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TRANSACTIONS

25th National Safety Congress

NATIONAL SAFETY COUNCIL, INC.

ATLANTIC CITY, NEW JERSEY
OCTOBER 5 to OCTOBER 9, 1936

Ambassador, Chelsea, Ritz-Carlton Hotels
and Atlantic City Auditorium

Accident Prevention Equipment Manufacturers

Who Exhibited at the 25th National Safety Congress and Exposition

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

Ballroom—Convention Auditorium

Aetna Casualty & Surety Co., Hartford, Conn
  Automobile Driving Tests.
American Mutual Liability Ins. Co., Boston, Mass
  Insurance, Workmen's Compensation, Property Damage and [illegible]
Arntzen, Inc., Chicago, Ill.
  Auxiliary Emergency Stretcher and First Aid Equipment
Arroway Traffic Signal Corp., Kingsport, Tenn
  Traffic Control Signals.
Beacon Corp., Minneapolis, Minn.
  Direction and Danger Signals for Motor Transport Vehicles
Bendix Products Corp., South Bend, Ind.
  Automotive Equipment.
Blatchford Corporation, Chicago, Ill.
  Traffic Signals and Markers
Cities Service Co., New York City.
  Oils and Gasoline.
Crouse-Hinds Company, Syracuse, N. Y.
  Traffic Signals and Flood Lights.
Dual Parking Meter Co., Oklahoma City, Okla
  Parking Meter Equipment.
Donald S. Duncan, Inc., Chicago, Ill.
  Parking Meter Equipment.
Eagle Signal Corp., Moline, Ill.
  Traffic Signals.
General Electric Co., Schenectady, N. Y.
  Electrical Equipment.
Harley Davidson Motor Co., Milwaukee, Wis.
  Police Motorcycles and Equipment.
The Highway Safety Signal Co., Baltimore, Md
  Double Filament Traffic Lamps and Color Design Traffic Lenses
Hoof Products Co., Chicago, Ill.
  Motor Vehicle Speed Control Governors.
Indian Motorcycle Co., Springfield, Mass.
  Police Motorcycles and Equipment.
Liberty Mutual Insurance Co., Boston, Mass.
  Automobile and Industrial Safety Service.
Martindale Electric Co., Cleveland, Ohio.
  Dust Respirators and Highway Safety Signals.
Monarch Governor Co., Detroit, Mich.
  Automobile Speed Control Governors.
National Carbon Co., Inc., New York City.
  Equipment for Battery Operated Devices.
Parkrite Corporation, Houston, Texas.
  Parking Meter Equipment.
Traffic Boy, Inc., Canton, Ohio.
  Traffic Warning Signs.
U. S. Steel Corporation & Subsidiaries, Pittsburgh, Pa.
  Street and Highway Markers and Highway Guards.
Weaver Manufacturing Co., Springfield, Ill.
  Automobile Testing Equipment.

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

Carbon Monoxide

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

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

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

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

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

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

Infection

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

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

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

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

Summary

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

1. How will your product affect my business?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Unusual Developments in Leg Protection

By E. L. WHEELER

Chicago

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The following questions were brought out in the discussion:

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

No.

2. Why are spats worn at all?

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

3. What material is the best heat resister?

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

Respiratory Protective Equipment for Use Against Dusts, Fumes and Gases

By PHILIP DRINKER
Boston, Mass.

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

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

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

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

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

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

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

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

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

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

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

Discussion following the address was based on these points:

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

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

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

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

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

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

Glass Used for the Protection of the Eyes Against Injurious Radiation

By E. D. TILLYER
Southbridge, Mass.

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

The effects of the ultra-violet and the infra-red radiations are not as quickly noticed as the visible. We cannot say, as we said for the visible, "get good immediately comfortable vision" because the first noticed effect of the ultra-violet oc-

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WEDNESDAY NOON SESSION

October 7, 1936

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

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

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

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

Automotive and Machine Shop Section

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Membership Committee Chairman—MELL E. TRAMMELL, Gulf States Steel Co., Alabama City, Ala.

Poster Committee Chairman—R. H. FERGUSON, Republic Steel Corp., Cleveland, Ohio.

Program Committee Chairman—H. M. CROGHAN, Inland Steel Co., East Chicago, Ind.

Publicity Committee Chairman—C. W. HANKO, Pittsburgh Steel Co., Monessen, Pa.

Railway Car Builders Committee Chairman—P. J. BRAND, Pullman Standard Car Manufacturing Corp., Pullman, Chicago, Ill.

Slides and Safety Kinks Committee Chairman—J. A. OARTEL, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

Statistics Committee Chairman—W. J. IRELAND, Kohler Co., Kohler, Wis.

Members at Large—

F. G. BENNETT, The Buckeye Steel Castings Co., Columbus, Ohio.
E. F. BLANK, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
J. A. COLTRIN, National Radiator Corp., Johnstown, Pa.
G. A. DAVIS, Carnegie-Illinois Steel Corp., Chicago, Ill.
M. W. DUNDORE, Beloit Iron Works Co., Beloit, Wis.
JOHN P. EIB, Carnegie-Illinois Steel Corp., Joliet, Ill.
W. T. FILMER, The Youngstown Sheet and Tube Co., Youngstown, Ohio.
A. C. GIBSON, Spang, Chalfant & Co., Inc., Pittsburgh, Pa.
O. F. HARVEY, American Car and Foundry Co., New York, N. Y.
S. E. HAWKES, MacWhyte Co., Kenosha, Wis.
H. H. HENRY, Otis Steel Co., Cleveland, Ohio.
H. G. HENSEL, The Youngstown Sheet and Tube Co., Chicago, Ill.
W. A. JARVIS, The Chase Companies, Waterbury, Conn.
F. A. LAUERMAN, Republic Steel Corp., South Chicago, Ill.
T. H. McKENNEY, Chicago, Ill.
D. V. MEDALIE, Interlake Iron Corp., Chicago, Ill.
JOHN O'ROURK, Bethlehem Steel Co., Sparrows Point, Md.
C. E. RALSTON, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
FRANK ROWE, Wheeling Steel Corp., Portsmouth, Ohio.
HERMAN SPOERER, The Youngstown Sheet and Tube Co., Evanston, Ill.
J. K. STAFFORD, Mississippi Valley Structural Steel Co., Decatur, Ill.
J. A. VOSS, Republic Steel Corp., Cleveland, Ohio.

* Deceased.

Officers Elected for 1936-37

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

Members at Large—

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

MONDAY AFTERNOON SESSION

October 5, 1936

The opening session was called to order by General Chairman H. W. Darr, Bethlehem Steel Co., Johnstown, Pa., who presided. Chairman Darr welcomed to think, inability to draw a personal lesson from the experience of others, overconfidence and a desire to make good on the job. These can only be overcome by careful and systematic handling on the part of the supervisor. His is the responsibility of putting over to the worker the value and advantages resulting from a close observance of rigid safety inspections.

Systematic Organized Safety Effort

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

The Present Status of Control of Dust and Fumes in Industry

By H. B. MELLER

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

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

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

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

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

Classification of Dusts

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

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

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

Ability of Dusts to Cause Injury

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Preventive Engineering

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

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

Methods of Determining Dust

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

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

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

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

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

Dust Elimination

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

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

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

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

Permissible Dustiness

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

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

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

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

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

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

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

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

Workmen's Compensation Acts

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

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

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

Examination After Claim for Disability Arises

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

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

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

Medical Treatment

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

These points were raised in the discussion following the addresses:

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

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

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

Ten students per instructor is a good ratio.

3. Which gases present the greatest harzards in welding?

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

THURSDAY MORNING SESSION

October 8, 1936

Metals Section Safety Contest

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

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

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

which had been followed during the past year.

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

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

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

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

Meeting of October 6, 1936

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

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

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

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

ADJOURNMENT

Accident Prevention Equipment Manufacturers

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

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

Ballroom—Convention Auditorium

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

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

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

American Mutual Liability Insurance Company, Boston, Mass.
Insurance, Workmen's Compensation, Property Damage, and General Automobile
American Optical Company, Southbridge, Mass.
Head and Eye Protection Products.
Arntzen, Inc., Chicago, Illinois.
Auxiliary Emergency Stretcher and First Aid Equipment.
Arroway Traffic Signal Corporation, Kingsport, Tenn.
Traffic Control Signals.
Associated Guard Manufacturers, Chicago, Ill.
Dust Control Units and Mechanical Safety Guards.

Frank E. Barnes Company, Chicago, Illinois.
Electrician's Rubber Gloves.
Beacon Corporation, Minneapolis, Minnesota.
Direction and Danger Signals for Motor Transport Vehicles.
Bendix Products Corporation, South Bend, Indiana.
Automotive Equipment.
Robert A. Bernhard, Rochester, New York.
First Aid Supplies.
Blatchford Corporation, Chicago, Illinois.
Traffic Signals and Markers.
Bradley Washfountain Company, Milwaukee, Wisconsin
Group Washing Equipment.
Stewart R. Browne Manufacturing Company, New York City.
Safety and Special Purpose Lights and Lamps.
Brown Shoe Company, St. Louis, Missouri.
Men's and Women's Safety Shoes.
R. H. Buhrke Company, Chicago, Illinois.
Safety Equipment for Construction and Maintenance.
E. D. Bullard Company, San Francisco, Calif.
Industrial and Mining Safety Equipment.
Burroughs Wellcome & Company, (U. S. A.), Inc., New York City.
First Aid Kits and Medical Equipment.

H. Childs & Company, Inc., Pittsburgh, Pa.
Safety Footwear.
Cities Service Company, New York City.
Oils and Gasoline.
Columbus-McKinnon Chain Corporation, Tonawanda, N. Y.
Alloy Steel Sling Chains.
H. S. Cover, South Bend, Indiana.
Respirators and Safety Goggles.
Crouse-Hinds Company, Syracuse, New York.
Traffic Signals and Flood Lights.

Davis Emergency Equipment Company, Inc., New York City.
First Aid and Safety Equipment.
C. H. Dockson Co., Detroit, Mich.
Head and Eye Protection.
Do-More Chair Company, Elkhart, Indiana.
Posture-Health Chairs for Office and Factory.
Dual Parking Meter Company, Oklahoma City, Okla.
Parking Meter Equipment.
Donald S. Duncan, Inc., Chicago, Ill.
Parking Meter Equipment.

Eagle Signal Corporation, Moline, Ill.
Traffic Signals.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Weaver Manufacturing Company, Springfield, Ill.
Automotive Testing Equipment.
West Disinfecting Company, Long Island City, N. Y.
Products for the Promotion of Sanitation.
Willson Products, Inc., Reading, Pa.
Personal Protective Devices.