., Pittsburgh, Pa.
H. C. HENRIE, Phelps Dodge Corp., Bisbee, Ariz.
THOMAS E. LIGHTFOOT, Koppers Coal Co., Pittsburgh, Pa.
LEE LONG, Clinchfield Coal Corp., Dante, Va.
GEORGE MARTINSON, Pickands, Mather & Co., Hibbing, Minn.
D. D. MOFFATT, Utah Copper Co., Salt Lake City, Utah.
M. W. PRICE, Jeddo-Highland Coal Co., Jeddo, Pa.
L. T. SICKA, St. Joseph Lead Co., Bonne Terre, Mo.
HOWARD I. YOUNG, American Zinc, Lead & Smelting Co., St. Louis, Mo.

atmosphere for 14 to 15 hours, during which they are thoroughly dried. After undressing the miner passes through a series of shower baths of temperatures varying from hot to cold. After drying he proceeds to his locker where he has placed his street clothes before the beginning of the shift.

With a view to reducing the infection of silicotics with tuberculosis, a clinic has been established in Timmins. An experienced public health nurse is employied full time and it is her duty to visit all tuberculosis suspects and patients, all contacts with these cases and contacts with silicotics to arrange for their examination and supervision and if necessary for treatment. Weekly clinics are held at which such patients are examined clinically, radiologically and by bacteriological and biological tests.

Since January of 1933, approximately 30 dangerous cases of tuberculosis have been removed from the district to a sanitarium and many more less severe cases placed on bed rest at home or on restricted activity. It is felt that by removing these cases from contact with silicotics, that within a comparatively short time tuberuclosis will be moderately well controlled and since tuberculous infection is necessary to precipitate secondary silicosis, this movement, it will be appreciated, is an excellent one.

ADJOURNMENT

Paper and Pulp Section

Officers 1933-34

General Chairman—H. G. Gilson, Oxford Paper Co., Rumford, Maine.

Vice-Chairman in Charge of Membership—H. D. Banta, Hoberg Paper and Fibre Co., Green Bay, Wis.

Secretary and News Letter Editor—F. L. Irvin, St. Croix Paper Co., Woodland, Maine.

Program Committee Chairman—E. E. Grant, The Crystal Tissue Co., Middletown, Ohio.

Engineering Committee Chairman—George J. Adams, International Paper Co., New York, N. Y.

Statistics Committee Chairman—R. I. Dickinson, Cornell Wood Products Co., Cornell, Wis.

Health Committee Chairman—Dr. L. H. Frechtling, The Champion Coated Paper Co., Hamilton, Ohio.

Poster Committee Chairman—Don C. Hunter, Oxford Miami Paper Co., West Carrollton, Ohio.

Contest Committee Chairman—A. Scott Down, The Paper Industry, Chicago, Ill.

Members at Large—

Ernest Augustus, The Mead Corp., Chillicothe, Ohio.

W. J. Brennan, State Department of Labor and Industry, Augusta, Maine.

E. R. Brown, Oregon and Columbia Basin Division, National Safety Council, Portland, Oregon.

Wm. H. Brydges, Bedford Pulp & Paper Co., Big Island, Va.

Kenneth L. Faist, The Champion Coated Paper Co., Hamilton, Ohio.

W. A. Gleason, Hammermill Paper Co., Erie, Pa.

John Lundrigan, International Paper Co., New York, N. Y.

W. J. Peacock, Northern Paper Mills, Green Bay, Wis.

J. J. Plzak, Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.

Samuel Pruyn, Finch-Pruyn and Co., Inc., Glens Falls, N. Y.

B. D. Rogers, Bird & Sons, Inc., East Walpole, Mass.

F. H. Rosebush, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

ing for him. To accomplish this it is necessary that he impress his workers, both by example and conversation, with his sincere interest, and encourage them to aid him in the conduct of plant activities, unmarred by either personal injury or non-personal injury accidents. The appointment of certain employees on safety committees will undoubtedly aid the supervisor in meeting his responsibility, if the committee is organized with this purpose in mind. Too frequently in the past committees have been organized wholly for the purpose of securing insurance premium reductions. In many instances, these committees have been effective on paper only, and in some cases they have resulted in a group of men authorized to criticize defects in safeguarding and in operating procedure. To be sure, there may still be conditions in industry where safeguarding is essential. On the other hand, there are many instances where accidents can only be prevented by the personal actions and practices of the employees. The effective safety committee is one which recognizes the entire situation and serves as a means of securing employee cooperation with the safety program.

In summary, therefore, may we emphasize the fact that the safety engineer has, at the present moment, perhaps the most opportunity he has ever had to analyze the defects in past procedure and to develop himself as an integral part of the operating procedure of his industry, and as a real assistant to the chief operating executive.

ADJOURNMENT

Petroleum Section

Officers 1933-34

General Chairman—R. W. BLACK, Standard Oil Co. of N. J., Elizabeth, N. J.
Vice-Chairman—A. W. BREELAND, Lone Star Gas Co., Dallas, Texas.
Chairman, Atlantic Division—J. H. BROWN, Tide Water Oil Co., New York, N. Y.
Chairman, Great Lakes Division—J. H. HERBERT, Standard Oil Co. (Ohio), Cleveland, Ohio.
Chairman, Mid-Continent Division—A. A. ODELL, Barnsdall Refineries, Inc., Tulsa, Okla.
Chairman, Gulf Division—W. P. REYMOND, JR., Standard Oil Co. of Louisiana, Baton Rouge, La.
Chairman, Rocky Mountain Division—B. V. OSBORN, Standard Oil Co. (Ind.), Casper, Wyo.
Chairman, Pacific Division—J. K. ROBERTS, The Texas Co., Los Angeles, Calif.
News Letter Editor—G. O. LOCKWOOD, The Empire Companies, Bartlesville, Okla.
Engineering Committee Chairman—R. B. ROAPER, Humble Oil and Refining Co., Houston, Texas.
Health Committee Chairman—DR. R. A. JEWETT, General Petroleum Corporation of California, Los Angeles, Calif.
Poster Committee Chairman—H. J. WILSON, Associated Oil Co., San Francisco.
Program Committee Chairman—C. L. HIGHTOWER, United Gas Company, Houston, Texas.
Publicity Committee Chairman—J. L. RISINGER, Magnolia Petroleum Co., Dallas, Texas.
Statistics Committee Chairman—J. W. MYERS, Standard Oil Co. (N. J.), New York, N. Y.
Past General Chairmen—
R. S. BONSIB, Standard Oil Co. (N. J.), New York, N. Y.
V. R. CURRIE, The Texas Co., Houston, Texas.
R. E. DONOVAN, Standard Oil Company of Calif., San Francisco, Calif.
C. L. HIGHTOWER, United Gas Company, Houston, Texas.
GEO. F. PRUSSING, Union Oil Company of Calif., Los Angeles, Calif.
E. J. SENNE, Socony-Vacuum Corp., New York, N. Y.
C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.
D. J. WALLACE, Petroleum Safety Council, Tulsa, Okla.
Secretary—H. N. BLAKESLEE, American Petroleum Institute, Dallas, Texas.

The Dust Hazards in Industry

By DR. R. R. SAYERS

Medical Officer in Charge, Office of Industrial Hygiene and Sanitation, United States Public Health Service, Washington, D. C.

The speaker said in part: Realizing the importance of the dust problem in stry, the United States Public Health Service in cooperation with the Bureau Mines began its first study of the health of workers in dusty trades in 1914, the mines of Joplin, Missouri; and later, in 1923, the Public Health Service gurated a series of dust studies. These later studies were all conducted in the e manner in order to permit as detailed a comparison as possible between the erent investigations.

Briefly, these methods of study may be divided as follows: (1) examination to rmine the general physical condition of the workers under observation; (2) cial physical examination to determine the prevalence of specific diseases of the iratory system and the lung pathology resulting from exposure to the particular hazard; (3) record of the nature and severity of the disabling illnesses; (4) lysis and detailed study of the occupational environment; (5) occupational tality statistics relating to the specific dust; and (6) autopsies.

The first six intensive investigations carried out by the Service dealt with the lth of workers exposed to dusts in a cement plant, granite cutting industry, racite and bituminous coal mining, silverware manufacturing plant, cotton cloth nufacturing, and in municipal street sweeping. Brief studies were later conducted certain slate, granite, marble and talc quarries, while more recently a rather nsive study of the health of anthracite coal miners was completed.

These six dust studies showed that the workers in the granite cutting plants o were exposed to the highest dust concentrations were found to suffer from an ess of pulmonary tuberculosis after 15 years or more of exposure and developed osis from 2 to 10 years. In the group exposed to a lesser amount of dust, osis developed only after prolonged exposure, with no excess of tuberculosis. was found that a close relationship existed between the degree of dust exposure the extent and severity of the pulmonary damage. Anthracite coal miners ered from dyspnoea and other signs of pneumoconiosis and experienced a high of respiratory sickness; in addition, an excessive mortality from influenza- monia and possibly tuberculosis was found. Bituminous coal miners experi- d a generalized fibrosis of the lungs and an excess mortality from influenza *pneumonia*. Cement workers showed some signs of early pneumoconiosis with xcess of diseases of the upper respiratory tract. On the other hand, workers e cotton cloth and silverware manufacturing plants and municipal street sweepers e negative for respiratory conditions and other illnesses when compared with general industrial population.

Rock Drilling. For five years, the United States Bureau of Mines studied lead zinc miners in the Tri-State District, Oklahoma. The ore here is high in free a. Of the 7,722 men examined, a group of 1,647, or 21.3 per cent, was definitely nosed as having silicosis, not including those diagnosed as having tuberculosis. the men diagnosed as having first-stage silicosis had worked an average of ears. But those men starting in the mines after 40 years of age worked an age of only 8 years.

The work of rock drilling in subway and tunnel construction in New York is in some respects similar to that of some of the activities in the hard rock es, at least in so far as the manner in which dust is evolved, the type of and the resultant hazard. Recently the result of a study of rock drillers, ters and excavators was reported by the New York Tuberculosis and Health ociation. An examination of 208 rock drillers, blasters and excavators showed 118, or 57 per cent of the men had silicosis in various stages of progression. exposure of most of these men (75 per cent) had been for 20 years or more.

Sandblasting. No study of the health of sandblasters has been reported in the ed States; however, a study of the dust exposure of sandblasters was recently leted by the United States Public Health Service in cooperation with the

National Safety Council. This investigation indicated that, judged by the nature of the dust and degree of the exposure, a real hazard exists in this occupation. This study also brought out the fact that it is possible to conduct sandblasting with safety, provided properly designed and well maintained equipment is used.

Diatomaceous Silica Workers. Most of the data on silicosis have been gathered from studies made both in industry and experimentally on dusts containing free silica in the form of quartz. Such studies have been made in the granite industry, pottery trades, hard rock drilling, etc. There are other free silica minerals in existence that are not crystalline in nature but of an amorphous composition. In Santa Barbara County, California, there exists the largest and purest diatomaceous silica deposit in the world. This substance consists of about 85 per cent free silica. Recently an examination was made of 108 workers selected among those employed less than 1 year, 1 to 2 years, 2 to 5 years, and more than 5 years. All of the workers were Mexican laborers and the examinations consisted of x-ray determinations, social and medical histories, and clinical examinations of the chests. Dust determinations were also made but these were not reported. The outstanding feature revealed by the examination was the splendid physical condition of the men. Eighty-four per cent of the workers were reported in excellent physical condition. It was found that 60 men showed signs of early pneumoconiosis; 15 were in the moderately advanced stage and 6 in the advanced stage. This latter finding was among workers with a history of exposure of more than 5 years.

Dust Hazard in the Granite Quarry Industry. It is a common belief that granite quarrying is not so dangerous an industry as granite cutting in enclosed sheds; quarry work is done outdoors and hence may not be attended with very much dust exposure. However, certain quarry operations require the use of pneumatic tools, which are usually associated with the formation of considerable quantities of dust. It was thought that a study made in a representative granite quarry might cast some light on our problem. Accordingly, a study of a clinico-radiographic nature of 63 quarriers was made and occupational dust exposures were also obtained. The dust determinations show that nearly 38 per cent of the workers (drillers) were exposed to many times the amount of dust considered safe at the present time. Drillers were the only persons showing pathologic lung changes. Half of these workers with an exposure of 5 to 19 years had silicosis, and 4 of the 5 men with more than 20 years of such trade life showed this condition. This study suggests that quarry drillers may experience as high a death rate from pulmonary tuberculosis as do pneumatic-tool workers in granite cutting sheds.

Effect of Inhaled Marble Dust. The pulmonary fibrotic changes due to the inhalation of marble dust appear to be slight in comparison with those caused by stone dust containing a high percentage of silica in the form of quartz. A recent study made by us among marble workers showed that although marble dust, when inhaled in concentrations averaging about 25 million particles per cubic foot of air, produced a mild bilateral, linear fibrosis in a certain number of the 80 men examined, no serious lung changes were noted and there was no disability due to the dust, even after many years of exposure (more than 40 years in some cases). The marble dust under consideration consisted of 98 per cent calcite and 2 per cent dolomite, with no silica present.

Dust Hazard in Abrasive Industry. Artificial abrasives are widely used in industry and for this reason the effect of the inhalation of dusts produced in the manufacture or preparation of these products is of great importance. In 1925, 1929 and again in 1931, Dr. Clark of the Norton Company at Worcester, Mass., made investigations of workers exposed to aluminium oxide and silicon carbide dust produced in the manufacture of grinding wheels, which showed that during a period of 13 years there were proportionately twice as many cases of pulmonary tuberculosis among those working in the abrasive dust departments as in departments where no abrasive dust occurred. In 1931, Kessler, of New Jersey, reported the occurrence of over 100 cases of alleged silicosis in the abrasive powder industry, in which the dust consisted of 99 per cent free silica.

Exposure to Silicate Dust. It has been the belief that the inhalation of dusts composed of silicates (combined silica), in comparison with silica (free silica in the form of quartz), was innocuous. Of recent years many investigators have become cognizant of the hazards of silicate dust exposure. Asbestosis, a fibrosis

of the lungs caused by the inhalation of asbestos dust, has already been described both in its clinical and roentgenographic manifestations by investigators in other countries, but to date no studies have been reported in the United States. Cement dust, which contains about 22 per cent combined silica, has been studied, and the effects of the inhalation by workers has been discussed here. In March, 1933, Dressen, of the United States Public Health Service, reported the results of a study conducted among tremolite talc and slate workers. The slate dust to which these workers were exposed consisted mainly of silicates, there being less than 5 per cent of quartz in the dust. The talc was a hydrous calcium-magnesium silicate, being 45 per cent talc and 45 per cent tremolite, with no quartz present. The results of the study seemed to indicate a relationship between the amount of dust inhaled and the effect of this dust on the lungs of workers.

Statistical Studies. Recently, Lanza and Vane estimated that there are some 1,000,000 workers engaged in the mining, quarrying and manufacturing industries in this country in which an exposure to silica dust to a harmful degree is entailed. Their analysis of mortality experience of twelve life insurance companies for the period 1915-1926 showed that the actual mortality from respiratory tuberculosis among the silica exposed persons was about three times that of a non-silica dust group. If one considers their data for certain occupations in metal mines and granite and sandstone quarries, occupations known to be exposed to high concentrations of hazardous dusts, then the comparison is more striking, since the actual deaths among these workers was found to be ten times that of the expected deaths. More detailed statistics on occupational mortality as reported by the Registrar-General of England and Wales (1921-1923), and summarized by Britten, show the high rate of 1,886 per 100,000 for tin and copper miners, while the rate for "all occupied and retired males" was only 150. Other occupations with silica exposure showed an excess.

From the evidence just presented concerning the injurious effects produced by the inhalation of certain dusts, it is apparent that a knowledge of the properties of a given dust which determine its capacity to produce pulmonary pathology is essential. Numerous investigations of the industrial dust problem indicate that these properties are the chemical and mineralogical composition of the dust, its concentration in the industrial atmosphere, and its particle size.

In an earlier portion of this discussion evidence was presented which indicated that a close relation existed between morbidity and mortality rates from various respiratory diseases and the exposure to certain dusts in industry. In the study of the dust hazard in the granite cutting industry, it was definitely proved that there is a direct relation between the magnitude of the dust exposure and sickness and death resulting from tuberculosis. It is quite evident, as a result of these studies, that the remedy of the dust evil lies in the effective removal or suppression of the dust to concentration considered safe. However, no set rules may be established for the mechanical protection to be instituted in an attempt to control industrial dust. Specific conditions encountered in a plant will determine the type of protection to be employed.

The protection of workers against certain dusts known to be toxic may at times be accomplished by the substitution of a non-toxic material for the toxic one. One example of such a procedure is the possible use of a metallic or other type of artificial abrasive for sand in the sandblasting process in those operations in which it is not essential to use sand, a substance high in quartz content. Again, a mechanical enclosure of the dust-creating process also serves to protect the worker. An excellent illustration of this type of protection is afforded by the Cohen sandblast barrel used in the cleaning of small objects. Sometimes it is possible to protect the worker by the substitution of wet for dry processes, as wet drilling instead of dry. In one instance, in the granite cutting study previously mentioned, an operator using a diamond point tool worked the stone wet; the cutting dust amounted to 22 million particles per cubic foot. The same operator was then requested to work the stone dry; as a result, the amount of dust reached a high figure of 45 million particles per cubic foot. In the weaving of asbestos cloth it has been possible to reduce the amount of dust in the air by wet weaving one-fourth of the amount present when the process is conducted by dry methods. Another example of this procedure in allaying dust is the use of a spray of water

in leyner and jack-hammer drilling in hard rock, although the new type of Kelly dust trap is now finding much favor for this kind of work.

The Kelly trap consists of a metal chamber designed to enclose the drill steel at the rock surface. No attempt is made to secure a mechanical seal with the rock or between the trap and the drill steel. The dust is removed by an air stream and is carried into an exhaust system connected to the trap. Escape of dust particles through openings between the uneven rock surfaces and the trap is prevented by the air seal produced by the inflowing air. Tests made on this trap under actual working conditions show that the dust concentration at the worker's breathing zone may be kept down to less than 10 million particles per cubic foot with a 60 cubic foot per minute rate of air flow through the hood. This trap is a step forward in the program of dust removal; however, in underground work, such as in mines and subways, there is still the need to solve the problem of compact dust disposal equipment.

In certain cases, such as in the sandblasting of large castings in sandblast rooms, the practical safeguard to the worker is to provide him with a mask or helmet of the positive air pressure type. In the sandblast investigation previously mentioned, it was found that when from 5 to 6 cubic feet of practically dust-free air per minute are supplied to the helmet, the worker receives ideal protection. However, one must always bear in mind that the ultimate criterion of protection should be the dust determination of the air within the helmet during blasting and not the quantity of the air supply itself.

In most dusty processes, however, the most effective means of dust elimination are by the use of properly designed exhaust ventilation systems. Since in many instances it is difficult, costly, and at times an unnecessary procedure to remove all the dust in the vicinity of a worker, we need first to determine the minimum amount of a certain dust which the worker can apparently tolerate with impunity. Such information can be made available by the type of studies carried out by the Public Health Service. For example, in the granite study already referred to, it dust at the breathing level of about 10 million particles per cubic foot (35 per cent free silica).

Studies of dust removal devices used in granite cutting plants at the time this work was conducted showed that a linear velocity of 1,500 feet per minute as measured by an anemometer at the face of the dust-removal hood, would keep the dust at the breathing level to an amount less than 10 million particles per cubic foot.

A word should be said concerning personal respiratory protection against dusts. It has already been shown that in the use of positive pressure respiratory devices in sandblasting, it is important to have a well-designed device supplied with about 6 cubic feet of dust-free air per minute to give full protection to the worker. With reference to respirators of the filter type, there is still much to be accomplished in the design of an efficient and comfortable mask for continuous use. Of great value are standard methods for the testing of the efficiency of respiratory protection devices. Drinker advocates testing a device against the particular dust which the respirator is to encounter, these tests to be made both in the laboratory and under actual industrial conditions. He further suggested that some impartial agency should conduct such tests and certify the devices for industrial use, the work being done on a cost basis. The U. S. Bureau of Mines has prepared such a schedule for testing and approving respirators.

I wish to stress the importance of good housekeeping in the effort to combat the dust hazard. Good housekeeping should not only imply the removal of accumulated dust about a workroom but should also embrace efficient maintenance of dust removal devices and respiratory protective equipment. Systematic inspection of all dust suppression equipment should be an axiomatic principle in every dusty industry rather than the casual attention which it now receives in many instances.

Report of the Nominating Committee

The chairman called for the report of the Nominating Committee at this point, and new officers for the section to serve during the ensuing year were nominated and elected as follows:

more study, not only to the causes and the placing of responsibility, but at the same time analyze the effects of accidents.

In order that our past experience may be a guide for future activities, let me call attention to those types of accidents most common to our industry. According to experience and averages over a period of years, it is found that more than 90 per cent of all types of accidents in the refrigeration industry can be brought under seven classifications: 1. Handling objects, 35 per cent; 2. Falls, 21 per cent; 3. Machinery, 9 per cent; 4. Using hand tools, 4 per cent; 5. Falling objects, 6 per cent; 6. Stepping on or striking against objects, 5 per cent; and 7. Electricity, explosives, heat, etc., 9 per cent.

It will be seen that 56 per cent of all our accidents occur on account of the handling of objects and falls. Let me discuss the specific causes of a few of these accidents.

1. Employee was dismantling the vat and coils no longer in use. In removing the coils from the vat, the coils slipped and the sharp edge of the agitator blade caught the employee's hand between the coil and the top of the vat, severing two fingers and cutting the third. Result, 350 days of lost time.

This accident could have been avoided had the blades on the agitator been removed first and the coils taken out later.

2. Employee slipped on steps inside office leading to rear door, falling from second or third step to office floor, and breaking left arm twice and bruising left thigh badly, also spraining left thigh. The steps were wet as a result of men passing in and out of the office after a heavy rain. Result, 307 days of lost time.

This accident could have been avoided had the treads been kept dry, or had some kind of anti-slip plates been placed over them. Safe Practices Pamphlet No. 2 of the National Safety Council on "Stairs and Stairways" gives complete information as to how steps, stairs and stairways are to be kept safe.

3. Employee was trying to pull loose a cake of ice which was hung in an ice scoring machine. His foot slipped, and the side of his leg hit the saw while running. Result, 56 days of lost time.

The guard had been removed from this saw to make an adjustment and had not been replaced. The employee, rather than go around on side of scoring machine and open guard gate to loosen block of ice, squeezed in between wall and scoring machine where he did not have room to work. He should have shut off the current on the machine and pried the ice loose with a bar, instead of trying to get it loose with hooks while the machine was running. He had been cautioned about this practice not more than two weeks before.

4. Employee was putting the purger in operation and when he tried to open the valve and let the foul gas escape, the valve stuck. When it did release, of course, it opened a little too wide, letting a large amount of gas out at one time. This gas is bubbled off in a vessel of water to absorb the fumes of ammonia, but the vessel of water had been in use for some time and the water had become heavily saturated with ammonia. The sudden gust of gas caused water to be blown into the face of employee, striking his eye, nose and mouth; the most serious injury being to his left eye. A small spot was burned on the eyeball and under the lid.

An employee should use a large mouth vessel for purging, having it located so that he will not be over it when adjusting valves; and the water should be changed regularly so that it will not become saturated with ammonia.

5. A vault door closed abruptly as an employee was coming out of the vault with ice for a customer. The door struck him, causing a near rupture. Result, 35 days of lost time.

This accident occurred, no doubt, because of a spring being attached to the door. The cause of the accident would, therefore, be ascribed to "haste."

6. Employee was repairing leak in boiler holding SO_2 gas, and in order to repair the boiler was pumping gas from boiler into receiver. He was standing over the liquid line valve when receiver at valve end exploded, and a full charge of the gas hit him in the face, severely burning him about face and eyes and all over the upper region of his body. Result, 25 days of lost time.

In this instance the employee had a gas mask but had failed to put it on.

ADJOURNMENT

Rubber Section

Officers 1933-34

General Chairman—H. W. Low, Miller Rubber Products Co., Inc., Akron, Ohio.
Vice-Chairman in Charge of Program—B. F. Gerpheide, The Goodyear Tire & Rubber Co., Akron, Ohio.
Secretary—A. M. Dietz, Pennsylvania Rubber Co., Jeanette, Pa.
News Letter Editor—R. A. Bullock, Corduroy Rubber Co., Grand Rapids, Mich.
Engineering Committee Chairman—W. L. Schneider, The B. F. Goodrich Co., Akron, Ohio.
Health Committee—
Dr. W. S. Ash, United States Tire Co., Inc., Detroit, Mich.
Dr. J. Newton Shirley, Hood Rubber Co., Inc., Watertown, Mass.
Membership Committee Chairman—E. W. Beck, United States Rubber Co., New York, N. Y.
Poster Committee Chairman—Oliver Hopkins, National India Rubber Co., Providence, R. I.
Publicity Committee Chairman—R. W. Morse, The Firestone Tire and Rubber Co., Akron, Ohio.
Statistics Committee Chairman—John J. Loge, The General Tire and Rubber Co., Akron, Ohio.
Slides and Safety Kinks Committee Chairman—H. A. Walker, The Goodyear Tire and Rubber Co., Akron, Ohio.
Members at Large—
C. F. Horan, Hood Rubber Co., Watertown, Mass.
J. T. Kidney, The Goodyear Tire and Rubber Co., Akron, Ohio.
M. A. Quirk, Samson Tire and Rubber Co., Los Angeles, Calif.
Charles F. Smith, U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y.

TUESDAY MORNING SESSION

October 2, 1934

The opening session of the Rubber Section was called to order by General Chairman H. W. Low, Miller Rubber Products Co., Inc., Akron, Ohio, who presided. The chairman gave a brief resume of the Rubber Section activities during the past

year, outlining the work of officers and especially praising the work of chairmen of standing committees. He then introduced the first speaker.

Safety Progress in the Rubber Industry

By J. J. LOGE

Employment Manager, The General Tire & Rubber Co., Akron, O.

The speaker said in part: The Rubber Industry had an unsatisfactory accident record during 1933. The frequency of disabling injuries rose 11 per cent and severity was up 42 per cent over 1932, according to records from 46 companies reporting to the National Safety Council for both years. The entire industry averaged 11.71 for frequency and 1.09 for severity in 1933, on the basis of records from these 46 plants that worked over 116 million man-hours during the year.

The frequency of each type of injury rose over 1932, and the only type to show improvement in severity was temporary disabilities. Fatalities were up 75 per cent in frequency and permanent partial disabilities rose 25 per cent in frequency and 75 per cent in severity.

While the 1933 rates of the Rubber Industry compare favorably with rates in other industries, the changes in rates from 1932 to 1933 were worse than average. Rubber companies, in comparison with 29 other major classifications, ranked 12th in frequency and 10th in severity. The industry's frequency rate is 20 per cent below the average of 14.56 for all industries and the severity rate is 31 per cent below the general average of 1.59.

The increases of 11 per cent in frequency and 42 per cent in severity do not compare favorably with the rise of 7 per cent in frequency and a decrease of 6 per cent in severity for all industries. The improvement in the all-industries severity rate is due entirely to better experienec with fatalities, in contrast to adverse experience with this type of injury in the rubber industry.

Plants manufacturing rubber footwear had the best safety records during 1933, averaging 6.56 for frequency and 0.90 for severity, in comparison with rates for the entire industry of 11.71 and 1.09. Manufacturers of mechanical rubber goods excelled tire plants slightly in frequency, but averaged 1.65 for severity against 0.98 for the tire plants. Large units made the best records during the year 1933. Small units, by averaging 1.13, were only slightly worse in severity, but their frequency rate is 26 per cent above large units.

Unsettled working conditions during the year were probably instrumental in retarding our progress. These statistics disclose that handling objects and machinery caused a total of 60 per cent of our accidents. Very probably the influx of new men during the rush season contributed largely to these accidents.

Safety in Rubber Mill and Calender Operations

By W. W. STEPHENS

General Foreman, The Goodyear Tire & Rubber Co., Akron, O.

The speaker said in part: Recent statistics indicate that approximately 90 per cent of accidents in industry today are due to three causes: first, unsafe practices; second, violation of safety rules; and third, chance-taking and indifference on the part of the workmen. These statistics also emphasize the necessity of education and discipline, and our efforts therefore must be concentrated on the educational training and instruction of the employee.

This can best be accomplished in three ways: first, by a study of the safety requirements of the job itself; second, by a plan whereby the man is taught how to fulfill the job with the greatest safety and efficiency; third, by absolute discipline, so that in the course of his training the best and safest way of performing the job becomes a habit with him.

To insure success in a movement of this kind there must be instilled in the employee a feeling of self-interest and self-protection. This is possible only through his own efforts—explaining to him that it may be his own person or that of a fellow worker who may be injured. If he can be made to understand that it is his individual duty to report dangerous practices and conditions, the greatest incentive for the continuation of safety will be recognized. The supervision should be made to realize that it is their responsibility to prevent accidents and that it is an important part of their duty to see to it that all unsafe practices and violations of safety rules are avoided.

Discipline has an important place in the safety program. Supervision should never allow an unsafe practice or a violation of safety rules to get their approval by ignoring it. The attention of the employee should be called immediately to the violation of any safe practice and he should be adequately warned against doing so in future. To pass up a violation of this kind always gives the stamp of approval. Suitable penalties should be provided for continuous violations.

We at Goodyear have attacked the accident problem from this angle. We have appointed safety committees. These committees are composed of members of the supervision, staff, and an industrial assemblyman. These committees meet monthly. In addition to this, we have weekly inspection committees, composed of piece workers, assemblymen and one member of supervision. It is by constantly keeping the subject of safety in front of the men that we have prevented a lot of serious injuries, as well as a multitude of minor ones. We make a special effort to see that all of the machinery is guarded as well as it can be guarded and that our men are familiar with all of the safety rules.

Changing Industry and Its Problems

This address by Mr. J. T. Kidney, Employees' Service Division, The Goodyear Tire and Rubber Company, Akron, O., discussed some of the changes industry may expect; emphasized the importance of management learning something about compensation for accidents since industry must bear its burden; and pointed out the important part education plays in the prevention of accidents. Mr. Kidney, however, spoke extemporaneously, and there is no record available for these Transactions.

Dust Problems in the Rubber Industry

By DR. J. NEWTON SHIRLEY

Arrow Mutual Liability Insurance Co., Watertown, Mass.

The speaker said in part: It might be assumed that workers in the rubber industry are exposed to the dusts of dangerous materials in large amounts; but this is scarcely true. A very small number of employees are exposed to materials which are dangerously toxic. In the following paragraphs the term dust will be applied to the finely divided particles of materials which arise when a substance is handled or when machinery or air currents may stir it up.

The first place we encounter dust is in the receiving departments. The materials come in various types of containers and arrive in freight cars or trucks. The containers are subject to damage with loss of materials and the opportunity is present for the handlers to inhale the dust from such materials. If these materials are at all toxic, the employees may develop symptoms. Exposure is variable, usually sporadic, and is of importance only in a casual way. In some plants considerable filler materials, such as Fullers Earth—Stoughton Earth—clays—infusorial earth—rotten stone, etc., are used in large quantities. Most of these materials contain a fair amount of free silica and cannot be overlooked as a source of silicosis. Such workers should be protected by the proper use of respirators. Silicosis is a condition rarely considered as an occurrence in the rubber industry but one case is on record in Massachusetts as a compensable condition. To be sure tuberculosis was

a predominant picture in that one case. Ordinarily labor turnover in these departments is sufficient to prevent such a condition developing.

There has been in my experience cases of marked dermatitis of these laborers when exposed to the dust from coal tar pitch while unloading this material from a box car when shipped in bulk. This material is brittle and chips readily when shoveled. The dust produced causes a marked erythema of the skin which increases in intensity for some twelve hours after the exposure. Along with this erythema, the men develop a marked conjunctivitis which causes intense pain in the eyes with loss of sleep. Such employees have frequently been unable to work the next day. In 24 hours the reaction has fairly well subsided. In an attempt to prevent such a condition, the work was done at night and some success has been noted. The use of goggles and respirators has not entirely prevented such reactions. It has become a practice, where this is done, to work the men only half a shift on this work and distribute the work over a larger group of men. Previous to starting the work, the men cover all areas of exposed skin, other than the hands, with a cloth hood which is fastened about the neck. They are required to thoroughly wash up after completing the job. The eye reaction is only equaled, in my experience, by the reaction noted in eyes where a man has been improperly protected from the electric arc used in electric welding.

The next place noted in exposure to dust is in the compound room. Here the various materials are weighed out for use. The highly toxic materials are usually found among the accelerators, coloring materials and anti-oxidants. Usually these materials are weighed out in small quantities under very satisfactory working conditions and placed in individual paper bags so that there will be no loss. The type of workman on this job is usually above that of the ordinary laborer. He is told to use care in weighing out his material and appreciates the dangers if he is slack. The materials here are primarily organic compounds and dermatitis is the condition found. Since the use of hexamethylene-tetramine, safex and aniline or aniline oil has been largely discontinued; toxic conditions in the weighing out of accelerators have largely disappeared. There is one material, formerly used in large quantities, which has always given the industry a bad name—litharge. Lead symptoms among men weighing out litharge have always been common. Use of respirators, adequate ventilation and rotation of workmen have become accepted practices. Adequate washing facilities should be provided and the men made to use them previous to lunch hour and previous to going home from work. Periodic check-up of compound room men exposed to lead or its salts should be made for physical signs or symptoms of lead absorption.

The remaining work in the compound room consists of weighing out the more bulky materials. These materials are stored in bins and weighed out, as a rule, into batch cans or pans. The amount of dust produced depends upon the technique of the operator. These dusts are practically non-toxic but dirty and annoying to the workman. Long time service in this work does not appear to have any effect on the health of the men exposed. Note should be made of certain fillers which contain small amounts of silica and some day we may find evidence of exposure in this work which has produced symptoms of silicosis. An impoved method used at times is to deliver the material to the mixing machine or mill in its original container, if a heavy paper bag, thus requiring only the one opening operation. This is a very common practice in handling lamp black.

We should not forget the sweeper in the compound room. His job is particularly dirty and dusty. He is exposed to all materials used. I was very much interested last summer while helping in the silicosis study made in Massachusetts, to note that two janitors showed more evidence of dust changes in the chest than many of the workmen X-rayed.

In the mill room we find a very much improved condition over what we saw ten years ago. Formerly, the various compounds were dumped unceremoniously onto the mixing mill with a great cloud of dust arising and no adequate ventilating hood to remove it. This dust contained all types of materials being compounded. Today most mills are equipped with efficient exhaust hoods which remove the dust raised and the various materials are added somewhat apart. Masticators have replaced mixing mills in most plants and in feeding these masticators, large amounts of dust are created at times. Exhaust hoods should be installed close to the openings of these masticators to remove this dust which usually is noted when the bursting

gum raises this dust. This is not the easiest task when one realizes how little space there is for such a hood.

The mill room has been further improved by the elimination of the old dusting bags used to prevent sticks or cuts of stock from sticking together. The present method of dipping the cut into a tank of supersaturated chalk solution or spraying with such a solution has eliminated practically all dust. This has been the cause of good improvement in the working conditions in the mill room. The credit belongs to the chemists, as the use of the faster accelerators has required quicker cooling of compounded rubber when removed from the mixing mill.

Stock or storage bins for storing compounded rubber require the free use of cloths or dusting powders, whiting, talc or chalk. The employees in this work are exposed to large amounts of dust, usually harmless in nature. There is a chance that this dust may be sufficiently contaminated with toxic materials to constitute a hazard. This was once claimed to be the source of a case of lead poisoning. Dermatitis from this dust in days of hexa was not unusual.

In the cutting room, numerous spots are found where considerable dusting powder is used. Well can I remember what I thought when I first saw the operator of the Parsons Cutter dieing out parts of filler materials and reinforcement stays; he was covered from head to foot with dust. Improved processes have reduced the dust in this part of the work. Such dust is only toxic from contamination but a man with chronic rhinitis is uncomfortable and he may have to give up such work. The only control is by local exhaust located on the head of the cutter and care on the part of the lay-out man in not using an excess of dusting powder. The use of wax paper between layers of stock has eliminated this dust in stock wherever such could be done to advantage.

Passing on to the manufacturing process, we invariably find cloth books or liners used to store and transport cut stock from one process to the next. These books or liners may become dusty from the dusting powders used or the sulphuring out of the stock in the book. Protection of the stock booked generally requires frequent cleaning of these books by compressed air hose. Dermatitis used to be a frequent occurrence among the employees handling these books or liners. One of the most stubborn cases of dermatitis I ever saw occurred in a man repairing these liners.

There is a last place where dermatitis can show up—the packing room. Here the finished product may have dusting powder which drops off or a slight sulphuring out reaction which gives rise to a toxic dust. This incidence is rare today because of the elimination of the toxic accelerators. One of my prize patch testers on dermatitis was once so sensitive to a certain accelerator that he could not sit at a desk having a small desk pad of this material without breaking out with a rash in the sensitized area.

This to a large extent covers the dust situations peculiar to the rubber industry, as I know them. Several other processes may occur. For some work, hard rubber dust is a necessary ingredient. This dust is explosive and where handled in large quantities, special precautions must be taken. The manufacturing process requires the use of carbon dioxide fumes to prevent fires or explosions.

Several processes are found where abrasive wheels or belts are used in the manufacturing processes. This dust may be toxic or non-toxic but is very objectionable and good practice requires its removal. We find such processes as buffing canvas shoes before cementing—buffing overflow from tire beads and similar molded products—buffing hard rubber products—buffing air bags used in curing tires, etc. All these processes should be provided with local exhaust ventilation and dust collectors. Perhaps the more common danger is the fire hazard when a spark or over-heated piece of material ignites such dust when it lands in a pocket in the duct. The air-current makes a forced draft burner.

For a while sand-blasting was used for cleaning metal bases on which rubber was to be vulcanized. I refer to the process of sand-blasting the solid tire rims. Such work requires enclosure in a sand blast chamber such as is found in any sand-blasting operation. The introduction of steel grit and the improvement of the sand blast chamber have removed most of the chance of silicosis. Good health supervision required periodic examination and X-rays of all men operating or working around sand blast machines.

There is one further dust situation which comes to my mind, lead oxide fumes found over the lead pot which some manufacturers have used to clean iron or steel molds. These lead pots are frequently heated to 650-750 degrees F. at which temperatures the lead is volatilized and the fumes are a ready means of acquiring lead poisoning. Such lead pots should be adequately exhaust ventilated.

In this connection, the use of lead in rubber hose manufacturing is not without danger. Cases of lead poisoning have occurred from the dust produced by the conveyor which returns the scrap lead to the melting pot. The rubbing of the lead fragments against the side of the conveyor produces a fine dust which falls through the cracks of the conveyor and may be circulated around in the air breathed by the operators. These men should be subject to periodic checkups.

Dust Problems in the Rubber Industry

By DR. W. S. ASH

Plant Physician, United States Tire Co., Detroit, Mich.

The speaker said in part: I am going to take the position of being a bit of a skeptic about all this alarm over the dust question. The health pendulum in industry swings to the extremes, like so many other things. At one time industry didn't care a rap about the health of the worker; he was easily replaced. Now sometimes we go so far as to exercise a kind of paternal jurisdiction over him until he sits back and expects us to make out his entire health program. Industry should not be permitted to sidestep any real responsibilities in health matters; a healthy and sanitary workshop should be maintained according to accepted standards; but beyond that it should still be an individual matter—the worker should be sufficiently interested in his livelihood to want to preserve his health without our cramming too much "do this," or "do that" down his throat.

You can easily see that I want to be the optimist of the party. I want to go on record as saying that, as far as I have been able to observe, we have no serious dust problem or hazard on our hands. Take it or leave it; that is my conviction. Opinion is certainly not unanimous one way or the other. This can be easily verified by getting together a half dozen safety engineers and some public health men and then mention dust. But the more research work that is being done, the more definite expressions of opinion are we getting. I am looking at it from the health standpoint only. Dust has been a problem ever since Adam and Eve shook the dust of the Garden from their feet. Explosive dusts can make quite a mess of a human being and spoil his health permanently. Dusts are harmful to equipment and to stocks, and they are eyesores just to look at when you have a nice accumulation. Dust storms have taken their toll, and I believe that somewhere in the bibliography on dust someone has brought forth the theory that the cliff dwellers of our southwest vanished from the earth because of rampant silicosis.

In this complex life that we live today I sometimes wonder just how we are to determine the exact part that dust plays in the industrial life of the worker. He works thirty or forty hours a week in the shop and the remainder of his time is put in elsewhere—and don't tell me he isn't exposed to dust elsewhere! He is surrounded with dust and fumes. In traffic, on the street car, at home, in the parks, everywhere he goes the dust particles are after him. You may say that after he leaves his work he is not exposed to sufficient dust concentration to do him any harm; but how are we to determine whether even this mild but continued exposure predisposes him to dust disease if these diseases are so prevalent? On the other hand, if light exposure develops an immunity, why should we assume that every tuberculosis or pneumonia case has its inception in a dusty job? And if you think that fumes play no part in the health picture, let me mention an article by Dr. Mortland in a recent issue of the Journal of the A. M. A. under the heading "Carbon Monoxide Poisoning." In Connecticut and Massachusetts 250,000 cars were stopped at random and checks made on the gas content inside the car. Sixty per

cent had measurable quantities of carbon monoxide present and 7 per cent had it in sufficient quantities to cause collapse in four hours or more.

Again, if you think you are not exposed to plenty of dust and dirt when away from the shop, listen to this: The city in which our plant is located certainly is not classed as the dirtiest city in the country, but here is what careful measurements brought out. Several years ago the dust and dirt precipitation was 140 tons per square mile per year. That is a lot of dirt, whether it is harmful or not. The city Safety Engineer got busy and they reduced it finally to 62 tons per year. Then, along came the era for economizing in everything, and as a result, the estimated precipitation is now twice what it was at its worst; in other words, we have about 280 tons per square mile now.

Now, let us look at it from the disease standpoint, if it means anything—and it must mean something because dust is almost always mentioned in the same breath with tuberculosis and pneumonia. The average death rate in our city is around eight per thousand, although the general urban death rate for the state is over nine. On this basis, we should have had at least 360 deaths in our plant in ten years. Actually we had 156.

The average death rate from pneumonia over this period was 1.04 for the city at large. We should have had at least 45 deaths; actually we had 26. The average death rate from tuberculosis over this period was .85. We should have had around 38 deaths; we actually had 13. We have had only one death from tuberculosis in the last three years, and only two cases on hand now, both being rated as "making satisfactory progress."

In our state females have a higher death rate from tuberculosis than males in the age brackets from 20 to 30, but from there on the males increase and the females decrease. We have about 15 per cent females in our employ, but have had only three deaths in the ten years and all three were office employees. During this period in which we were losing 13 from tuberculosis, we were losing 15 from automobile accidents and 25 from heart trouble. In that time we had only 4 compensable deaths, one of which occurred while giving an anesthetic for the removal of a simple ganglion on the wrist. We had only one other lung death and that was classed a cancer.

Of the pneumonia and tuberculosis deaths combined, nine were in the mill and calender department, but there were five in the offices. Of the males, 30 were white and 6 colored, showing the higher rate among the negroes. Our greatest number of deaths was in the 20 to 40 age bracket, which corresponds with the general picture of the state at large where about 40 per cent of the deaths occur in this age limit.

Now, if I have seemed to draw the herring across the trail of dust in our industry, I don't want you to get the impression that we are so pure and undefiled that we can sit back and make faces at other industries. If I have seemed to deal lightly with the subject, I don't want you to feel that my slogan is "Let the Dust Fly." Not by a long shot. If for no other reason than good housekeeping, we must be after dust and dirt like the figure on a nationally known cleanser. A clean working place means a better worker and a better product, just as the well-groomed man gets an easier hearing when he sets out for an interview.

Instead of taking a random pot shot at our dust, let us go at it in an orderly manner. Sit down and follow your manufacturing through from raw material to finished product. You may be surprised at the places you find dust and dirt a factor.

Is your receiving room a dark, cobwebby, dirty place? Are your dusty substances stored in such a way that every time some of it is requisitioned there is a cloud of dust stirred? Are these substances packaged in such a way as to lessen dust in the handling? When they are used in the manufacturing process, are they handled in such as way as to keep dust at a minimum, or are they just dumped helter-skelter? Do you continue to use dusty processes when an emulsion, or solution, or tank conveyor might be used? If you dust a tire, for instance, do you scatter the dust all around and cover everything within dusting distance, or have you figured just about how much powder you need and use it accordingly? If you must use a powder, even though it is not rated as dangerous, do you ventilate, or use suction or provide your worker with a respirator? Do you place an employee with a dusty

job right in front of an open window where all the dust will blow back on him? Is your general housekeeping as good as it might be in dusty sections of your plant? Have you places where you avoid escorting visitors because the place is untidy and unsightly? Do your windows get so dirty and dusty that the cost of extra illumination becomes a factor? Do your window sills slant, or are they flat to catch more dust? Take a look at everything from this dust point of view. What kind of dust is it? Is it dangerous to health? Is it a constant feature of the manufacturing process, or an occasional one? Is one worker at it all the time, or are they rotated? Whatever its nature, plan some means of elimination or lessening its concentration.

I have said nothing about silicosis, asbestosis, anthracosis, etc. I am not denying that they are definite entities in the disease picture. They certainly are, but the picture is not yet complete enough for me to feel that they present a hazard in our particular industry. Let me quote two investigators who seem to voice the majority opinion that a definite material and a definite concentration must be present to make a dangerous combination.

Public Health Report, Vol. 48, pp. 1398-1400, Nov. 1933:

"The physical examination and X-ray findings in this series of studies clearly indicate an association between the amount and character of dust in the working atmosphere and the effect on the health of the exposed worker. Serious physical impairment was noted only where the workers were exposed to large amounts of dust containing a high percentage of quartz. Where the dust concentration and the quartz percentage were relatively low there was found only a mild fibrosis which could not in most cases be regarded as due to the particular dust."

Dr. Leroy Gardner, Journal of the A. M. A., Vol. 103, No. 10, pp. 743-748, Sept. 8, 1933:

"It is no longer reasonable to maintain that all kinds of dust are equally dangerous to the lungs. A very convincing array of clinical, statistical and experimental observations has demonstrated that dusts composed, in whole or in part, of silica are capable of exciting a characteristic, progressive, nodular fibrosis of the lungs and that at the same time these organs become abnormally susceptible to the tubercle bacillus. All the other types of dust that have thus far been investigated can apparently be inhaled almost with impunity for long periods of time."

"Nonsiliceous dusts localize about the lymphatic trunks and some of them excite the proliferation of small amounts of loose cellular connective tissue. They apparently do not increase susceptibility to tuberculosis."

"Nonsiliceous dusts inhaled in combination with silica modify the actions of the latter, altering the anatomic characteristics of the lesion and apparently decreasing the susceptibility to tuberculosis."

TUESDAY LUNCHEON SESSION

October 2, 1934

This session, after a pleasant luncheon, was devoted to the bestowal of trophies to winning companies in the 1934 Safety Contest of the Rubber Section. The data on the Contest was given by Chairman H. W. Low, as follows:

The Rubber Section Safety Contest extended from January 1st to June 30, 1934. Twenty-eight unit companies registered in the contest and 52,492 persons worked a total of 47,276,101 man-hours. The average frequency rate for the contest was 6.430, which is a 33 per cent decrease from the 1933 contest rate of 9.636. Fifteen of the competing units completed the contest with a frequency rate below the average, and five unit companies went through the contest period with perfect safety records. During the contest there were 304 disabling injuries.

The handsome trophies awarded to the winning companies by the National Safety Council were presented by G. T. Hellmuth, General Claims Attorney, Chicago, North Shore & Milwaukee Railroad Co., and Vice President for Finance of the National Safety Council. Mr. Hellmuth, representing the Executive Committee of the Council, presented trophies to the following companies:

Group A and B (monthly exposure of more than 125,000 man-hours).

The Goodyear Tire & Rubber Co., New Toronto, Canada; two disabling injuries while working 1,251,290 man-hours, frequency rate of .598.

Group C and D (monthly exposure of less than 125,000 man-hours).

Dunlop Tire & Rubber Corp., Buffalo, N. Y.; no disabling injuries while working 660,000 man-hours.

The Goodyear Tire & Rubber Co., Bowmanville, Canada; no disabling injuries while working 337,754 man-hours.

Van Cleef Brothers, Chicago, Ill., no disabling injuries while working 137,273 man-hours.

The Goodyear Tire & Rubber Co., Reclaim Plant, Akron, Ohio; no disabling injuries while working 111,928 men-hours.

Fabric Fire Hose Co., Sandy Hook, Conn.; no disabling injuries while working 48,512 man-hours.

WEDNESDAY MORNING SESSION

October 3, 1934

The Hazards of Rubber Cement Churns and Storage Rooms

By E. W. BECK

Supervisor of Safety, United States Rubber Co., New York City

The speaker said in part: Let us assume that we have a well-designed cement churn room, and I will confine my reminders to what goes on within the room.

A designated person with a proper knowledge of all the hazards involved should be in charge of each shift and be held responsible for the safe practices of all employees working under his supervision, as well as proper inspection and maintenance of all equipment. He should not be allowed to leave his quarters for any great length of time. Definite instructions regarding safe practices should be posted within the room.

Each employee should know all the hazards and just what to do in case of emergency. They should be posted as to where the proper shutoff valves are and where the steam valves are located for flooding the room with steam. It should be a rule that the employees shall not carry matches in their working clothes. Lockers should be of the fireproof type placed outside of the cement churn and cement storage rooms. No person should be permitted to take any material from the cement room without permission from the person in charge. The use of gasoline, naphtha or benzene to clean clothing, such as overalls, aprons, gloves, etc., should not be allowed.

Chains, pulleys, belts and churns operating in these rooms should be grounded and it should be the duty of the electrical department to test periodically—at least once a month—the grounds on all shafting and churns, submitting written reports to be filed in the office of the safety supervisor. The electrician should inspect monthly all lighting and wiring equipment. Only properly installed vapor-proof lights and switches with ample capacity should be used. Switches and fuses should be located outside the building or room and solvents should be handled through permanently installed pipe lines.

The cement house should be inspected daily by foremen and a rigid monthly inspection should be set up by the safety supervisor and the superintendent. Rigid machinery inspections should be made by the mechanical department and frequent inspections should be made of the exhaust system in this room to see that it functions properly. It is advisable also, periodically, to invite the local fire department to make an inspection of the plant, more particularly the cement churn room.

Every fire and accident within the department should be reported to the supervisor of safety without delay, so that the proper investigation can be made and

National Safety Council's annual proceedings: "When the sample had been allowed to stand from 24 to 48 hours we had a little reaction. Safex itself was very satisfactory but its compounded condition, with a little age, caused dermatitis." Members of this Committee personally saw Dr. Shirley with a sample of Safex on his arm under a piece of adhesive. It had been there for 4 days. He showed the naked arm and it had only a little rash, as stated by him. The test (as made by Dr. Shirley) of fastening samples of Safex and Safex compounds to the flesh for days at a time would not be a parallel condition to employees working with any such compounds.

Reference is made in Mr. Nolan's brief on page 19, to the hazard of x-rays. This hazard might take place in any industry and is not peculiar to the Rubber Industry. In fact there are very few rubber industries equipped with an x-ray machine. The Committee knows of no rubber company where x-rays are used other than in the Medical Department and under the operation of skilled technicians only. Therefore, this illustration, as mentioned by Mr. Nolan, is far-fetched and should carry no weight in this brief as applying to the rubber industry.

Signed: W. L. SCHNEIDER, B. F. Goodrich Co., Akron, Ohio.
J. T. KIDNEY, Goodyear Tire & Rubber Co., Akron, Ohio.
R. B. MORSE, Firestone Tire & Rubber Co., Akron, Ohio.
E. W. BECK, United States Rubber Co., New York, N. Y.
PAUL VAN CLEEF, Van Cleef Bros. Co., Chicago, Ill.

October 1, 1934.

ADJOURNMENT

Safety Section, A R A -- Steam Railroad Section, N S C

Chairman—C. L. LaFountaine, Great Northern Railway Co., St. Paul, Minn.
First Vice-Chairman—H. A. Parish, Chicago & North Western Railway, Chicago.
Second Vice-Chairman—W. H. Failing, Central Railroad of New Jersey.
Secretary—J. C. Caviston, American Railway Association, New York City.

A complete report of these sessions is published by the American Railway Association in a booklet entitled, "Proceedings of the Fourteenth Annual Meeting of the Safety Section, Cleveland, Ohio, October 2-4, 1934." Copies of the booklet are available from the Association of American Railroads, N. Y. C. The following is a condensed record.

TUESDAY MORNING SESSION

October 2, 1934

The opening session of the Safety Section, American Railway Association—Steam Railroad Section, National Safety Council was called to order by Chairman C. L. LaFountaine, Great Northern Railway, St. Paul, Minnesota, who presided. The invocation was delivered by L. G. Bentley, Chesapeake and Ohio Railway. The report of the Secretary, J. C. Caviston, New York City, in which he outlined briefly the activities of officers and standing committees during the last year, was read and approved. The Chairman then presented his annual report.

Annual Report of the Chairman

By C. L. LA FOUNTAINE

Great Northern Railway, St. Paul, Minn.

The speaker said in part: Let us go back for a moment to the resolution adopted at our annual meeting in 1924, which set a goal calling for reduction, based on the 1923 record, of 35 per cent in casualties to employees on duty, Class I railroads, by

It is no simple remedy to cure this ever-increasing cost, and the solution of it lies with the individual companies and their efficient handling of very fundamental facts. There seems no immediate possibility of any material change in this trend toward the super-liberalization of compensation laws and compensation benefits all down the line. But the return of prosperity, with higher wages, more definite employment, a greater number of regular working days, all should have a tendency to make a more favorable ratio between the payments made by industry and man-hours of work produced by labor. Men will be more anxious to return to their employment and stay on their jobs, and with the return of more regular employment, there will be less reopening of old cases on rather exaggerated claims of injury.

But this lies far in the future. The only immediate answer to the employer's problem seems to be diligence, intelligence and persistence in the work in which your people are so vitally interested—accident prevention. If the accident can be prevented, then all of these other problems will never need be solved.

We realize, of course, that the elysium will never arise, but certainly the very remarkable work that is being done in accident prevention must be keeping the ocmpensation and medical problems from becoming an unbearable cost to industry. When we find individual plants, over a short period of years, reducing accidents from 75 to 90 per cent, many of them with several million man-hours without lost time accidents, when we find steam railroads cutting accidents among their employees 60 per cent during the past eighteen years—when a group of leading steel concerns have a 90 per cent reduction in plant accidents during the same period —when forty-five large cement plants finish a recent year without a single lost-time accident among their thousands of employees—when we find the plant of an electric company with 28,000 employees reducing accidents in 1925 by 92 per cent—we realize what you men and women have accomplished, and feel that perhaps it is possible for accident prevention work to actually solve some of the most distressing problems that arise in the administration of the workmen's compensation law.

However, in connection with your accident prevention work, you can accomplish much in obtaining a proper administration of the Act and in correcting some of the glaring evils that exist. For one thing, you can keep constantly in your own mind and impress upon those about you the fact that this law is not an unemployment insurance law—that it is not designed for that purpose and should not be prostituted to obtain that end. You can also spread the gospel to those about you that there are health and sickness insurance policies designed to cover the illnesses that one may be subject to, outside of accidents, and that the compensation law was designed only as a compensation for actual loss of wages due to actual injuries arising out of the employment itself.

ADJOURNMENT

INDEX

D

E

F

G

N

O

P

Q

R

S

T

V

W

Y