

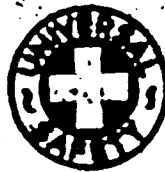
TRANSACTIONS

PLAINTIFF'S EXHIBIT

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33rd NATIONAL SAFETY CONGRESS



**General Subject and
Industrial Sessions**

CHICAGO

October 3-5, 1944

**National Safety Council, Inc.
20 North Wacker Drive, Chicago 6**

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TUESDAY EVENING SESSION

October 3, 1944

Presiding: General Chairman, HAROLD R. BIXLER, Personnel Dir., The Mutual Life Insurance Co. of N. Y., New York City.

Aims and Responsibilities of the A.S.S.E.

By W. DEAN KEEFER

General Chairman, American Society of Safety Engineers—Engineering Section
National Safety Council and Second Vice-Pres., Lumbermen's Mutual Casualty Co.,
Chicago, Ill.

Ours is a great society. We now have more than 4,000 members and twenty chapters. We have had an interesting past in which much has been accomplished. You are all familiar with the research work; you know of our contribution to the Safety Standards of the American Standards Association.

Engineering colleges have been encouraged

to formulate plans for teaching the fundamentals of Safety Engineering to undergraduate students.

I need not remind you that through the efforts of our various committeemen, more engineering and technical societies are giving greater attention to safety than ever before.

There is one activity, however, that to

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Labor and Safety

THURSDAY MORNING

October 5, 1944

A Panel Discussion

Presiding: C. W. ELIASON, Chief Labor Relations Adviser, U. S. Maritime Commission, Oakland, Calif.

Participants:

T. O. ARMSTRONG, Personnel Dir., Westinghouse Electric, East Springfield, Mass.

EDWARD KLEWER, Safety Dir., Oil Workers International Union, C.I.O.

VICTOR HANNIGAN, Representative Wisconsin State Federation of Labor, A.F.L.

JOHN H. HAZELHURST, Pres., Public Utilities Service, Chicago.

GRIFFIN JONES, Labor Representative, War Production Board, Washington.

VOYTA WRABETZ, Chairman, Industrial Commission of Wisconsin.

CHAIRMAN ELIASON: Last year, the pattern was set for the meeting this year. If you will recall, there was a platform adopted as follows: (1) Promotion of safety to create a definite objective of labor; (2) Management actively should seek labor's cooperation; (3) The basic responsibility for the safety program must be accepted by management; (4) The physical condition of the plant is an essential factor in any safety program; (5) Full cooperation of organized labor with the National Safety Council is necessary to put across the best possible safety program.

Before we hear from our first speaker, I should like to stress the importance of safety being accepted by top management. When I say that, I mean, from the chairman of the board, or the chief executive officer, right on down. If that isn't the case, I cannot see how a safety program

can start in the middle of some level of supervision and carry through to the men that are affected more than anybody else.

I should also like to stress the need of the top people in organized labor to carry out their responsibility on safety. And now, Mr. Armstrong.

MR. ARMSTRONG: There shouldn't be any confusion about safety and the cooperation we should get between management and labor relating thereto. I don't think either side should refuse to sit down and get together on the subject that we are here to discuss this morning—the safety of those within our plants.

We have heard a great deal in the newspapers about strikes. We hear far too little about accidents. When we stop to look at the figures we find a tremendous number of hours lost due to accidents, as compared with any other phase of lost time, strikes, labor turnover, absenteeism, or anything else.

From my experience, and I only talk from my experience, and I hope it has not been unusual, we have been able to get along very nicely with labor, and its safety question. Now, I give you briefly just a pattern of organization. I will let the balance of it go to the questions relating thereto.

No. 1: Supporting the plant management is an executive committee. It is made up of the management of the plant, the president of the local and the various divisional superintendents. Each year they set the policy with respect to the jobs to be done that year and with respect to the

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TUESDAY AFTERNOON SESSION

October 3, 1944

Presiding: General Chairman, JOHN TREWEEK, Safety Eng., Homestake Mining Co., Lead, S. D.

Some Sources of Error in Dust Sampling

By A. S. RICHARDSON, J. W. WARREN and W. C. WILLIAMSON
Anaconda Copper Mining Co., Butte, Mont.

In the measurement of the concentrations of dust that are present in air used for the ventilation of mines, or other working places, it is recognized that the dust is not uniformly dispersed in the air. Also that under the same atmospheric conditions widely different results may be obtained by the use of different dust sampling instruments, and by different methods of quantitation. In dust sampling work done by the writers with impingers a number of sources of error have been found to exist, and these are here described for the benefits of others engaged in similar work.

Impinger Sampling in a Flow of Air

In the collection of any volume of air for dust sampling purposes, it is essential that the number of dust particles in the sample volume be the same before and after collection. When the air is not in motion it may perhaps be assumed that this condition exists for sampling with impingers. However, dust sampling in mines is often done in flows of air moving at fairly high velocity, and similar conditions exist in ducts carrying flows of air from dust collection hoods. Although nothing like exact measurement of dust conditions as yet seems possible, it is desirable that the methods of sampling streams of air in motion should be comparable to those taken in still air. Since dust particles carried in a moving current of air possess some definite directional momentum, it is indicated that for uniformity of dust content, the sample volume should be drawn from the air stream without change in the velocity and direction of flow.

In impinger sampling work the flask must necessarily be held in a vertical position and

with the tube vertical. This means that air drawn from a horizontally moving air stream must be deflected at right angles to its original direction of flow to enter the tube opening. The momentum of the dust particles would then tend to continue them in motion past the tube opening, and thus reduce the dust content of the sample volume.

To develop the effect of these conditions upon dust sampling results, some tests were made by taking dust samples from air moving horizontally at different velocities simultaneously with two impingers, one having the ordinary vertical tube opening at right angles to the direction of flow, and the other being equipped with an elbow extension to bring the tube in line with the direction of flow. Two samples were also taken with restricted orifices placed at the elbow openings so as to make the velocity of air passing through the orifice the same as that of the main air stream.

Dusty air for this purpose was obtained by allowing a flow of dust, collected at a bag type dust arrester, to fall at a short horizontal distance away from the inlet of a blower. The induced flow of dusty air was then forced through a galvanized iron duct to the sampling position. Compensation for variations in dust collection efficiency of the two impinger instruments used in the test was made by alternating use of the instruments in the two sampling positions.

Geometric mean diameter of the dust particles was 0.65 microns with standard geometric deviation 2.09, as determined by samples taken with an Owens Jet sampler with microscopic work done by micro-projector at a magnification of 10,000 diameters.

Tabulation No. 1
Dust Counts with Impingers Alternated in Two Sampling Positions

Air Velocity Ft. Per Min.	High Concentrations				Low Concentrations			
	Impinger No. 3 Pos. A	Impinger No. 3 Pos. B	Impinger No. 5 Pos. A	Impinger No. 5 Pos. B	Impinger No. 3 Pos. A	Impinger No. 3 Pos. B	Impinger No. 5 Pos. A	Impinger No. 5 Pos. B
250	80.2			81.9	29.9			35.2
250		108.0	112.3			27.9	30.3	
250	69.2			80.2	32.0			30.0
250		61.6	68.8			19.3	25.0	
Average		79.8		85.8		27.3		30.1
Per Cent Variation in Instrument Collection			7.0				9.35	

Tabulation No. 2
Dust counts for Vertical and Parallel Impinger Tube Intakes

Air Velocity Ft. Per Min.	Sample Drawn at Right Angles to Flow		Samples Drawn Parallel to Flow		Per Cent Right Angles to Flow Parallel to Flow
	Imp. No. 3	Imp. No. 5	Imp. No. 3	Imp. No. 5	
250		64.3	65.4		98.9
500	88.2			92.0	96.0
500		83.6	90.3		92.5
750		37.8	41.3		91.6
750		21.8	22.8		95.6
1000		28.4	46.6		61.0
1000		17.2	27.6		62.2
1000	43.6			56.8	76.8
1250		15.8	22.3		70.9
1250	36.7			51.1	72.0
1500	9.96			33.3	29.9
1500	17.1			74.8	22.9
1500		34.4	74.0		46.4
1500*	51.6			110.8	46.5
1500*		48.3	98.3		49.2

*8.5 mm circular orifices on impinger sampling tubes.

Calibration of Impinger Tubes

In the taking of a number of dust samples at one time with one instrument, it is necessary that a number of impinger tubes be used, and variations in the volumes of air sampled by different tubes under such otherwise identical conditions is a matter of some importance. Variations in sample volume may occur because of differences in size and shape of the tube, particularly the size of the orifice from which the air stream is impinged against the bottom of the flask.

For calibration of the tubes it is, however, necessary to take into account the suction pressure, or vacuum, induced by the pump since in the case of compressed air operated ejectors, it seems impossible to

obtain exact uniformity in the size of the ejector orifice and this will cause some variations in the induced vacuum.

In the case of the standard tubes not much variation is shown but in the case of midget impinger tubes, there are appreciable differences. A maximum variation of 23 per cent in the volume of air sampled may be noticed for tubes used in two different midget impingers and this is known to be mainly due to variations in the size of the orifice in the tubes supplied by the manufacturer. Midget impinger number one is equipped with a hand-operated, constant pressure pump and Midget impinger number two is equipped with a hand-operated pump delivering constant volume at constant speed.

Tabulation No. 3
Calibration Comparisons of Midget Impinger Tubes

No. 1 Midget Impinger						
Tube No.	Volume Thru Gas Meter Cu. Ft.	Manometer Reading	Vacuum Gauge H ₂ O	Time Minutes	Volume of Liquid CC	Flow thru Tube C.F.M.
1	1.0	12.1	12.5	9.48	10	0.1058
2	1.0	11.75	12.5	8.40	10	0.1191
3	1.0	11.75	12.5	8.44	10	0.1186
4	1.0	11.80	12.5	7.28	10	0.1374

No. 2 Midget Impinger						
Tube No.	Volume Thru Gas Meter Cu. Ft.	Manometer Reading H ₂ O	Time Minutes	Volume of Liquid CC	Flow thru Tube C.F.M.	
5	1.0	10.7	6.36	15	0.1573	
6	1.0	13.6	7.50	15	0.1344	
7	1.0	13.0	7.68	15	0.1300	
8	1.0	10.3	6.70	15	0.1492	

Tabulation No. 4
Calibration Comparisons of Standard Impinger Tubes

No. 3 Standard Impinger					
Tube No.	Volume Thru Gas Meter Cu. Ft.	Manometer H ₂ O	Time Minutes	Volume Collecting Medium C.C.	Flow thru Tube C.F.M.
1	5.0	37.2	4.74	75	1.055
2	5.0	45.5	4.74	75	1.055
3	5.0	32.5	4.75	75	1.053
4	5.0	38.4	4.745	75	1.054
5	5.0	35.1	4.77	75	1.048
6	5.0	32.6	4.775	75	1.047
7	5.0	38.4	4.74	75	1.055
8	5.0	36.1	4.76	75	1.050
9	5.0	36.0	4.765	75	1.049
10	5.0	39.6	4.72	75	1.058
D	5.0	42.3	4.75	75	1.053

No. 5 Standard Impinger					
Tube No.	Volume Thru Gas Meter Cu. Ft.	Manometer H ₂ O	Time Minutes	Volume Collecting Medium C.C.	Flow thru Tube C.F.M.
1	5.0	32.2	5.165	75	0.967
2	5.0	40.3	5.15	75	0.971
3	5.0	28.2	5.16	75	0.969
4	5.0	33.0	5.18	75	0.965
5	5.0	30.8	5.145	75	0.972
6	5.0	29.1	5.125	75	0.975
7	5.0	32.9	5.17	75	0.966
8	5.0	31.3	5.17	75	0.966
9	5.0	31.7	5.145	75	0.972
10	5.0	34.5	5.125	75	0.975
D	5.0	36.5	5.19	75	0.963

Effect of Dirty Glassware

While the effect of the presence of dirt on glassware used in dust determination work is so obvious that in most cases no illustration of its importance is needed, it is believed, that there are some fairly common practices in which lack of adequate cleanliness has an appreciable effect upon the results obtained. These are related mainly to the cleaning of the impinger tubes and counting cells.

In the flow of dusty air through an impinger tube, the increased velocity of air motion at the approach to the orifice causes a reduction of pressure which, with the accompanying cooling effect caused by evaporation of the collecting fluid in the flask, causes a lowering in the temperature of the

air stream and a consequent deposition of dust on the inside of the tube. Being difficult of access, this inside tube surface is often given only insufficient cleaning as by hand with the use of a pipe cleaner or tapered brush.

The following tabulation shows, for four different samples, the effect upon dust counts of placing a poorly cleaned impinger tube in a flask with the usual quantity of collecting fluid and then briefly shaking the flask by hand.

A method of cleaning the tubes, both standard and midget that has given satisfactory results includes a replaceable fibre brush held in a metal shaft that is rotated by the motor of an electric erasing machine, having a friction grip.

Tabulation No. 5
Data Dirty Impinger Tubes

Description	Midget No. A	Midget No. B	Standard No. A	Standard No. B
Dust count in 5 Fields before insertion of Impinger tube or Control Count.....	2	2	2	2
Dust count in 5 Fields after insertion of Impinger tube and shaking.....	38	95	32	56
Net increase in Count in 5 Fields.....	36	93	30	54

Depth of Counting Cells and Effect of Settling Time

At the present time a wide variety of cells of different design are used to contain the portion of sample collected for counting. A common defect in the Sedgewick-Rafter type is failure to closely seal the corners of vertical containing strips or walls, with the result that leakage or the evaporation of alcohol causes the formation of air bubbles that interfere with counting. Corners of the cell are also difficult to clean. These defects are well recognized but it is perhaps not so well recognized that appreciable variations in the depth of cells also occur. In the case

11 cells received from a supply house the variation in depth, as determined by microscope and micrometer was from 0.945 m.m. to 1.195 m.m.

A cell that has been found to give good results is made with the use of a brass ring placed, without any cement, upon a base of

non-corrosive glass and covered with a coverslip 1 m.m. thick. The brass ring is 38 m.m. outside diameter, 29 m.m. inside diameter and is machined to exactly 1 m.m. in thickness. The glass base is 75 m.m. long, 38 m.m. wide and 3 m.m. thick. The coverslip is 38 m.m. square and 1 m.m. thick. Since all component parts are separated for washing and cleaning, there are no surfaces that are not easily cleaned. An essential piece of equipment for brushing cell surfaces free of air-borne dust before filling with sample fluid is a good camel's hair brush.

An illustration of the effect upon dust counts of variations in the depth of cells is shown in Tabulation number five, which shows the counts obtained from two different portions of the same samples when counted in two different cells. Cell number five had an average depth of 0.87 m.m. and Cell number six had an average depth of 1.13 m.m.

Tabulation No. 6
Variable Cell Depth

Cell No. 5	0.0344" = 0.87 m.m.				Ratio No. 5 to No. 6 = 1 to 1.3					
Cell No. 6	0.0445" = 1.13 m.m.				Cell No. 6 = 30% deeper than Cell No. 5					
Sample Number	1		2		3		4		Total	
	1-4									
Cell Number	5	6	5	6	5	6	5	6	5	6
Field Concentration	354	472	308	366	352	401	262	360	1276	1599
Calculated Concentration at 1 m.m. depth	407	417	354	324	404	355	301	318	1467	1415
Ratio Concentration in Cell	1.0	1.33	1.0	1.19	1.0	1.14	1.0	1.37	1.0	1.26
Increase Cell No. 6 over Cell No. 5 in percentage	33		19		14		37		26	

Tabulation number seven, below, shows the counts obtained from different portions of the same sample when counted in five different circular cells of the type previously described.

Tabulation No. 7

Cell No.	1	2	3	4	5	Avg.
Count	376	405	370	386	390	385

When, as is required for accurate results, two counting cells are filled from each sample flask, it is necessary that an interval of time be allowed to elapse between the filling of the first and second cell so that the settling time before the start of the count be the same for both cells. In general, it is well recognized that increased settling time causes a larger count but it may not be so well understood how much the results are affected by this influence.

Tabulation number eight shows the effect upon dust count of allowing the settling time to increase from 25 to 35 minutes.

Tabulation No. 8

Effect of Increasing Settling Time from
25 minutes to 35 minutes

Count at 25 min. Settling	Count at 35 min. Settling	Increase in 10 min.	Increase in 5 min.	% increase in 5 min. from 25 min. settling
14	15	1	5	3.6
18	23	5	25	13.9
33	42	9	45	13.6
38	48	10	50	13.1
43	52	9	45	10.5
54	71	17	85	15.8
55	62	7	35	6.4
61	75	14	70	11.5

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Safety Exposition Exhibitors

EXHIBITION HALL—SHERMAN HOTEL

Alphabetical List of Exhibitors of Industrial Safety Equipment

Aetna Casualty & Surety Co., Hartford, Conn.
Insurance Underwriters.

American Abrasive Metals Co., Irvington, N. J.
Safety Treads, Abrasive Paints.

American Allsafe Co., Inc., Buffalo, N. Y.
Industrial Safety and Fire Protection Equipment.

American-LaFrance-Foamite Corp., Elmira, N. Y.
Fire Protection Equipment.

American Mat Corp., Toledo, O.
Safety Matting and Switchboard Matting.

American Optical Co., Southbridge, Mass.
Industrial Safety Goggles, Respiratory Devices, and Protective Clothing.

American Safety Tank Co., Kansas City, Mo.
Safety Fuel Tanks for Trucks.

Ampco Metal, Inc., Milwaukee, Wis.
Beryllium-Copper Non-Sparking Safety Tools.

Automatic Canteen Co. of America, Chicago, Ill.
Food Services.

Bausch & Lomb Optical Co., Rochester, N. Y.
Safety Lenses and Goggles.

Bear Manufacturing Co., Rock Island, Ill.
Motor Vehicle Inspection and Correction Equipment; Static and
Dy-Namic Balancing Machines.

Benjamin Electric Mfg. Co., Des Plaines, Ill.
Industrial Lighting Equipment; Call and Warning Devices;
Punch Press Safety Device Equipment.

Boyer-Campbell Co., Detroit, Mich.
Face Shields, Welding Helmets, Safety Tongs, Grinder Guards, Inspection Lights,
Protective Clothing.

John H. Breck, Inc., Springfield, Mass.
Protective Creams and Hand Cleaner.

Brown Shoe Co., Chicago, Ill.
Safety Shoes.

R. H. Bahrke Co., Chicago, Ill.
Safety Equipment and Allied Products for Construction and Maintenance Work.

E. D. Bullard Co., San Francisco, Cal.
Safety Equipment.

Burroughs, Wellcome & Co. (U.S.A.) New York, N. Y.
First Aid Equipment.

Carbisulphoil Co., Dallas, Tex.

Antiseptic Emulsion, Ointment, Liquid Soap.

Cardox Corp., Chicago, Ill.

Fire Extinguishing Systems, Fire Trucks, and Mobile Extinguishing Equipment.

Celanese Celluloid Corp., New York, N. Y.

Plastics for Safety Devices.

A. B. Chance Co., Centralia, Mo.

Live Line Maintenance Tools and Equipment.

Chicago Eye Shield Co., Chicago, Ill.

Head and Eye Protective Equipment.

Columbus McKinnon Chain Corp., Tonawanda, N. Y.

Chain and Chain Hoists.

C-O-Two Fire Equip. Co., Newark, N. J.

Carbon Dioxide Fire Extinguishers, Hose Units, Manual Automatic Systems,

Smoke Detecting Systems.

Davis Emergency Equip. Co., Inc., Newark, N. J.

Respiratory Protection, Combustible Gas Indicators, General Safety and First Aid Equipment.

Dickson Safety Products Co., Los Angeles, Cal.

Personal Protective Equipment.

Dionol Co., Kalamazoo, Mich.

Ointment, Protective Creams, Salt Tablets.

Dickson Corp., Detroit, Mich.

Industrial Head and Eye Protection.

C. B. Dolge Co., Westport, Conn.

Fungicides, Protective Creams, Skin Cleaner, Cutting Oil Germicides.

Dugas Engineering Co., Marinette, Wis.

Fire Protection Equipment.

Dunn Products, Chicago, Ill.

Industrial Protective Clothing Made from Rubber, Asbestos Cloth and Leather.

Duo-Safety Ladder Corp., Oshkosh, Wis.

Safety and Fire Ladders, Ladder Shoes.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Hand Protective Creams, Industrial Hand Creams, Neoprene Products, Rayon Yarn.

E. & J. Manufacturing Co., Philadelphia, Pa.

Resuscitator Inhalator and Aspirator.

Elliott Service Co., New York, N. Y.

Foremanship Training Material, Bulletin Board Displays on Safety, Quality and Waste; Suggestion Systems.

J. H. Emerson Co., Cambridge, Mass.

Automatic Resuscitation and Respiration Equipment.

Finnell System, Inc., Elkhart, Ind.

Floor-Care Machines and Floor Treatments.

Franklin Research Co., Philadelphia, Pa.

Anti-Skid Floor Maintenance Materials.

General-Detroit Corp., Detroit, Mich.

Fire Protection Equipment.

Goodyear Tire & Rubber Co., Akron, O.
Non-Slip Surfacing Materials.

Holcomb Safety Garment Co., Chicago, Ill.
Protective Clothing Made of Asbestos, Leather and Fire-Proofed Duck.

Hollywood Turban Products Co., Chicago, Ill.
Protective Headwear for Women Industrial Workers.

Hynson, Westcott & Dunning, Inc., Baltimore, Md.
Mercurochrome and Thantis Lozenges.

Industrial Gloves Co., Danville, Ill.
Protective Clothing, Gloves, Mittens, Headguards, Leggings, Flame-Proof Suits.

International Cellucotton Products Co., Chicago, Ill.
Menstruation Materials for Women in Industry.

International Shoe Co., St. Louis, Mo.
Safety Shoes.

Iron Age Div., H. Childs & Co., Inc., Pittsburgh, Pa.
Safety Shoes.

C. Walker Jones Co., Philadelphia, Pa.
Industrial Knitted Specialties, Protective Clothing.

Junkin Safety Appliance Co., Louisville, Ky.
Safety Guards for Punch Presses, Splint Type Stretchers.

Kestrite Manufacturing Co., Chicago, Ill.
Safety Cans, Safety Flashlights, Electric Lanterns.

Karel First Aid Supply Co., Chicago, Ill.
Industrial Hospital Supplies, First Aid Supplies.

Keystone View Co., Meadville, Pa.
Industrial Vision Tests.

Walter Kidde & Co., New York, N. Y.
Fire Prevention and Extinguishing Equipment and Systems.

Kimball Safety Products Co., Cleveland, O.
Protective Clothing, Gloves and Goggles.

Klear-Vu Products Co., Newark, N. J.
Safety Caps, Hair Guards, Arm Guards, Aprons.

Walter G. Legge Co., Inc., New York, N. Y.
Non-Slip Floor Polishes and Treatment, Non-Sparking Floor Treatment.

Lehigh Safety Shoe Co., Inc., Allentown, Pa.
Safety Shoes and Rubber Boots.

Lien Chemical Corp., Chicago, Ill.
Soaps, Cleaning Compounds, Disinfectants, Insecticides Deodorants,
Maintenance Supplies.

Lightfoot Schulz Co., New York, N. Y.
Powdered Hand Soap for Industrial Use.

Loom Mfg. Co., Inc., Indianapolis, Ind.
Blow Guns, Spraying and Cleaning Guns, Water Savers.

MacWhyte Co., Kenosha, Wis.
Wire Rope and Wire Rope Slings.

Thom McAn Safety Shoe Co., New York, N. Y.
Safety Shoes.

B. F. McDonald Co., Los Angeles, Cal.

Industrial Safety Equipment.

Medical Supply Co., Chicago, Ill.

First Aid Kits and Supplies.

Meili-Blumberg Corp., New Holstein, Wis.

Safety Line Markers for Roads, Streets, Airports, and Industrial Plants.

Metropolitan Life Insurance Co., New York, N. Y.

Life, Health, Accident, Annuities and Group Insurance.

Melflex Products, Akron, O.

Flooring Materials, Treads and Standing Mats.

Milburn Co., Detroit, Mich.

Protective Creams and Plastic Safety Clothing.

Mine Safety Appliances Co., Pittsburgh, Pa.

Safety Equipment for Personal and Plant Protection.

E. R. Moore Co., Chicago, Ill.

Work Clothes for Women.

National Safety Council, Inc., Chicago, Ill.

Services and Material for Safety Education.

National Society for the Prevention of Blindness, New York, N. Y.

Conservation and Utilization of Eyesight in Industry.

Oil-Dri Co. of America, Chicago, Ill.

Oil and Grease Absorbent.

Onox, Inc., San Francisco, Cal.

Athlete's Foot Preventive.

G. H. Packwood Mfg. Co., St. Louis, Mo.

Skin Cleansers, Soap Dispensers, Cleansing Cream.

Patent Scaffolding Co., Chicago, Ill.

Safety Ladders, Scaffolding and Work Stands.

Phister Mfg. Co., Newark, N. J.

Maintained Air Pressure Liquid Fire Extinguishers.

Protectoseal Co., Chicago, Ill.

Safety Devices for Hazardous Liquids.

Pyrene Mfg. Co., Newark, N. J.

Fire Extinguishers, Compounds and Systems.

Rose Mfg. Co., Denver, Colo.

Industrial Safety Equipment.

Safety Clothing & Equipment Co., Cleveland, O.

Industrial Safety Equipment.

Safety Engineering, New York, N. Y.

Publishers, Safety Engineering Magazine.

Safety First Shoe Co., Holliston, Mass.

Safety Shoes.

W. H. Salisbury & Co., Chicago, Ill.

Linemen's Rubber Protective Equipment.

A. Schrader's Son, Brooklyn, N. Y.

Pneumatic Safety Control Devices.

- Sellstrom Mfg. Co., Chicago, Ill.**
Face and Eye Protective Equipment.
- Wenger Turbine Co., Hartford, Conn.**
Industrial Vacuum Cleaners and Dust Collecting Equipment.
- Standard Safety Equipment Co., Chicago, Ill.**
Personal Safety Protective Equipment.
- Stepan Chemical Co., Chicago, Ill.**
Skin Cleanser.
- Stonehouse Signs, Inc., Denver, Colo.**
Accident Prevention Signs.
- The Strauss Co., Pittsburgh, Pa.**
Personal Protective Equipment.
- Sugar Beets Products Co., Saginaw, Mich.**
Skin Cleanser and Cleaner; Non-Slip Floor Treatment.
- Surty Mfg. Co., Inc., Chicago, Ill.**
Safety Appliances for Machines and Underfoot Hazards.
- G. H. Tennant Co., Minneapolis, Minn.**
Floor Cleaning Machines, Floor Seal and Floor Wax.
- Trimont Mfg. Co., Roxbury (Boston), Mass.**
Forged Steel Safety Tools.
- United States Army, Washington, D. C.**
- U. S. Safety Service Co., Kansas City, Mo.**
Industrial Safety Equipment.
- Wagner Electric Corp., Brooklyn, N. Y.**
Industrial Hydraulic Brakes.
- Wahlert Products Corp., Brooklyn, N. Y.**
Industrial Safety and Fire Equipment.
- Watchemoket Optical Co., Inc., Providence, R. I.**
Industrial Safety Goggles.
- Waverly Petroleum Products Co., Philadelphia, Pa.**
Oil Absorption Material.
- Weaver Mfg. Co., Chicago, Ill.**
Automatic Brake Testers "Safety Lanes."
- West Disinfecting Co., Long Island City, N. Y.**
Personal Protection Safeguards and Plant Sanitation Products.
- F. H. Wheeler Mfg. Co., Chicago, Ill.**
Protective Apparel.
- Willson Products, Inc., Reading, Pa.**
Personal Protective Equipment, Instruments.